Research on Conditions and Design Parameters for Strengthening Offshore Safety Expertise in EU Member States: Stage 1

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List of acronyms

Aoc:	Acknowledgment of Compliance
CA:	Competent Authority
CAPEX:	Capital expenditures
EDTC:	European Diving Technology Committee
EEA:	European Economic Area
EMSA:	European Maritime Safety Authority
EU:	European Union
EUOAG:	European Union Offshore Oil and Gas Authorities Group
FPSO:	Floating production storage and offloading
FTE:	Full Time Equivalent
HPHT:	High Pressure, High Temperature
HSE:	Health, Safety and Environment
HSL:	(UK) Health and Safety Laboratory
ICRARD:	International Committee on Regulatory Research and Development
IRF:	International Regulators' Forum
JRC:	Joint Research Center
kbbl:	Thousands of barrels (1 kbbl = 158,987.3 litres)
MAH:	Major Accident Hazard
MS:	Member State
NCA:	Norwegian Coastal Administration
NDA:	Non-Disclosure Agreement
NEA:	Norwegian Environmental Agency
NSOAF:	North Sea Offshore Authorities Forum
NUI:	Normally Unattended Installation
OMHEC:	Offshore Mechanical Handling Equipment Committee
OPEX:	Operational expenditures
OSD:	Offshore Safety Directive (Directive 30/2013/EU)
PSA:	(Norwegian) Petroleum Safety Authority
R&D:	Research and Development
RoMH:	Report on Major Hazards
RSO:	Recognised Safety Organisation
UK:	United Kingdom

1. Purpose of this document

The present document contains the detailed results of Stage 1 of the study carried out under the framework contract ENER A2 360-2010, entitled 'Research on Conditions and Design Parameters for Strengthening Offshore Safety Expertise in EU Member States'. This study is realised by BIO by Deloitte with the support of Deloitte Norway.

The initial version of this report was sent on 22nd October 2014 and some of its findings were presented to Member States' representatives during the 8th meeting of the EUOAG on the 12th November 2014, in Brussels. The initial version of the report was updated based on discussions that took place during this meeting and on additional feedback from DG ENER.

Section 2 presents briefly the general context, the previous works realised on this topic (most specifically those realised by the JRC), the objectives of this study and the progress to date.

Sections 3 to 4 present the results of Stage 1. Section 3 presents the updated gap analysis between the resources required to perform the requested tasks from national Competent Authorities in the Directive on safety of offshore oil and gas operations (Offshore Safety Directive)[1] and the resources available and planned in the different Member States. Section 4 proposes and describes a few options to address the gaps described in Section 3. In section 5, we analyse the costs and benefits of the options presented in Section 4.

[1] Directive 2013/30/EU of the European Parliament and of the Council of 12 June 2013 on safety of offshore oil and gas operations.

2. Context of the study, objectives and approach

2.1 General context of the study

Offshore activities in Europe

In the beginning of the 2010s, over 90% of oil and over 60% of gas produced in Europe (EU and Norway) came from offshore operations. Offshore operations (exploration and exploitation) were ongoing in the territorial waters of 11 Member States. Furthermore, some other Member States plan to commence drilling activities in the near future. In total, over 1,000 offshore installations are operating in European waters (including Norway), with more than 6,000 wells, of which 400 are located in Italian and Spanish waters. These numbers are growing despite an overall decline in hydrocarbon production[2].

The Deepwater Horizon disaster and its consequences

The explosion and sinking of the Deepwater Horizon offshore drilling rig in April 2010 generated the largest marine oil spill in history, causing life losses, extensive environmental damage in the region, health issues[3] and significantly impacting the global oil industry.

The accident resulted from a series of human errors and equipment failure of the drilling unit, calling for more preparedness and oversight on offshore operations in the future, with a focus on the reliability of devices used and a balanced consideration of environmental safety issues and economic benefits.

The explosion has deeply impacted the regulatory process that governs offshore development. It is considered a game changer and a wakeup call for the industry to develop tougher regulations. This represents a positive development for the whole industry as oil exploration moves into increasingly inaccessible areas and deeper waters, which present higher levels of risk. It is now widely considered that a move towards risk-based regulation will prove to be a more effective way to avoid future accidents.

The Offshore Safety Directive and the relevant provisions

The Offshore Safety Directive[4] is considered one of the outcomes of the Deepwater Horizon disaster, and sets out minimum requirements with the aim of preventing major accidents in offshore oil and gas operations and for limiting the consequences of such accidents. The Directive applies to future offshore oil and gas installations and operations and to existing installations (under transitional arrangements). Member States (MS) with offshore waters that have no offshore oil and gas operations under their jurisdiction, and landlocked countries with companies registered in their territories would need to apply only a limited number of this Directive's provisions.

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[2] EC (2011) Impact Assessment accompanying the document 'Proposal for a Regulation on safety of offshore oil and gas prospection, exploration and production activities' (SEC(2011) 1293 final).

[3] Clean-up workers were mainly concerned.

[4] Directive 2013/30/EU of the European Parliament and of the Council of 12 June 2013 on safety of offshore oil and gas operations and amending Directive 2004/35/EC.

An open reporting culture of incidents is guaranteed by the fact that MS require operators to prepare a document setting out their "corporate major accident prevention policy".

In order to achieve its goals, one of the major changes implemented by the Directive is the creation of an independent and objective offshore **competent authority** (CA) (Article 8), handling safety and environmental regulatory functions, independent from other entities that may have an interest in the economic development of offshore resources. Each active Member State should appoint a CA and ensure its resource availabilities, take measures to improve its effectiveness and communicate its composition and regulatory functions to the public.

The CA has to ensure the correct application of the Directive by operators and owners, assess reports on major hazards, facilitate communication with the public and advise other authorities, including the licensing authority.

The table below describes the main functional tasks that the Competent Authorities has to perform according to the Offshore Directive.

Table 1: Functional tasks in offshore safety

#	Article in the Directive	Functional Tasks	Description
1	Article 8 (a)	Assessment of operators and owners formal risk assessments (Reports on Major Hazards (RoMH)	RoMHs are prepared by operators of production and non-production installations and include information on major hazards, their likelihood and consequences as well as on the prevention and emergency measures established by the operators. CA's must ensure that operators have identified and clearly described all potential major accident hazards. This task will ensure that operators have identified key risks associated with their installations and have identified suitable measures to control those risks.
2	Article 8 (b) 21 (1).	Inspections of Major Accident Hazard (MAH) controls; detailed verification of compliance; systems audits	The purpose of an inspection for offshore oil and gas installations is to oversee compliance with the requirement of the Directive. CA's target their inspection of installations and duty holders on the basis of verifying their report on major hazards, the inherent hazard of the installation, the operator's ability to manage risks and the impact of any combined operations. In addition the authorities must verify that the operators have established a sufficient verification and audit scheme.
3	Article 8b and 26	Investigations of major accidents; issuing reports into major accidents; enforcement activity and reporting	CA's of the Member States are required to thoroughly investigate all major accidents produce an investigation report and send a summary to the Commission and make available summary information to the public.
4	Article 8 (d and e), 9 (c and e) and 21 (3)	Development of regulatory policies, processes and procedures	Member States are required to ensure the CA established policies, processes and procedures for the thorough assessment of reports on major hazards and notifications and furthermore for inspection, investigation and enforcement.. Other elements of this functional task include the development of systems of technical and regulatory internal guidance, the establishment of training and competence assurance of personnel and the development of data storage, handling, reporting and archiving systems.

#	Article in the Directive	Functional Tasks	Description
5	Article 8 (f) and 27 (3)	Continuous updating of offshore knowledge and guidance; continuous improvement in standards.	Competent Authorities are required to participate in the establishment of common priorities for the preparation and updating of standards and guidance.

Expertise needs

The Directive is based on a goal-setting approach. Such a regime requires a transparent relationship and a constructive and continuous dialogue between the regulated and the regulated, represented by the competent authority, the owners and operators. This dialogue concerns the oil and gas offshore activities and, more specifically the characterisation of major hazard risks and the suitability of control measures.

Such a dialogue is possible only if the competent authority and the duty holder share, to a certain extent, a common way of thinking regarding offshore activities, the risks associated with these activities and the range of potential control measures. To this end, it is necessary that the competent authority should have the required expertise to understand the technical, financial and organisational specificities of the offshore industry.

The strengthening of offshore safety expertise in EU Member States is therefore a necessary condition for the achievement of the targets of the Offshore Safety Directive.

2.2 Previous works

On behalf of the Commission services (JRC and DG ENER), several studies have already been realised on this topic:

- HSL (UK Health and Safety Laboratory) performed a study on behalf of Commission services (JRC and DG ENER)[5]. This study consisted in an analysis of the current structure of the UK offshore regulatory authorities (HSE and DECC) and provided unit effort data by competence for different types of regulatory functions and different types of installations.
- JRC, with the collaboration of the offshore regulatory authorities of the Member States (a questionnaire was sent to these authorities), collected information on the size and composition of offshore oil and gas activity in the Member States, their plans for the coming years, and their access to competent expert resources. Then, using as a basis the resources used in one Member State - namely the United Kingdom - to oversee offshore safety, an estimation of the necessary expert resources for each Member State was performed[6].
- JRC estimated in particular the adequacy of national expert resources, i.e. the gaps between the resources required to perform what is requested from national Competent Authorities in the

[5] HSL (2014) Research study on best technologies for safety of offshore oil and gas installations and expert services for the development of guidance on safety-related terms and for the definition of competencies necessary for the authorities supervising the offshore oil and gas operations

[6] S. Contini, A. Kokonozi and M. Christou (JRC) "National expert resources for overseeing offshore safety in the EU - Stocktaking on offshore activities and expert resources available in the Member States and estimation of necessary resources -Support to a Report on the adequacy of national expert resources, as required by Art.27(4) of Directive 2013/30/EU" (draft report, August 2014).

Offshore Safety Directive and the resources available and planned in the different Member States.[7]

The results of these studies were presented to representatives of the Member States during the 7th meeting of the EUOAG on July 4, 2014, in Brussels.

In the figure below, JRC's overall approach is presented:

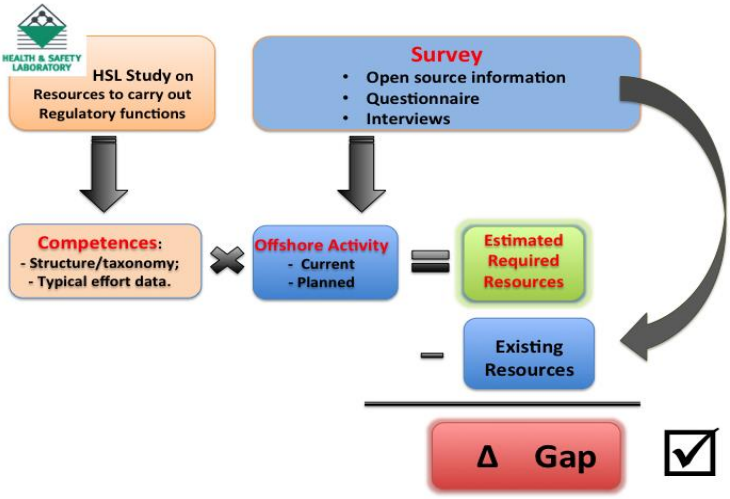

Figure 1: Overview of the methodology used by JRC (source: JRC)

2.3 Objectives

The current study aims to build knowledge and understanding on the current and future organisational needs of the Competent Authorities of Member States in order to meet the requirements of the Offshore Safety Directive.

It will provide solutions for addressing identified gaps and will also suggest different options in close cooperation with the European Commission.

The geographical scope of the study covers potentially 16 EU Member States, as well as Norway and Iceland[8] which are all conducting or intending to carry out offshore operations as detailed below.

- Countries covered by this study which are currently conducting offshore activities: Italy, Spain, Norway, United Kingdom, Netherlands, Croatia, Greece, Bulgaria, Denmark, Germany, Poland, Romania, France, Ireland;
- Countries covered by this study which are intending to conduct offshore activities: Iceland, Cyprus, Malta, Portugal[9].

It was possible to collect the relevant data from Bulgaria during the course of the project.

[7] M.Christou, S.Contini, A.Kokonozi, L.Debarberis (JRC) "Estimation of the adequacy of national expert resources (As required by Art.27(4) of Directive 2013/30/EU)", presentation for the 7th EUOAG Group, 4 July 2014.

[8] Members of the European Economic Area (EEA).

[9] Source: RystadEnergy, Ucube, 2014

2.4 Approach and progress of the study

The methodological approach for this study was divided into two main stages:

- Stage 1 – Identification of resources needed, gap analysis and development of potential options;
- Stage 2 – Design of Support Organisation.

This Report presents the outcomes of Stage 1.

The figure below presents the methodological approach adopted for this Stage 1. The green boxes represent the actions realised by BIO by Deloitte to complement the previous studies, realised by HSL and JRC, a.o., and to reach the objectives of this Stage 1.

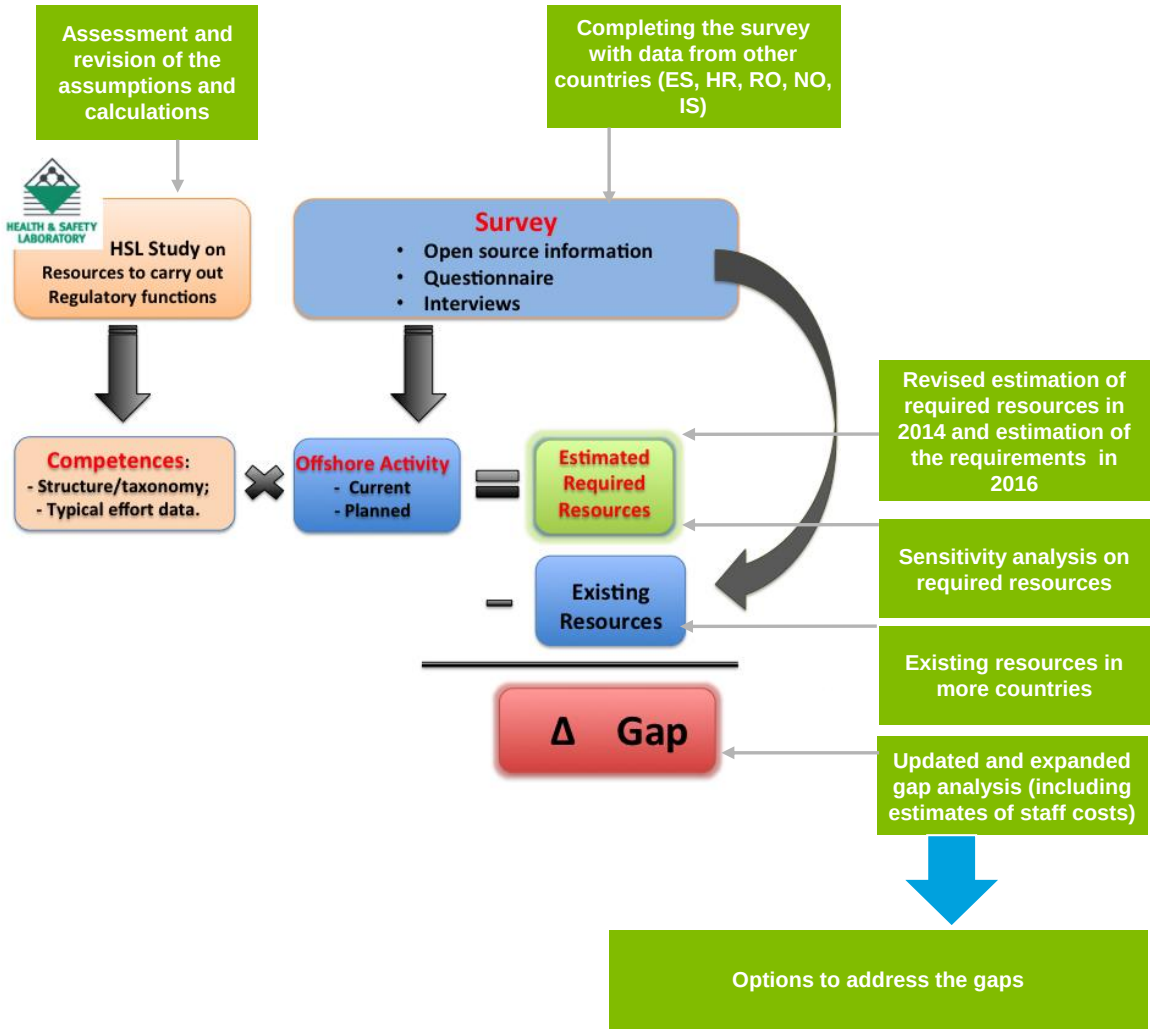

Figure 2: Overview of the methodology used by BIO by Deloitte for this study

Based on the results of Stage 1, preferred option(s) will be selected. This selection will be validated by the European Commission. This (these) selected option(s) will be studied in greater detail in Stage 2.

The results of Stage 2 are presented in a separate report.

3. Gap analysis

3.1 Assumptions and sensitivity analysis

3.1.1 Assumptions

The present study assessed the assumptions of previous studies, primarily against the current situation in Norway. However, the collected evidence and information did not suggest that the current regulatory arrangements in Norway are more or less comprehensive than UK's regime. In addition, difficulties in providing data under the same classification and definition used in the JRC study did not allow the use of Norwegian data without reclassifying the information collected through the JRC survey. A description of the challenges and uncertainties in relation to the collected information from the Norwegian authorities is provided in Annex II.

For these reasons, the assumptions were developed based on UK's regulatory arrangements and a consultation with the European Commission (DG ENER and JRC).

The assumptions developed in the present study are categorised in the following three categories:

- Typical effort days to perform specific regulatory functions;
- Additional effort required to fulfil the requirements of the Directive;
- Required staff mix in the UK.

The paragraphs below describe the modifications made on each of these aspects.

Grouping of Member States according to the level of maturity of their offshore activities

Following the JRC, we consider, throughout the whole study, three groups of countries depending on the level of maturity of their offshore activities.

The mature jurisdictions correspond to Group 1 countries (United Kingdom, The Netherlands, Italy, Denmark, Croatia and Norway) and the new jurisdictions include Group 2 and 3 countries (Germany, Greece, Ireland, Poland, Romania, Bulgaria, Spain, Cyprus, France, Malta, Portugal, and Iceland).

Table 2: Grouping of EU Member States by the level of their offshore activities (adapted from the JRC method)

Regional groups	Countries
Group 1: mature offshore development (with installations > 10, by 2014)	Croatia, Denmark, Italy, Netherlands, Norway, United Kingdom
Group 2: limited offshore activities (with 10 ≥ installation ≥ 0, by 2014)	Bulgaria, Germany, Greece, Ireland, Poland, Romania, Spain
Group 3: zero offshore activities (with 0 installations by 2014, but with installation planned from a future prospective)	Cyprus, France, Iceland, Malta, Portugal

Typical effort days to perform specific regulatory functions

Table 3 shows the typical efforts required per type of installation to perform various regulatory requirements. These values are multiplied by the respective number of installations or exploration and drilling activities to estimate the frontline effort. The definition of the values is based on a review of the HSL report and a consultation with the European Commission.

These typical efforts are applied both in the 2014 and 2016 baseline and high production scenarios (a description of the scenarios is provided in section 3.2). Nevertheless, Competent authorities in Member States with safety cases that are accepted under the current regulatory regime and which substantially meet the requirements of the Safety Directive, may assess the additional information required as of July 2015 (transposition of the Directive). This might be carried out at the same time they carry out their 5-year thorough reviews of the safety cases or in addition to this. The additional effort to assess the compliance of the safety cases with the Safety Directive is considered only in the 2016 scenarios by taking into account that it will occur once per installation within a 3-year period. A distinction is made between mature and new jurisdictions. Specifically, the efforts required in mature jurisdictions which have already Major Hazards (MH) documents include most of the requirements of the Directive and therefore only the addition information satisfying the additional requirements of the Directive need to be assessed. In new jurisdictions, it is assumed that the required efforts for a completely or substantially new document are equal to a full assessment of a UK safety case. This is based on the assumption that the MH documents currently in place in new jurisdictions have significantly less information than the Directive's requirements.

Table 3: Typical effort days per regulatory requirements per type of installation used in the present study (Mandays)

Regulatory requirements	Large	Small	NUI[10]	Non-Production	Well	FPSO	MODU
Assessment of RoMH	60	50	50	35	-	**60**	**60**
Assessment of Design Notification	60	50	50	50	-	**60**	**60**
Assessment of Material Change Information	25	25	25	-	-	**25**	**25**
Assessment of Well Notification					3	-	-
Assessment of 5-year Thorough Review	15 **15**						**15**
Inspection (yearly)	60	30	10	30	-	60	**60**
Investigation	10	10	10	10	-	10	**10**
Enforcement	2	2	1	2	**-**	2	**2**
Reassessment of safety cases (new countries)*	60	50	50	35	-	**60**	**60**
Reassessment of safety cases (mature countries)*	25	25	25	25	**-**	**25**	**25**

*Considered only in the 2016 gap analysis

Additional effort required to fulfil the requirements of the Directive

The assumptions on the additional efforts required to fulfil the requirements of the Directive are shown in Table 4. The figures correspond to percentages, applied on the overall frontline effort to perform various support functions.

[10] NUI stands for Normally Unattended Installation.

Table 4: Assumptions on additional efforts required for the implementation of the Directive

Task	Currently used parameters
Development of policy/systems/procedures in mature jurisdictions (%)	20
Development of policy/systems/procedures in new jurisdictions (%)	80
Interaction with Stakeholders (Common good) (%)	20
Training in mature jurisdictions (%)	20
Training new jurisdictions (%)	50
Business Critical, corporate, other (%)	10
Legal (%)	5
Administration (%)	12
Staff wells (Full time Equivalent - FTE)	10

* This category includes activities such as managing science and research and analysing evidence from the industry.

The required effort often depends on the maturity of the Competent Authorities. The competent authorities in mature jurisdictions will be required to devote relatively small additional effort for requirements related to the development of policy, systems and procedures, or training (20% in both categories). Nevertheless, it must be noted that even in mature jurisdictions the needs for recruitment and skill development vary significantly. For example it is expected that Italy and Croatia will have further to develop compared to other mature jurisdictions.

On top of the daily regulatory work, the authorities in new jurisdictions will be required to develop policies, systems and procedures from the beginning. This will require additional efforts, equivalent to 80% of their frontline effort. The same applies for their needs for training which correspond to 50% of additional efforts. Based on this approach, it is estimated that while UK needs 15 FTEs (Full time Equivalent) for the development of policy, systems and procedures, Cyprus is assumed to require only 1 FTE. Therefore this approach can be considered as conservative as the actual requirements can be expected to be higher.

The other required efforts that relate to interaction with stakeholders, admiration, legal tasks, business critical[11], corporate[12] and other, do not depend on the maturity of the competent authorities. As regards the staff requirement of well experts, these are based on the required staff of the competent authority in the UK (10 FTEs). Specifically the requirements in each country are based on the size of their industry, on planned exploration and drilling activities and on a comparison with that in UK.

As in the case of the typical efforts, the mature jurisdictions correspond to Group 1 countries and new jurisdictions to Group 2 and Group 3 countries.

Required staff in the UK

As mentioned above, HSE performed an assessment on the required resources in UK which differ from the resources actually used in the country. These differences are summarised in the table below. The required resources as estimated by HSE are used on the following two aspects of the calculations:

[11] According to HSL's categorisation, business critical includes tasks such as managing research, analysis of evidence, development and implementation and campaigns, etc.

[12] Corporate includes internal provision of advice, management of the performance.

- Required resources of UK's competent authorities: In all other countries the required resources are estimated according to the number of their installations and the exploration and drilling activities. In UK only, HSE's estimations are considered, except for the required legal and administrative staff which is estimated as in other countries.
- Definition of the mix of staff categories: the performed calculations estimate the total required resources for each country (frontline staff) except for well experts, administration and legal which are estimated separately. The frontline staff is then split according to UK's staff mix.

Nevertheless, it must be noted that **the mix of disciplines might vary significantly between different countries.** For example, if a country uses predominantly FPSOs in their production activities, the requirement of divers would be lower.

Table 5: Required resources in the UK (FTEs, %)

Staff categories	Required resources (FTEs)	Share of required resources per discipline (%)
Regulatory Specialists & Safety Management Systems	35.0	23%
Process Engineering incl. Fire, Explosion & Risk Assessment	13.0	9%
Mechanical Engineering, Materials & Corrosion	10.0	7%
Diving	8.0	5%
Environmental Protection & Oil Spill Response	12.0	8%
Electrical & Control Systems	6.0	4%
Wells	10.0	7%
Structural Integrity & Verification	9.0	6%
Pipelines	6.0	4%
Evacuation and Emergency Response, Marine & Aviation Operations	6.5	4%
Occupational Health	4.0	3%
Naval Architecture & Marine Engineering	5.0	3%
Organisational & Human Factors	5.0	3%
Admin*	5.1	3%
Legal *	14.7	10%
Total	149.3	100%

* Estimated

It must be noted that this categorisation is applied to all countries for the estimation of their organisational requirements. Indeed, the different technical disciplines applied in the UK cover all the competences required for a comprehensive and consistent implementation of the Directive. Nevertheless, the definition of the disciplines and the overall organisational arrangements might differ significantly between countries, depending on the structure of their offshore industry and the general culture of the administration. A discussion on the organisational arrangements is provided in a later section.

3.1.2 Sensitivity analysis

A sensitivity analysis was performed to assess the effects of setting different parameters to the overall calculation of the gaps. The analysis is carried out on the following aspects:

- Different typical effort days to perform specific regulatory functions (+/- 10% of mandays in each regulatory requirement);
- Different values on the additional effort required to fulfil the requirements of the Directive (+/- 10% in each type of effort);
- Calculation of the required staff in the UK instead of using HSE's estimates.

The effects for each of the changes above are summarised in the two following tables. The sensitivity analysis was carried out for the baseline scenario in 2014.

Table 6: Sensitivity analysis per parameter (FTEs)

Parameter	Overall gap		
	Gap with current parameters	Gap with min. values	Gap with max. values
Typical effort days to perform specific regulatory functions	-7.6	11.0	-26.2
Additional effort required to fulfil the requirements of the Directive		57.1	-85.9

Table 7: Sensitivity analysis per different required resources in the UK

Parameter	Overall gap	
	Gap with current parameters	Gap with calculated requirements in the UK
Required staff in the UK	-7.6	-5.6

The modifications of the typical effort days to perform specific regulatory functions had the most significant effect. An increase by 10% increases the total requirements by approximately 93.5 FTEs resulting to an overall gap of 85.8 FTEs. Similarly, an increase by 10% results to decrease of the requirements by approximately 65 FTEs resulting to a surplus of 57.2 FTEs. The modification of the typical effort days (increase and decrease of mandays by 10%) has a significantly lower effect. Finally, the calculation of the required resources in the UK instead of applying UK's estimates decreases UK's and the overall gaps by approximately 14 FTEs.

3.2 Gap analysis

3.2.1 Introduction

The gap analysis was carried out for 2014 to assess the current situation and for 2016 to provide an estimate of the resource needs, one year after the transposition of the Directive.

The categorisation of countries is based on the number of installations which indicates the level of maturity:

- Group 1: Mature (with more than 10 installations by 2014): United Kingdom, The Netherlands, Italy, Denmark, Croatia and Norway;
- Group 2: Limited (with 0 < installations ≤ 10 by 2014): Germany, Greece, Ireland, Poland, Romania, Bulgaria and Spain;
- Group 3: New (with 0 installations by 2014): Cyprus, France, Malta, Portugal, and Iceland.

It can be assumed that the size of the industry also indicates the required regulatory arrangements of each group for the implementation of the Directive's requirements:

- Group 1: Due to the size and complexity of the industry in these countries it is expected that all functional tasks as stipulated by the Directive will be required and these will need to be performed on a relatively frequent basis.
- Group 2: The competent authorities in countries of this group will most likely require most regulatory functions. However due the smaller size and complexity of the industry the required regulatory functions are expected to be in low numbers. Consequently, functions such as

licensing of exploration and production, assessment of design notifications and RoMHs will be performed infrequently.

- Group 3: As currently the countries of this group do not perform any production activities, the regulatory requirements will be limited on exploration licensing, well notifications and assessment of individual drilling installations for well campaigns. In some cases, the exploration activities and the respective regulatory requirements may be very infrequent. In this context, the recruitment of permanent professionals might not be required.

The calculations at the country level are made by subtracting the required resources from the current resources available in the Member States.

The following types of information are presented in this section:

- An estimation of the share of the required resources per different functional tasks;
- The gap analysis at an aggregated level for all Member States in EU;
- The gap analysis by Group of countries;
- The three analyses from above adapted to the "high-production scenario" or Scenario 2.

As explained above, this 'high-production scenario' (described in the JRC report) is based on the following hypotheses of increased production between 2014 and 2016:

- 50% increase in exploration and production for New Jurisdictions;
- 20% increase in exploration in Mature Jurisdiction.

3.2.2 Interpretation of the estimates

The estimates take into account the vast majority of the regulatory requirements of the Directive. Nevertheless, as highlighted in section 3.1 certain requirements (e.g. in relation to MODUs that enter Member State waters for exploration activities) have not been considered in the calculation of the gaps due to lack of data. In addition, the estimates are largely based on the organisational arrangement and typical efforts in the UK which acts as a reference country in the calculations. As far as data allowed, MS specific data (e.g. type and number of installations, planned production activities and exploration campaigns) has been considered in the calculations. Nevertheless due to the complexity of the gas and oil offshore industry, the exact MS activities cannot be captured fully in the calculations. For this reason, the gap estimates shall be considered as rough and indicative. Member States will have to plan their own organisational arrangements according to the actual offshore activities of their own offshore industry. The balance sheets provide estimates that will act as an indication of the deficits at a European as well as regional levels which will allow the consideration of the most appropriate and effective arrangements to meet any shortfall in resources to be conducted in the following steps of the present study.

Another challenge of JRC's and the present study was to define the categorisation of the different technical disciplines that are required for a comprehensive and consistent application of the Directive. The data collection process and the calculations follow the categorisation of 15 disciplines followed in the UK, for the following three reasons:

- UK's organisational and regulatory arrangements are considered as one of the most advanced in ensuring the safety and environmental performance of its offshore industry.
- The competent authorities in the country have carried out formal studies to estimate their own resources that are required to fulfil the requirements of the Offshore Safety Directive. Studies with essential information for a comprehensive and comparable benchmarking have not been carried out in other countries.
- The Directive is written broadly in line with UK offshore regulatory regime, even though it stipulates several additional requirements (e.g. on environmental protection).

Nevertheless, it must be noted that this categorisation shall not be considered as strict but it may be adapted according to the needs and characteristics of the authorities in each country. For example, the Norwegian authorities have established different organisational arrangements for offshore expertise. Their professional competence is divided into six wide professional categories (working environment, drilling and well technology, HSE management, structural integrity, logistics and emergency preparedness, process integrity), to where all professional staff is tagged (a detailed description of the Norwegian organization arrangements is provided in Annex II). Additionally, there are six supervision groups, with responsibility for supervision of different companies involved on the Norwegian continental shelf. Professionals are staffed to upcoming task based on the competence and experience required for that specific task.

There is no evidence to suggest that the arrangements of one country are better that the other. Nevertheless it is likely these two regimes cover the required disciplines for the fulfillment of the Directive and thus both can act as model for establishing the arrangements in other countries according to the size and characteristics of their industry. For example the Norwegian classification might be considered as more simplified due to the smaller number staff categories and thus more appropriate for smaller competent authorities.

The following sections present the results of the gap analysis.

3.2.3 Split of resources

The following tables show the overall results of the gap analysis for each of the following functional tasks which derive from the Offshore Safety Directive:

- No1: Assessment of operators and owners formal risk assessments (RoMH);
- No2: Thematic/preventive inspections of MAH controls, detailed verification of compliance, systems audits;
- No3: Investigations of major accidents, issuing reports into major accidents, enforcement activity and reporting;
- No4: Development of regulatory policies, processes and procedures;
- No5: Continuous updating of offshore knowledge and guidance, continuous improvement in standards.

A description of each of these functional tasks is provided in Table 1.

Table 8 shows the estimated share per functional task in the UK, as estimated based on information from the HSL report (detailed results per country and group are presented in Annex III). The present study based its estimates on the share of effort spent by HSE inspectors in various activities (e.g. assessment, enforcement, inspection, investigation, training etc.). To the largest extent possible these activity categories were associated with the functional tasks used in the present study. Table 8 also shows UK's share of each functional task as estimated in the 2014 and 2016 scenarios of the present study. Overall, the shares based on the HSL study and the ones estimated in the present study are similar even though they could be expected to be equal or less dispersed. Nevertheless some notable differences appear due to the different categorisation and methodologies applied in the HSL report and the present study.

As regards the 2014 and 2016 scenarios, the most significant differences are the following:

- Assessment efforts (task No1) increase between 2014 and 2016 due to higher assessment requirements and larger offshore activity. The same is observed in the baseline and high production scenarios, but solely because of the increased offshore activity.
- The share of Inspections (task No2) drops between the reference years and scenarios, but remains relatively stable in absolute terms.

- The share of investigations (task No3) remains relatively stable as this relies on the occurrence of accidents which cannot be predicted.
- The development of policies (task No4) also remains stable as UK's requirements are in generally already in line with the Directive's requirements. Thus no significant additional efforts will be required for the transposition of the Directive.
- For the same reasons as in the development of policies, the continuous updating of offshore knowledge also remains stable.

Table 8: Share of the required resources in the UK by functional task (%)

		Estimated Share in the UK			
Functional task	HSL share	2014 Baseline	2014 High production	2016 Baseline	2016 High production
No1	10.9%	12.2%	13.2%	16.7%	17.4%
No2	42.8%	37.3%	36.4%	33.6%	32.9%
No3	14.2%	12.1%	11.9%	11.1%	10.9%
No4	4.8%	12.1%	12.2%	12.2%	12.3%
No5	27.2%	26.3%	26.3%	26.5%	26.5%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table 9 presents the shares per functional task for all EU Member States covered in the present study. As expected the overall results vary significantly when compared with the ones of the UK, as each country has a different offshore industry and thus diverse needs of regulatory arrangements. Specifically:

- The share of assessment efforts (task No1) is significantly higher, particularly in the 2016 scenarios when the old and especially the new jurisdictions will be required to carry out a thorough reassessment of their safety case. For example, Group 3 countries will need to devote up to 21% of their efforts on this task.
- The share of inspections (task No2) drops in 2016 but remains relatively stable in absolute terms.
- The same applies for investigations (task No3) where in absolute terms efforts remain relatively stable but with a decreased share due to the increased assessment efforts;
- No significant differences occur between 2014 and 2016 for the development of policies (task No4). However there is an increase in absolute terms as countries intensify their efforts in 2016 to comply with the requirements of the Directive. As expected this task requires a significantly higher share in Group 2 and Group 3 countries (respectively 28% and 25% versus 12% in Group 1 countries). Overall, the less mature jurisdiction will be required to increase their efforts significantly to fulfil the requirements of the Directive.
- The share of the development of offshore knowledge also remains stable but increases in absolute terms, for the same reason as in the development of policies.

Table 9: Share of the required resources in the EU by functional task (%)

Functional task	HSL share	Estimated Share in the EU			
		2014 Baseline	2014 High production	2016 Baseline	2016 High production
No1	10.9%	13,7%	15,9%	18,4%	19,7%
No2	42.8%	32,3%	29,9%	28,6%	27,0%
No3	14.2%	12,8%	11,7%	11,5%	10,8%
No4	4.8%	14,7%	15,8%	14,7%	15,7%
No5	27.2%	26,5%	26,6%	26,7%	26,8%
Total	**100.0%**	**100,0%**	**100,0%**	**100,0%**	**100,0%**

3.2.4 Gap analysis – 2014 Findings at the aggregated level for baseline scenario

The analysis at the **aggregated level** (EU level) takes into account the current and required resources of all countries except Norway and Iceland. The exclusion of Iceland does not affect the overall results as there are no organisational arrangements within the period covered by this study. Specifically the Icelandic Shelf will start production around 2028. Thus no resource arrangements are required within the period covered by the present study. The estimates of the current staff in Norway cover both the offshore and onshore industries. For this reason Norway data was not included in this calculation since it would have significantly affected the overall estimates giving misleading information on gaps. An estimation of the resource requirements in Norway is provided in Annex II.

In addition it must be noted that the Spanish and Romanian authorities were not in the position to provide estimates of their current resources. Nevertheless an estimation of their required resources as calculated based on their ongoing and planned offshore activity has been included. In addition, no data is available for Bulgaria. However this has no major impact on the aggregated results, as the offshore activities in the country are very limited.

At the EU level, the overall deficits are estimated at 32 FTEs and the surpluses at 24 FTEs, with a balance of a deficits of 7.6 FTEs. The most significant deficit in the baseline scenario is identified for Naval Architecture & Marine Engineering staff with 6 FTEs (19% of deficits and 135% of the available staff) less than required according to the estimates.

Another significant deficit can be identified Divers and Evacuation and Emergency Response Experts with a deficit of around 4 FTEs each (13% of deficits each) at the overall EU level. The gaps of divers represent 29% of the current staff and the gaps of Evacuation and Emergency Response Experts correspond to 39% of the current staff.

Less significant deficits are identified for some other expertise fields:

- Pipelines: a deficit of around 2.7 FTEs (9% of deficits and 28% of the available staff);
- Process Engineering: approximately 2.4 FTEs less than required (7% of deficits and 9% of the available staff);
- Mechanical Engineering, Materials & Corrosion: approximately 3 FTEs (9% of deficits and 16% of the available staff);
- Electrical & Control Systems: 2.6 FTEs (8% of deficits and 26% of the available staff);
- Structural Integrity & Verification: around 2.5 FTEs (7% of deficits and 11% of the available staff);
- Organisational & Human Factors: approximately 2.7 FTEs (8% of deficits and 15% of the available staff);
- Administrative staff: approximately 2.4 FTEs (8% of deficits and 8% of the available staff).

The following staff categories appear to be in surplus, mainly:

- Environmental Protection & Oil Spill Response: 4.1 FTEs (17% of surpluses and 14% of the available staff);
- Occupational Health specialists: 2.9 FTEs (8% of surpluses and 34% of the available staff);
- Legal staff: approximately 4.9 FTEs (20% of deficits and 31% of the available staff);
- Wells specialists: approximately 1.8 FTEs (7% of deficits and 8% of the available staff).

As regards wells specialists, it must me noted that evidence provided by CAs, suggests that in reality this discipline faces significant shortages in the market. The surplus estimated in the present study can be attributed in the uncertainty characterising the figures on the exploration and drilling activities as these were reported by Member States.

Figure 3 show the aggregated results the of the gap analysis of 2014 in the baseline scenario for all EU Member States.

Results at the Group level in the baseline scenario

The following paragraphs present the main findings of the gap analysis at the group level. As in the aggregated results, Norway and Iceland have been excluded from the analysis.

Group 1

Results for the baseline scenario concerning countries from Group 1 are presented in Table 10 below. It must be noted that overall the deficits and surpluses are higher in Group 1 than in Group 2 and 3 because of the larger offshore industry which correspond to higher resource requirements.

The results for the first group of countries show overall deficits of 17.6 FTEs and surpluses of approximately 19 FTEs. Significant deficits are observed on the following categories:

- Regulatory Specialists & Safety Management Systems: a deficit of 2.4 FTEs observed (14% of deficits and 4% of the available staff);
- Diving: 1.2 FTEs deficit (7% of deficits and 9% of the available staff);
- Electrical & control systems: 1.4 FTEs deficit (8% of deficits and 16% of the available staff);
- Structural integrity and verification: 3.3 FTEs deficit (19% of deficits and 26% of the available staff);
- Pipelines: 1.3 FTEs deficit (7% of deficits and 14% of the available staff);
- Evacuation and Emergency Response, Marine & Aviation Operations: 2 FTEs deficit (13% of deficits and 23% of the available staff);
- Naval Architecture & Marine Engineering: 4.5 FTEs deficit (25% of deficits and 101% of the available staff);
- Organisational & Human Factors: 1.1 FTE deficit (6% of deficits and 14% of the available staff).

Important surpluses can be observed for Occupational Health (4.1 FTEs) and Legal staff (4.4 FTEs).

Group 2

Results for Member States in Group 2 are also presented in Table 10. Romania and Spain have reported 0 resources to this date since they were not able to provide precise figures concerning their current resources. By taking into account a 0 value, an important overall gap appears for these two countries, having an important effect on the overall gap for this Group. These considerations should be taking into account when analysing the following results.

Several shortages of personnel can be observed in various countries for almost all of the staff categories. In absolute numbers the deficits are small, given the low maturity level of offshore operations in these countries. In total the deficits reach 26.1 FTEs and the surpluses only 3.2 FTEs.

By order of relevance, there is a shortage on staff for: regulators (5.1 FTEs, 19% of total deficits and 100% of the current staff levels), administration (3.6 FTEs, 14% of total deficits and more than 5 times higher than the current staff levels) and mechanical engineers (2.4 FTEs, 9% of total deficits and about 5 times higher than the current staff levels). The only surplus in resources for this Group can be identified for environmental protection and oil spill response (3.2 FTEs), due to the staff reported by Poland.

It must be noted that MODUs which enter in Member State waters to carry out drilling campaigns and the respective regulatory requirements which derive from the Directive are not considered in the calculations due to lack of data. Nevertheless, these requirements consist of a significant amount of resources and shall be considered by each Member State authority according to the country's planned campaigns and production activities. The share of the resource requirements for assessment and other activities related to MODUs, is particularly high in Group 2 and even higher in Group 3 countries, where offshore activities include largely (or solely in Group 3 countries) on exploitation and drilling campaigns.

Group 3

Several shortages can be identified for this Group, although in a less extent than for countries from Group 2. Shortages are present in several technical expertise (mainly process engineering, diving and environmental protection).

In the high production scenario for 2014, the overall needs in staff resources considerably increase at the EU level, as shown in Figure 4. The overall gaps reach 74.4 FTEs (approximately 2.3 higher than the gaps of the 2014 baseline scenario) and the surpluses 13.1 FTEs (approximately half of the surplus of the 2014 scenario).

The shortages in resources are very important, particularly for the following categories:

- Regulators:10 FTEs (14% of deficits and 13% of the available staff);
- Administrative staff: 9.4 FTEs (13% of deficits and 33% of the available staff);
- Naval architecture: 7.8 FTEs (10% of deficits and 173% of the available staff).

Diving specialists, mechanical engineers and divers have a deficit of approximately 6.5 FTEs each. Well specialists also have a deficit of 2 FTEs, but in reality the shortage is significantly higher.

At the group level, shortages appear in all groups (see also Table 11) especially in Group 2 countries where deficits exist almost in all disciplines. The most significant ones are on regulators (10 FTEs, 22% of the total deficits and 188% of the current staff), and administration staff (5.8 FTEs). Group 1 has also significant deficits, especially as regards regulators (5.8 FTEs, 19% of the total deficits and 9.7% of the current staff), Naval Architecture & Marine Engineering (4.9 FTEs, 17% of the total deficits and 112% of the current staff) and structural integrity experts (4.2 FTEs, 14% of the total deficits and 33.5% of the current staff). On the contrary, Group 3 countries show a surplus of regulators due to the reported figures of France and Portugal. Nevertheless several deficits appear in various disciplines, most notably on Process Engineers (1.9 FTEs) and Environmental Protection & Oil Spill Response (1.8 FTEs).

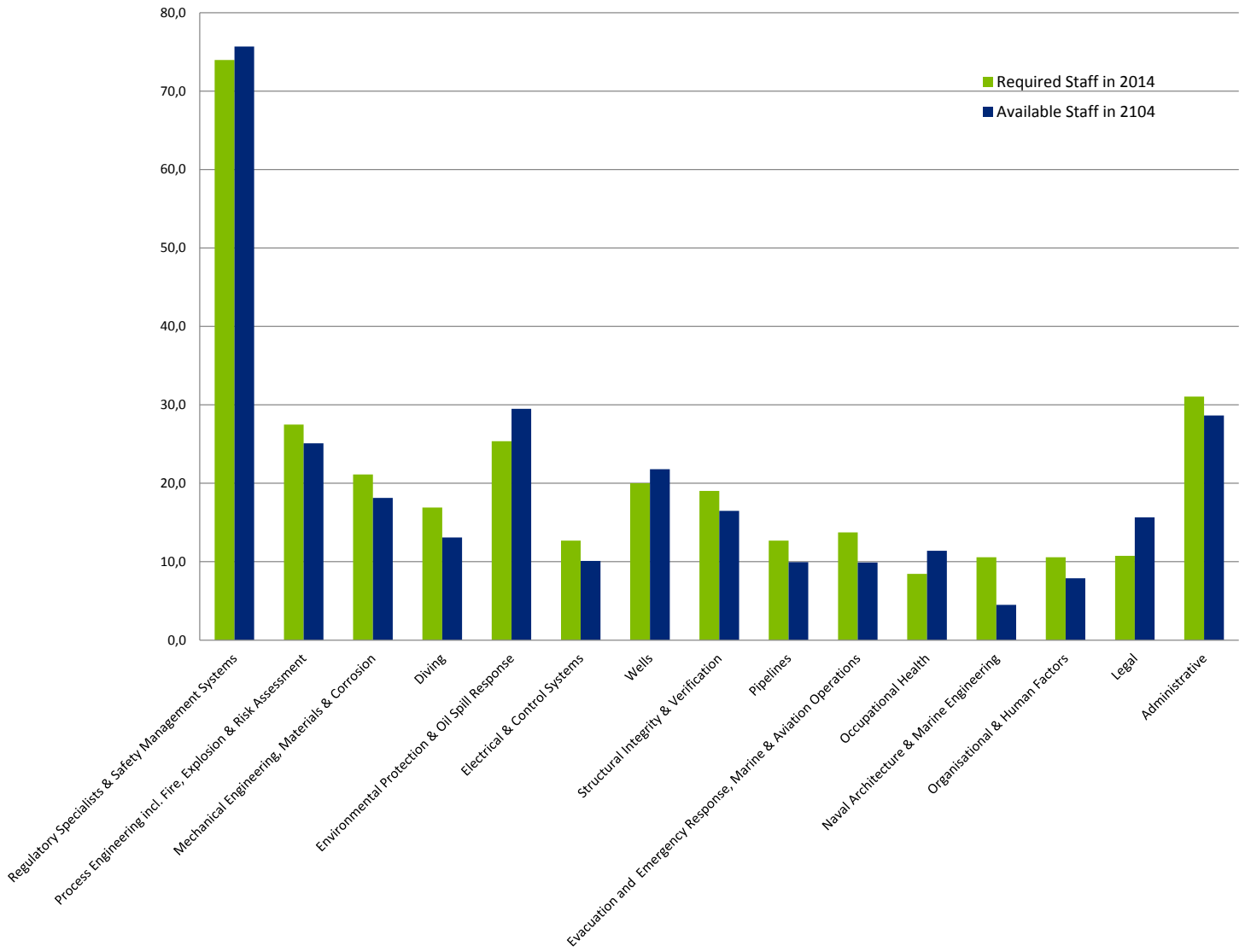

Figure 3: Overall resources, Baseline Scenario (FTE, 2014)

Table 10: Gap analysis by Group in the Baseline Scenario, 2014 (FTE)

Country	Regulatory Specialists & Safety Management Systems	Process Engineering incl. Fire. Explosion & Risk Assessment	Mechanical Engineering. Materials & Corrosion	Diving	Environmental Protection & Oil Spill Response	Electrical & Control Systems	Wells	Structural Integrity & Verification	Pipelines	Evacuation and Emergency Response. Marine & Aviation Operations	Occupational Health	Naval Architecture & Marine Engineering	Organisational & Human Factors	Legal	Administrative	Other	SUM
Croatia	-0.2	1.6	0.7	-0.3	0.6	-0.2	1.9	2.7	0.8	-0.2	0.9	-0.2	1.8	1.8	1.5	0.0	13.2
Denmark	-0.9	-0.8	-1.1	-1.1	1.0	-0.6	-0.7	-0.6	-0.6	-0.6	1.7	-0.3	0.1	2.2	-0.1	0.0	-2.4
Italy	1.9	0.7	-1.4	-2.0	-1.0	1.5	0.6	-0.3	-1.4	-1.6	1.0	-1.3	2.7	1.7	2.3	1.0	4.6
Netherlands	0.8	-0.5	0.5	-0.8	4.8	-2.1	4.3	-2.1	-0.1	1.7	0.6	-0.7	-1.7	-0.8	-1.1	5.0	7.6
United Kingdom	-4.0	-1.0	1.0	3.0	-4.0	0.0	-4.0	-3.0	0.0	-1.5	0.0	-2.0	-4.0	-0.6	-1.7	0.0	-21.8
Total Group 1	-2.4	0.0	-0.3	-1.2	1.3	-1.4	2.1	-3.3	-1.3	-2.2	4.1	-4.5	-1.1	4.4	0.9	6.0	1.2
Bulgaria	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-1.0
Germany	-0.7	-0.2	-0.1	-0.1	-0.2	0.0	-0.3	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.3	0.0	-1.7
Greece	-0.9	0.3	-0.6	-0.4	-0.7	-0.3	-0.7	-0.5	-0.3	0.1	-0.2	-0.3	-0.3	0.2	-0.8	0.0	-5.4
Ireland	2.4	-0.6	-0.5	-0.4	-0.6	-0.3	-0.7	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2	0.0	-0.7	0.0	-2.9
Poland	-1.5	0.2	0.0	-0.4	6.1	0.4	0.5	0.4	0.2	-0.3	-0.2	-0.2	-0.2	0.1	-0.6	0.0	4.5
Romania	-3.6	-1.3	-1.0	-0.8	-1.2	-0.6	-0.4	-0.9	-0.6	-0.7	-0.4	-0.5	-0.5	-0.5	-1.5	0.0	-14.5
Spain	-0.5	-0.2	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	0.0	-1.9
Total Group 2	**-5.1**	**-1.9**	**-2.4**	**-2.2**	**3.2**	**-1.0**	**-1.6**	**-1.7**	**-1.2**	**-1.3**	**-1.1**	**-1.4**	**-1.4**	**-0.3**	**-3.6**	**0.0**	**-23.0**
Cyprus	0.3	-0.1	0.0	-0.2	-0.1	0.0	-0.7	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.2	0.0	-1.6
France	6.6	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	0.0	5.2
Malta	-0.4	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	0.0	-1.8
Portugal	2.6	-0.1	-0.1	-0.1	-0.1	-0.1	2.7	2.9	-0.1	-0.1	0.0	-0.1	-0.1	0.9	0.8	3.0	12.2
Total Group 3	**9.2**	**-0.5**	**-0.3**	**-0.4**	**-0.4**	**-0.2**	**1.3**	**2.5**	**-0.3**	**-0.3**	**-0.1**	**-0.3**	**-0.3**	**0.8**	**0.3**	**3.0**	**14.1**

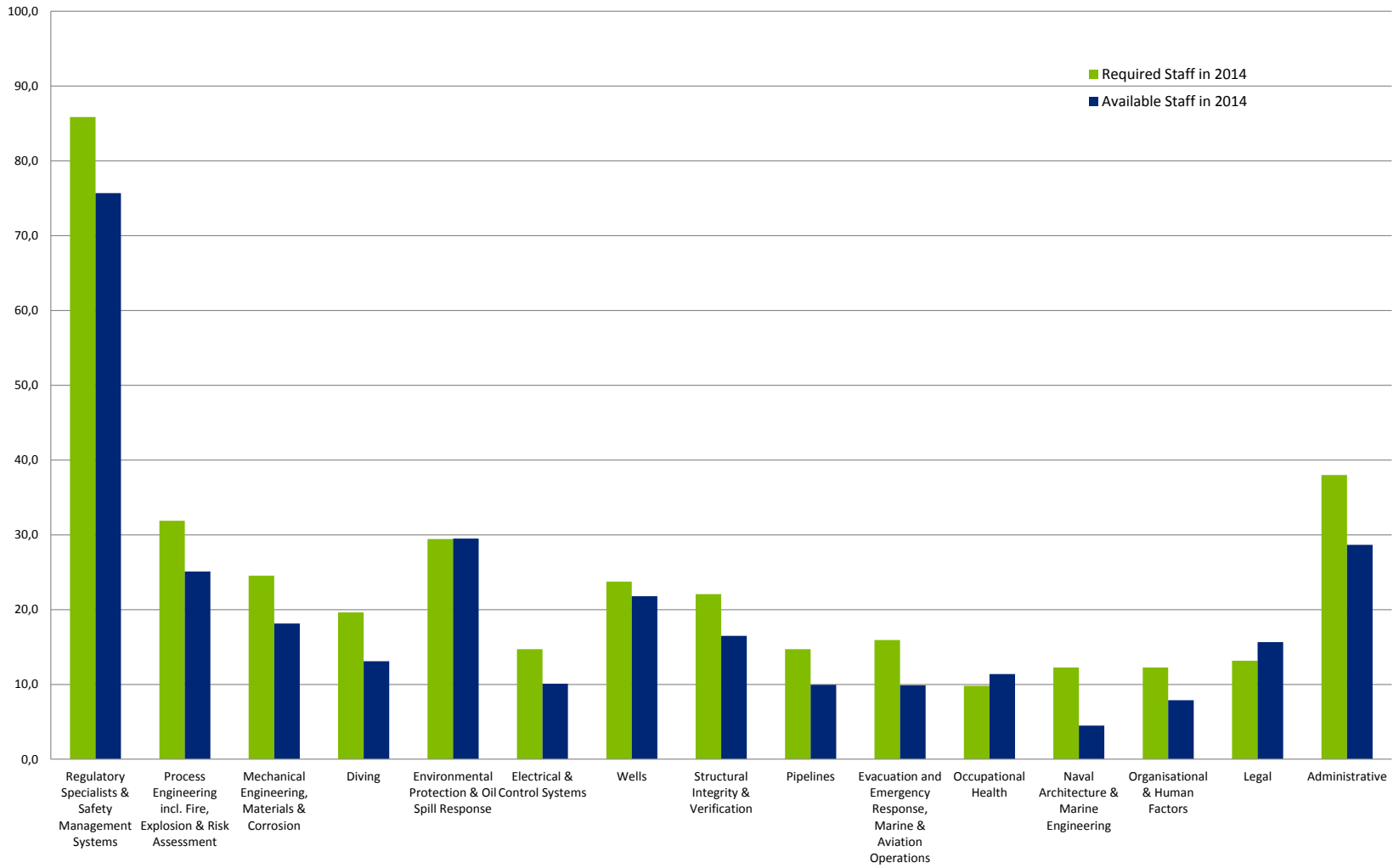

Figure 4: Overall resources, High Production Scenario (FTE, 2014)

Table 11: Gap analysis by Group in the High Production Scenario, 2014 (FTE) *

Country	Regulatory Specialists & Safety Management Systems	Process Engineering incl. Fire, Explosion & Risk Assessment	Mechanical Engineering, Materials & Corrosion	Diving	Environmental Protection & Oil Spill Response	Electrical & Control Systems	Wells	Structural Integrity & Verification	Pipelines	Evacuation and Emergency Response, Marine & Aviation Operations	Occupational Health	Naval Architecture & Marine Engineering	Organisational & Human Factors	Legal	Administrative	Other	SUM
Croatia	-0.2	1.6	0.7	-0.3	0.6	-0.2	1.9	2.7	0.8	-0.2	0.9	-0.2	1.8	1.8	1.5	0.0	13.2
Denmark	-1.9	-1.2	-1.4	-1.3	0.6	-0.8	-0.9	-0.9	-0.8	-0.8	1.5	-0.4	0.0	2.0	-0.7	0.0	-7.0
Italy	0.6	0.2	-1.7	-2.3	-1.5	1.3	0.2	-0.6	-1.6	-1.9	0.8	-1.4	2.6	1.5	1.5	1.0	-1.3
Netherlands	-0.3	-0.9	0.2	-1.0	4.4	-2.3	3.9	-2.4	-0.3	1.5	0.5	-0.9	-1.9	-1.0	-1.9	5.0	2.5
United Kingdom	-4.0	-1.0	1.0	3.0	-4.0	0.0	-4.0	-3.0	0.0	-1.5	0.0	-2.0	-4.0	-0.9	-2.5	0.0	-22.9
Total Group 1	-5.8	-1.3	-1.2	-1.9	0.2	-2.0	1.0	-4.2	-1.9	-2.8	3.7	-4.9	-1.5	3.4	-2.0	6.0	-15.4
Bulgaria	-1.0	-0.4	-0.3	-0.2	-0.4	-0.2	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.2	-0.5	0.0	-4.4
Germany	-1.6	-0.5	-0.4	-0.3	-0.5	-0.2	-0.6	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.2	-0.1	0.0	-5.4
Greece	-1.4	0.1	-0.7	-0.5	-0.8	-0.4	-0.6	-0.6	-0.4	0.1	-0.3	-0.3	-0.3	0.1	-1.1	0.0	-7.2
Ireland	1.5	-0.9	-0.7	-0.6	-0.9	-0.4	-0.9	-0.6	-0.4	-0.5	-0.3	-0.4	-0.4	-0.1	-1.1	0.0	-6.8
Poland	-2.7	-0.2	-0.4	-0.6	5.7	0.2	-0.1	0.1	0.0	-0.5	-0.3	-0.4	-0.4	-0.1	-1.2	0.0	-0.8
Romania	-3.9	-1.5	-1.1	-0.9	-1.3	-0.7	-0.7	-1.0	-0.7	-0.7	-0.4	-0.6	-0.6	-0.6	-1.7	0.0	-16.3
Spain	-0.5	-0.2	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	0.0	-1.9
Total Group 2	**-9.6**	**-3.6**	**-3.7**	**-3.3**	**1.7**	**-1.7**	**-3.3**	**-2.9**	**-1.9**	**-2.1**	**-1.6**	**-2.0**	**-2.0**	**-1.1**	**-5.8**	**0.0**	**-42.9**
Cyprus	-1.0	-0.6	-0.4	-0.5	-0.5	-0.2	-0.9	-0.5	-0.3	-0.4	-0.1	-0.3	-0.3	-0.2	-0.8	0.0	-7.1
France	5.7	-0.5	-0.4	-0.3	-0.4	-0.2	-0.6	-0.3	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.6	0.0	1.4
Malta	-1.3	-0.5	-0.4	-0.3	-0.4	-0.2	-0.6	-0.3	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.6	0.0	-5.6
Portugal	1.8	-0.5	-0.4	-0.3	-0.4	-0.2	2.4	2.7	-0.2	-0.2	-0.1	-0.2	-0.2	0.8	0.5	3.0	8.4
Total Group 3	**5.2**	**-1.9**	**-1.5**	**-1.3**	**-1.8**	**-0.9**	**0.3**	**1.5**	**-1.0**	**-1.1**	**-0.6**	**-0.8**	**-0.8**	**0.2**	**-1.5**	**3.0**	**-2.9**

3.2.5 Gap analysis - 2016

Figure 5 illustrates the results of the overall results for the baseline scenario and Table 12 shows the results by group. In all countries, the required resources in 2016 are estimated as in 2014 by considering the planned production and exploration activities in that year. As in the 2014 overall estimates, Norway has been excluded. The gap analysis for Norway is provided in Annex II. The same assumptions and parameters as described in section 3.1 are considered. As mentioned in the same section, these estimates for 2016 also consider the typical efforts required for reassessment of safety cases in addition to the assessment of 5-year thorough review that was considered in the 2014 estimates. It must be noted that the former requirement will remain valid only for 3 years (between July 2015 and July 2018). **In this context, the overall requirements are expected to drop significantly after July 2018**.

The balance of deficits generally reduce significantly compared to the ones identified for 2014 baseline scenario, even though the total requirements increased by nearly 65 FTEs. Specifically the cumulative gaps are estimated at 11.6 FTEs (32 FTEs in the 2014 baseline scenario) and the total surplus at 46.6 FTEs (24.5 FTEs in the baseline scenario). The estimated decrease of shortages can be explained by the plans of countries to recruit staff by 2016 which, if implemented it will add approximately 75 FTEs to the current resources. The effect of the recruitment plans on the gap estimates is also illustrated in Figure 5. In addition some potential uncertainties as regards the data used in the estimates (e.g. in relation to planned offshore activities) might have resulted to underestimated requirements. Regarding the specific disciplines, at the **EU aggregated level**, the following changes are observed

- Regulatory Specialists & Safety Management Systems: surplus increases by around 8.1 FTEs and reaches 9.8 FTEs (21% of the total surplus and 11% of the planned staff in 2016);
- Process Engineering incl. Fire, Explosion & Risk Assessment: shows a marginal surplus of 0.1 FTEs instead of a deficit of approximately 2.4 FTEs;
- Mechanical Engineering, Materials & Corrosion: the deficit decreases by around 1.3 FTEs, reaching a shortfall of 1.7 FTEs (15% of the total deficit and 8% of the planned staff in 2016);
- Diving: the deficit of around 3.8 FTEs decreases slightly and reaches 3.2 FTEs (28% of the total deficit and 21% of the planned staff in 2016);
- Environmental Protection & Oil Spill Response: the surplus increases by 2 FTEs and reaches 6.1 FTEs (13% of the total surplus and 18% of the planned staff in 2016);
- Electrical & Control Systems: a small surplus of 0.7 FTEs appears instead of a deficit of 2.6 FTEs in (1% of the total surplus and 5% of the planned staff in 2016);
- Wells: the surplus increases by 4 FTEs and reaches 6 FTEs (13% of the total surplus and 23% of the planned staff in 2016);
- Structural Integrity & Verification: a small deficit of 0.8 FTEs instead of a deficit of 2.5 FTEs in 2014 (7% of the total deficit and 4% of the planned staff in 2016);
- Pipelines: a marginal deficit of 0.9 FTEs appears instead of 2.7 FTEs in 2014 (8% of the total deficit and 7% of the planned staff in 2016);
- Evacuation and Emergency Response, Marine & Aviation Operations: the deficit is reduced by around 4 FTEs and reaches 1.5 FTEs (13% of the total deficit and 11% of the planned staff in 2016);
- Occupational Health: the surplus is increased by 3 FTEs and reaches 5.3 FTEs (11% of the total surplus and 13% of the planned staff in 2016);
- Naval Architecture & Marine Engineering: the deficit decreases by around 4.7 FTEs and reaches 1.3 FTEs (19% of the total deficits and 112% of the current staff);
- Organisational & Human Factors: the shortfall decreases by 2.7 FTEs and becomes a surplus of 0.9 FTEs (2% of the total surplus and 2% of the current staff);

- Legal: the surplus increases marginally 4.8 FTEs (10% of the total surplus and 27% of the current staff);
- Administrative: the shortfall of around 2.4 FTEs decreases and reaches a deficit of 2.2 FTEs (18% of the total deficits and 6% of the current staff),

The most significant change is observed in regulators despite the fact that the overall requirements of this discipline increases by around 6 FTEs. Nevertheless, Member States have reported the recruitment of additional 15 regulators between 2014 and 2016. The same effect, but at a lesser extent is observed in all disciplines.

Based on the available data, the requirements of wells specialist will not increase between 2014 and 2016. In addition the planned recruitment of 6 wells specialist further increase the surplus of this discipline. However, as also highlighted in the analysis of the 2014 baseline scenario, there is strong evidence that this specific discipline faces significant deficits. For example the estimates show a surplus of 4.3 FTEs in the Netherlands. However in the UK, where the required resources are estimated by the national competent authority, a gap of 4 FTE's of wells specialists is estimated. This indicates that the collected data on the planned drilling and exploitation activities might be lower than the actual activity levels.

Same trends are observed at the **group level** where overall the deficits decrease significantly (see Table 12). The most significant change is observed in Group 2 where the deficit of 23 FTEs in 2014 becomes a surplus of 20 FTEs. Nevertheless this large difference is attributed mainly to Romania and Spain which reported its recruitment plans for 2016 but did not provide estimates of its resources in 2014.

The **high production scenario** (Figure 6) overall shows considerably higher deficits than the 2016 baseline scenario deficit but at a smaller extent than in the deficit identified in the high production scenario of 2014. The largest deficits are identified for administrative staff (10 FTEs), divers (5.9 FTEs) and mechanical engineers (5.1 FTEs). When compared to the 2014 high production scenario, similar gaps and surpluses are observed but in smaller gratitude.

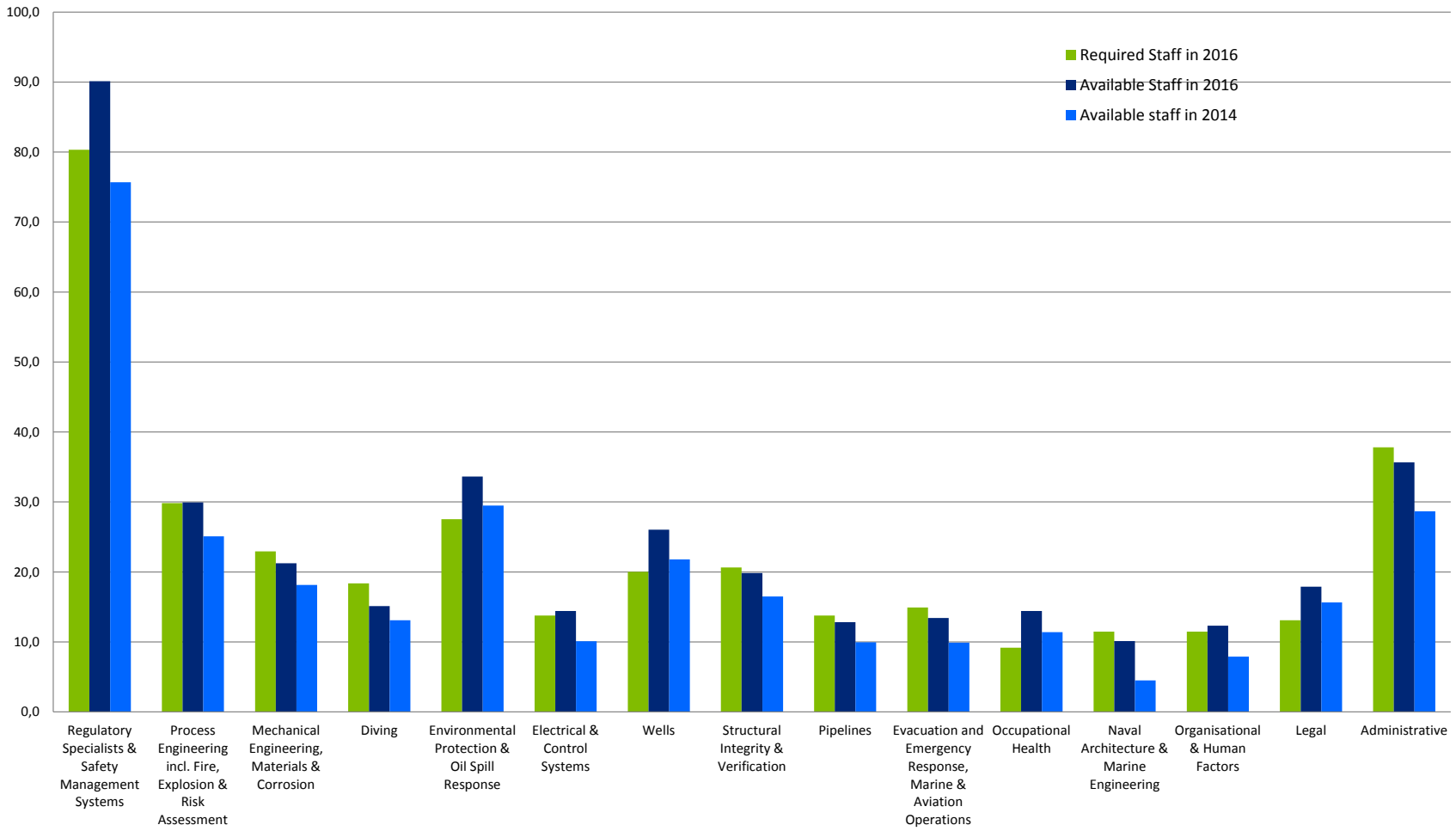

Figure 5: Overall resources, baseline scenario (FTE, 2016)

Table 12: Gap analysis by Group in the Baseline Scenario, 2016 (FTE)*

Country	Regulatory Specialists & Safety Management Systems	Process Engineering incl. Fire, Explosion & Risk Assessment	Mechanical Engineering, Materials & Corrosion	Diving	Environmental Protection & Oil Spill Response	Electrical & Control Systems	Wells	Structural Integrity & Verification	Pipelines	Evacuation and Emergency Response, Marine & Aviation Operations	Occupational Health	Naval Architecture & Marine Engineering	Organisational & Human Factors	Legal	Administrative	Other	SUM
Croatia	0.5	2.4	0.6	0.7	0.5	0.7	1.9	3.6	0.7	0.7	0.8	0.8	1.8	1.8	1.3	0.0	18.7
Denmark	-0.3	-0.2	-1.0	-1.2	0.9	-0.4	1.5	-0.5	-0.7	-0.7	1.6	-0.8	1.4	2.0	-0.1	0.0	1.6
Italy	1.3	0.0	-1.0	-2.4	-0.7	1.2	0.6	-0.7	-0.8	-2.0	0.8	-0.5	2.5	1.3	1.0	1.0	1.4
Netherlands	0.4	-1.4	-0.2	-1.3	4.0	-2.5	4.3	-2.8	-0.5	1.3	0.3	-1.1	-2.1	-1.4	-2.9	5.0	-0.8
United Kingdom	0.0	-1.0	0.0	2.0	-4.0	0.0	-4.0	-3.0	0.0	-1.5	0.0	-2.0	-4.0	-1.2	-3.5	0.0	-22.2
Total Group 1	1.9	-0.1	-1.7	-2.3	0.7	-1.0	4.3	-3.4	-1.3	-2.2	3.5	-3.6	-0.4	2.5	-4.2	6.0	-1.2
Bulgaria	-0.3	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	-0.1	-0.2	0.0	-1.4
Germany	-0.8	-0.2	-0.1	-0.1	-0.2	0.0	-0.3	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	-1.1
Greece	-0.1	1.2	0.4	-0.5	0.3	0.6	-0.7	-0.5	-0.4	0.6	-0.2	0.7	-0.3	0.7	0.0	0.0	1.7
Ireland	6.3	-0.6	-0.5	-0.4	-0.6	-0.3	-0.7	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2	-0.3	-0.8	0.0	0.4
Poland	-1.8	0.1	-0.1	-0.4	6.0	0.4	0.5	0.3	0.2	-0.3	-0.2	-0.3	-0.3	0.0	-0.8	0.0	3.4
Romania	-1.9	0.5	0.9	1.1	0.7	1.3	1.6	1.0	1.3	1.3	1.6	1.4	1.4	1.4	2.2	4.0	19.8
Spain	-0.6	-0.2	-0.2	-0.1	-0.2	-0.1	0.0	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	0.0	-2.6
Total Group 2	**0.7**	**0.7**	**0.3**	**-0.5**	**5.8**	**1.9**	**0.4**	**0.0**	**0.7**	**1.0**	**0.8**	**1.5**	**0.5**	**1.5**	**0.8**	**4.0**	**20.1**
Cyprus	0.3	-0.1	0.0	-0.2	0.0	0.0	-0.7	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.2	0.0	-1.6
France	6.6	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	0.0	5.2
Malta	-0.4	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	0.0	-1.8
Portugal	0.6	-0.1	-0.1	-0.1	-0.1	-0.1	2.7	2.9	-0.1	-0.1	1.0	0.9	0.9	0.9	1.8	3.0	14.2
Total Group 3	7.2	-0.5	-0.3	-0.4	-0.4	-0.2	1.3	2.5	-0.3	-0.3	0.9	0.7	0.7	0.8	1.3	3.0	16.1

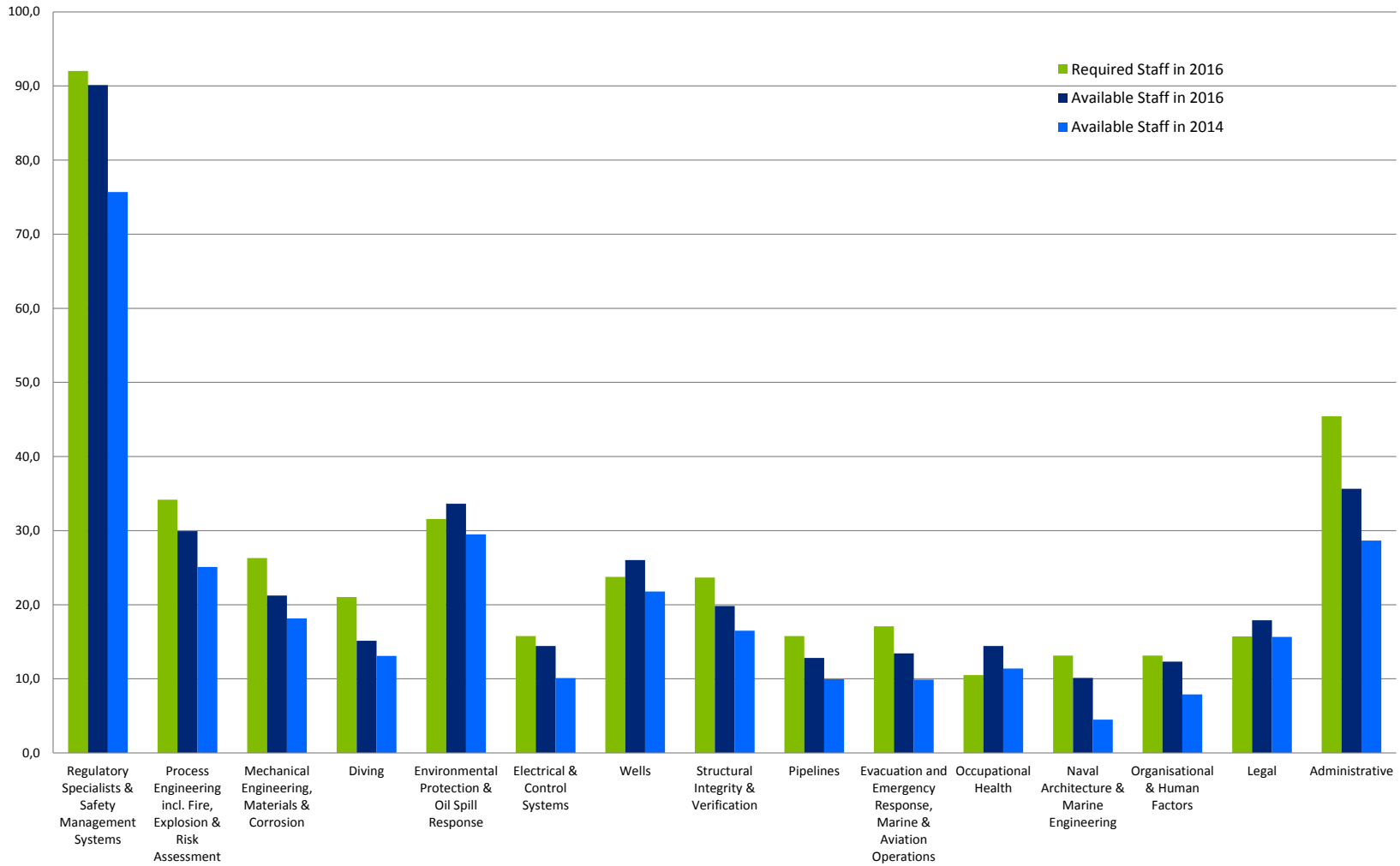

Figure 6: Overall resources, high production scenario (FTE, 2016)

Table 13: Gap analysis by Group in the high production scenario in 2016 (FTE) *

Country	Regulatory Specialists & Safety Management Systems	Process Engineering incl. Fire, Explosion & Risk Assessment	Mechanical Engineering, Materials & Corrosion	Diving	Environmental Protection & Oil Spill Response	Electrical & Control Systems	Wells	Structural Integrity & Verification	Pipelines	Evacuation and Emergency Response, Marine & Aviation Operations	Occupational Health	Naval Architecture & Marine Engineering	Organisational & Human Factors	Legal	Administrative	Other	SUM
Croatia	0.5	2.4	0.6	0.7	0.5	0.7	1.9	3.6	0.7	0.7	0.8	0.8	1.8	1.7	1.3	0.0	18.7
Denmark	-1.4	-0.6	-1.3	-1.5	0.5	-0.6	1.3	-0.7	-0.9	-0.9	1.5	-0.9	1.3	1.8	-0.8	0.0	-3.3
Italy	0.0	-0.4	-1.4	-2.7	-1.1	1.0	0.2	-1.1	-1.0	-2.2	0.6	-0.7	2.3	1.0	0.1	1.0	-4.6
Netherlands	-0.6	-1.8	-0.5	-1.6	3.6	-2.7	3.9	-3.0	-0.7	1.1	0.2	-1.2	-2.2	-1.7	-3.7	5.0	-5.8
United Kingdom	0.0	-1.0	0.0	2.0	-4.0	0.0	-4.0	-3.0	0.0	-1.5	0.0	-2.0	-4.0	-1.5	-4.3	0.0	-23.3
Total Group 1	-1.5	-1.4	-2.6	-3.1	-0.5	-1.6	3.2	-4.2	-1.9	-2.8	3.1	-4.1	-0.9	1.4	-7.4	6.0	-18.2
Bulgaria	-1.1	-0.4	-0.3	-0.3	-0.4	-0.2	-0.3	-0.3	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.6	0.0	-4.9
Germany	-1.6	-0.5	-0.4	-0.3	-0.5	-0.2	-0.5	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.2	0.3	0.0	-4.9
Greece	-0.6	1.0	0.3	-0.6	0.1	0.6	-0.6	-0.7	-0.4	0.5	-0.3	0.6	-0.4	0.6	-0.3	0.0	-0.1
Ireland	5.4	-1.0	-0.7	-0.6	-0.9	-0.4	-0.9	-0.7	-0.4	-0.5	-0.3	-0.4	-0.4	-0.4	-1.3	0.0	-3.5
Poland	-2.9	-0.3	-0.4	-0.7	5.6	0.2	-0.1	0.1	0.0	-0.5	-0.3	-0.4	-0.4	-0.2	-1.4	0.0	-1.9
Romania	-2.3	0.4	0.8	1.0	0.5	1.3	1.3	0.9	1.3	1.2	1.5	1.4	1.4	1.3	1.9	4.0	18.0
Spain	-0.6	-0.2	-0.2	-0.1	-0.2	-0.1	0.0	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	0.0	-2.6
Total Group 2	**-3.7**	**-1.0**	**-1.0**	**-1.5**	**4.3**	**1.1**	**-1.2**	**-1.1**	**-0.1**	**0.2**	**0.3**	**0.9**	**-0.1**	**0.7**	**-1.7**	**4.0**	**0.1**
Cyprus	-1.0	-0.5	-0.4	-0.5	-0.5	-0.2	-0.9	-0.5	-0.3	-0.4	-0.1	-0.3	-0.3	-0.2	-0.9	0.0	-7.1
France	5.8	-0.5	-0.4	-0.3	-0.4	-0.2	-0.6	-0.3	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.6	0.0	1.4
Malta	-1.2	-0.5	-0.4	-0.3	-0.4	-0.2	-0.6	-0.3	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.6	0.0	-5.6
Portugal	-0.2	-0.5	-0.3	-0.3	-0.4	-0.2	2.4	2.7	-0.2	-0.2	0.9	0.8	0.8	0.8	1.4	3.0	10.4
Total Group 3	3.3	-1.9	-1.4	-1.3	-1.7	-0.9	0.3	1.5	-1.0	-1.1	0.5	0.2	0.2	0.1	-0.7	3.0	-0.9

4. Proposal for addressing identified gaps

4.1 Introduction

This section provides a comprehensive analysis of potential solutions for addressing gaps between required and actual resources needed for relevant MS to fully resource their respective national Competent Authority (CA) for overseeing offshore safety in the EU and meeting the requirements of the Offshore Safety Directive[13].

Based on a primary research on the theoretical options by the project team and the respective feedback collected from MS on these options during the 8th EUOAG conference held in Brussels on 12th November 2014, an extensive range of sourcing options are included in the present analysis. The options are presented in Table 14 in terms of four high-level sourcing options, some of which have been further divided into more specific sub-options. For each option, a brief description of the option is provided.

It is important to note that except in the baseline option (Options 1a and 1b), all other options to be considered correspond to the development of cooperation mechanisms (forms of network).

Table 14: Sourcing options for addressing the resource gaps of national CAs in the EU

Options	Name of the option	Sub-options		Brief description of the option
Option 1	Baseline: MS' CAs have a fully resourced CA including offshore expertise, technical and knowledge systems and regulatory systems.	Option 1a	Recruitment needs	Recruitment of discipline specialists from the offshore industry and other relevant sectors to train them to be regulators
		Option 1b		Recruitment or develop from within CA of persons who are not technically competent to fill the role of the offshore specialist and this will include technical training and development in the specialist field.
		Option 1c	Training needs	Model I: Trainings collectively organised by the European Commission or other competent body
		Option 1d		Model 2: Shared training organised by specific MS
Option 2	Intra-EU expert transfer and knowledge sharing	Option 2a		Bilateral agreements: Intra-EU expert transfer and knowledge sharing with bilateral agreements between MS
		Option 2b		Multilateral agreements Intra-EU expert transfer and knowledge sharing with multilateral agreements between MS
Option 3	Creation of a network of 3rd party expertise and a dedicated mutual	Option 3a		Scenario 1: Network of 3rd party expertise, with a central facility organised and controlled by the EC
		Option 3b		Scenario 2: Network of 3rd party expertise in a joint support scheme, with organisms shared by several MS

[13] Directive 2013/30/EU of the European Parliament and of the Council of 12 June 2013 on safety of offshore oil and gas operations.

Options	Name of the option	Sub-options	Brief description of the option
	facility for each authority spread between MS or further afield	Option 3c	Scenario 3: Network of 3rd party expertise based on resource dependence using experts from the industry
		Option 3d	Scenario 4: Network of 3rd party expertise through self-selection in some technical forums on specific Oil & Gas related topics.
Option 4	A mix of different options to address the resource gaps at different levels	Option 4	Based on the specific resource needs per country group (1, 2 and 3)

In order to illustrate whether different options are feasible and cost-effective to address resource needs for the EU Member States, it is important to make a distinction between different country groups based on the maturity level of offshore development of each MS. Based on the JRC report and new evidence collected in this study, EU MS can be categorised into three different groups as presented in the Table 2: Grouping of EU Member States by the level of their offshore activities (adapted from the JRC method).

The proposed solutions are meant to address the main gaps identified through a gap analysis provided in Chapter 3. In particular, some of these identified gaps include:

- Sharing a specific expertise in cases when there is an overall lack of qualified expertise – the preliminary gap analysis has identified such deficiencies especially in engineering-related competences (e.g. well specialists).
- Shortfalls in systems for stakeholder interaction – deficiencies have been identified in the areas of interaction with unions and workers representatives as well as in interaction with international and national technical standard committees.
- One conclusion from the gap analysis is that there is a shortage of specific expertise in some countries, which may require the recruitment of experienced experts from outside Europe. Both the JRC report and the present study indicate that many countries are facing resource constraints.

Furthermore, in the context of offshore safety in the EU, significant resource gaps have been identified for specific expertise at both national and the EU levels. In particular, the identified gaps for each Member State (i.e. the difference between the estimated required staff and the currently available staff) suggest that some MS with the highest level of offshore activity and with the highest degree of maturity in the offshore sector appear to have smaller resource gaps in comparison to other MS. On the other hand, MS with lower level of offshore activity and lower degree of maturity in the offshore sector do not only face more serious gaps for their offshore CAs, but also more strict funding limitations to address the resource gaps through self-recruitment and training.

Moreover, the DG Energy at the Commission and the JRC are foreseeing that **the staff requirements will peak between July 2015** (transposition of the Directive) **and July 2018**. During this period, national CAs will be required to reassess the safety cases (RoMHs Material Change notification etc.) for each of their existing installations and their resource requirements will drop significantly thereafter.

For these reasons, it is expected that many EU MS will be facing a significant general shortage of regulatory experts and technical specialists for their CAs. **MS should not consider all sourcing options in direct recruitment of CA staff to meet the growing resourcing needs. Only where those MS seeking the recruitment of the range of specialists is excessive for their individual**

requirements then they shall also explore other alternatives including international cooperation between the EU MS and with other countries outside EU as a part of the solutions to address the resource gaps. For example, the survey conducted by JRC has shown that certain Member States are already using third party expertise: Among others, Ireland currently uses external expertise and an arrangement has been set to allow the commitment of external expertise when this is needed. In addition, by 2016, Cyprus, Denmark, Italy, Malta and Portugal plan to make some sort of formal outsourcing arrangement for expert advice.

Therefore, the key issue to be asked is: **what are the cost-effective options that could help different countries to address their resource gaps for strengthening their offshore safety organisations?** Are there other options than that in which in MS CA recruits all the experts it needs? Maximising the use of external expertise through certain forms of cooperation might be a relevant solution (even if it raises other questions).

4.2 Key concepts related to sourcing options

4.2.1 Existing formats of expertise sourcing and sharing

Recruitment

Recruitment refers to the overall process of attracting, selecting and appointing suitable candidates for competencies required for accomplishing various tasks of a national CA. These recruited jobs can be either permanent or temporary.

Temporary staff can be recruited from different sources, such as:

i. Recruiting discipline specialists from the offshore industry and train them to increase their regulation expertise (discuss options in direct recruitment);
ii. Recruiting or training from within CA people who are initially not technically competent to fill the role of the offshore specialist; this will include technical training and development in the specialist field.

Moreover, recruitment can also refer to processes involved in choosing individuals for unpaid positions, such as voluntary roles or training programmes.

It is important to note that recruitment for safety regulatory and offshore specialists can be very expensive to recruit more permanent staff, particularly experts with high competences in the oil and gas sector. Average salaries of oil and gas experts in the private sector are high and increasing. The competitive salaries in the private sector could render the recruitment of permanent staff even more difficult especially for Member States with lower salary levels compared to the private sector or to other MS salaries. Table 15 presents the estimated average salary levels for inspectors based in different EU MS, which in general are over four times the average net earnings of the country[14] and significantly higher than the average salary paid for a civil servant. In addition, Table 15 also presents salary information collected from private Oil and Gas sectors for both local and imported technical expertise, which will be useful when considering options of seconding staff from the private sectors to support the temporary needs of the national CAs.

[14] Eurostat data on net earnings of the EU Member states

Table 15: Estimated salary levels for inspectors in different EU MS (2014 €)

Country	Average Salary for Inspectors in the public sector*	Local average annual salary in private O&G sector[!]	Imported average annual salary in private O&G sector	Country	Average Salary for Inspectors in the public sector*	Local average annual salary in private O&G sector	Imported average annual salary in private O&G sector
Bulgaria	11158	N/A	N/A	**Latvia**	23153	N/A	N/A
Cyprus	48871	N/A	N/A	**Lithuania**	19614	N/A	N/A
Denmark	108518	109 700	148 500	Malta	45166	N/A	N/A
Estonia	30440	N/A	N/A	Netherlands	105920	123 800	84 900
France	91425	92 800	107 400	Portugal	43402	51 000	125 800
Germany	109029	N/A	N/A	Romania	14846	34 400	105 200
Greece	58849	N/A	N/A	**Spain**	69233	68 900	97 900
Ireland	72611	N/A	N/A	United Kingdom	98407	93 400	93 100
Italy	79694	69 000	84 600				

Note:

***** Due to the data limitation, the figures of average salary for inspectors in the public sector are calculated based on our own estimates, determined by two factors: (1) the salary of inspector offered by the public CA in the UK; (2) the ratio of per capita net earnings in the MS and UK. It is important to note that these are only indicative figures, may be different from the real salary imposed by the MS in question.

[!] Average annual salary for Oil & Gas companies for local and imported staff per country, derived from HAYS Recruiting experts in Oil & Gas and OILANDGAS JOBSEARCH (2013), OIL & Gas global salary guide 2013: Global salaries and recruiting trends. Since the number is a sector average, it might not reflect the exact salary that is decided to the inspectors only and most probably lower than actual salary for some technical specialist.

At a first glance at the salary table, it is clear that an important barrier that many CAs may face is sufficient funding to recruit and retain staff. Despite the funding limitations in recruitment and capacity building activities, CAs also have requirements to ensure their CAs are adequately resourced and have cost recovery powers within the Directive (see Section 4.2.3 below for further information on cost recovery powers). Therefore, instead of direct recruitment through the CAs, these countries may consider alternative arrangements to save costs, e.g. contracting temporary staff (3-5 years) and secondments from CAs and industry for short term arrangement. However, since there is a significant salary gap between CA staff and oil & gas experts in private sectors in many countries, the transfer of highly qualified personnel and training staff from other CAs to support the capacity building in countries with less developed offshore activities appears to be the preferable solutions in these circumstances.

Training

It must be emphasised that **working for a CA require to gather several kinds of expertise, both technical expertise and regulatory experience**. So training, more or less extensive, seems to be necessary for any newcomers in a CA, wherever he comes:

- if he comes directly from university, he needs practical training;
- if he comes from the industry with a good technical background, he will probably need training in regulatory matters;

- even if he comes from another MS' CA, he may need training to get familiar with the country's specific offshore context and to the policy, procedures and processes of the CA.

Training of Offshore HSE Regulations refers to the acquisition of technical knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relate to specific useful competencies in the Offshore HSE Regulations. Training is part of professional development of the CA staff, with specific goals of improving one's capability, capacity, productivity and performance and maintaining, upgrading and updating skills throughout working life. In particular, trainings can be provided in different forms, including **fresh graduates training** and **on-the-job training**. In terms of format, training can be organised through training workshops/courses at a cost of £360pp/day[15], if the trainers are coming from high-income EU countries.

Table 16: Different types of training

Training type	Definition	Training receiver	Training provider
Fresh graduates training	This training program targets at a group of fresh graduates who intend to take up a job in the national CA, and provides specific pre-job trainings aims at qualifying and training them to prepare them for the role of offshore safety regulator.	Fresh graduates from engineering schools or university who is recruited by the CA of MS in question	CA regulators from the MS in question or those borrowed from other MS CAs
On-the-job training (OTJ)	OTJ is a form of training taking place in a normal working situation. It can be offered in two conditions: (1) the relevant CA can offer OTJ to train its technical specialists who are seconded from industry or contracted staff to work on offshore regulation, or (2) CA regulation experts from other countries with mature offshore activities can offer specific HSE trainings to other less mature countries to help with capacity building in the latter country.	Contracted staff and secondments from CAs and Industry who need specific training to become familiar with offshore safety regulation issues.	CA regulators from the MS in question or those borrowed from other MS CAs (e.g. countries with mature level of offshore activities).

4.2.2 International cooperation

By definition, cooperation means any form of social interaction between actors allowing them to achieve voluntarily set common goals by sharing certain resources together. The options of cooperation presented here have been selected based on a broad review of the existing collaboration schemes among the EU member states, taking into account the following aspects:

- Required administrative and legal arrangements;
- Type of resources to be provided;
- Geographical coverage (i.e. international, national, regional, local, cluster, EU levels);
- Implementation barriers;
- Different design options to address these barriers.

[15] http://www.nmms.co.uk/training/courses/Pages/NORWEGIAN-OFFSHORE-HSE-REGULATIONS.aspx

4.2.3 Existing cost recovery schemes

The Offshore Safety Directive includes provisions for Member States to recover costs associated with implementing the Directive. Under Article 8, the Directive states that "Member States may establish mechanisms according to which the financial costs to the competent authority in carrying out its duties under this Directive may be recovered from licensees, operators or owners." Furthermore, under Annex III (d): Provisions relating to the appointment and functioning of the competent authority pursuant to Articles 8 and 9, the Directive stipulates that where appropriate, Member States should require operators or owners to reimburse the competent authority for the cost of carrying out its duties pursuant to this Directive. Therefore, **the Directive makes it possible for Member States to recover operational costs incurred through various mechanisms**. In terms of establishment costs, the same mechanisms could also be used to recover set up costs of the option by increasing the associated fees or re-distributing the funds collected to cover the set-up expenses.

To cover the costs of different souring arrangements for national CAs, there are at least two funding options that can invoke MS's cost recovery powers:

1. Increasing (an effectiveness condition) or revising (a final tranche condition) EU-wide tariffs charged to energy generators (including big oil and gas companies) for the purpose of strengthening energy safety issues. The calculation of tariffs should remain flexible, based on the annual energy production capacity of the country. This approach has already been used by the International Association of Oil and Gas Producers (OGP) for collecting member fees. Similarly, in Ireland, the Irish Commission for Energy Regulation (CER) calculates the establishment costs also based on infrastructure and production volumes of different duty holders (petroleum undertakings).

2. Utilising a fraction of the countries' annual tax revenues or levy from duty holders that carry out or propose to carry out production activities and those petroleum undertakings that carry out Well Work Activities to create a budget for the CAs to cover the cost associated with offshore safety related activities, e.g. monitoring, assessment, inspection, etc.

By far, each of the Member States that are involved in offshore oil and gas activities have established fiscal tax regimes that collect taxes and fees from oil and gas producers and operators.

- For example, in the UK, a producer of oil in the UK or from the UK Continental Shelf (UKCS) is subject to corporation tax (CT) and supplementary charge to corporation tax (SCT – sometimes referred to as the supplementary charge), which is currently at 30% and 32% respectively for the financial year to 31 March 2013. In addition, and depending on the date on which the government gave its consent to the development of the producing field, the oil producer may be subject to petroleum revenue tax (PRT), at 50%.
- In Norway, a company that is involved in extractive activities (i.e. upstream activities) within the geographic areas described in the Norwegian Petroleum Tax Act (PTA) Section 1 is subject to a marginal tax rate of 78% on its net operating profits (28% ordinary corporate tax and 50% special tax) derived from the extractive activities. The area covered, generally, is activities undertaken within Norwegian territorial borders or on the Norwegian continental shelf (NCS).
- In the Netherlands, the petroleum industry is subject to a combination of a corporate income tax (CIT), a surface rental tax, a state profit share (SPS) levy and royalty-based taxation:
    - Royalties 0% to 8%;
    - CIT 25%; 20% applies to the first €200,000;
    - Surface rent tax: Production areas €703 per km²;
    - Reconnaissance areas €235 to €703 per km²;
    - SPS levy 50%;

- Investment incentives Research and Development (R&D) credit, additional 25% deduction on capital invest on qualifying small fields (SPS) – in force since September 2010.

In Ireland, a key principle of the Levy methodology[16] is to impose the Levy upon petroleum undertakings proportionate to the level of regulatory burden created for the CER as regulator in the performance of its functions under the Petroleum (Exploration and Extraction) Safety Act 2010 (the Act). These collected taxes can potentially be used to fund some of the options discussed. Other cost recovery options such as the establishment of an extended producer responsibility (EPR) scheme in the sector is another alternative. Further discussion with Member States would therefore be helpful to shed further light on the feasibility of different sourcing options.

Finally, regarding the charging systems, it is important that the cost recovery schemes provide clear guidance to duty holders (a petroleum operator or owner) on the exact nature of the work to be covered by a fee and how these fees are calculated. In the UK, the HSE will recover the cost of work associated with assessment of safety cases under the Offshore Installations (Safety Case) Regulations 2005 (SCR05) and for enforcement of the relevant statutory provisions (RSPs), that is, those health and safety provisions which apply to offshore installations or to activities on, or in connection with, them. More specifically, the general scope for cost recovery has been broken down into descriptions of 'activities for which costs are recoverable' framed around the main functions which HSE undertakes in respect of SCR05 and RSPs, including:

- assessment of safety cases and design notifications submitted under any of the provisions of SCR05;
- inspection work associated with offshore installations and with activities on or in connection with such installations;
- investigation of incidents;
- enforcement;

Detailed information about the charging system in the UK can be found on the HSE website[17]. This experience could be particularly useful for those MS who need to establish own charging systems under the cost recovery scheme.

4.2.4 Development and implementation of regulatory policy, procedures and process

In order to carry out the regulatory duties and implement the OSD in an effective and efficient manner, the MS will need follow regulatory policy, procedures and processes in order to guide the CAs to conduct the tasks as described in the OSD:

Table 17: Main tasks of the CA

CA's Tasks
Assessment of RoMH
Assessment of Design Notification
Assessment of Material Change Information
Assessment of Well Notification
Assessment of safety cases for 2016 scenarios
Inspection (yearly)
Investigation

[16] http://www.cer.ie/docs/000697/CER%2014429%20-%20Decision%20Paper%20Petroleum%20Safety%20Levy%20(Version%203.0).pdf

[17] Cost recovery for offshore activities - A guide, available at: http://www.hse.gov.uk/charging/offshore/chgoffsh.htm

Enforcement, Combined operations, Setting CA objectives and priorities and Reporting to the public and European Commission.

However, due to the different levels of offshore activities involved in the different country groups, the levels of development and implementation of regulatory policy, procedures and processes also differ among these countries.

Although it might be helpful to have EU-level guidelines regarding regulatory policy, procedures and processes for guiding and monitoring the performances of CA in carrying out its duties, it seems important to leave the MS CA decide their own regulatory policy, procedures and processes, in particular the Group 1 countries who have accumulated extensive experience with their own CAs in the past.

However, an EU-level regulatory policy, procedures and processes can be extremely useful for Groups 2 & 3 countries, where offshore regulatory experience is scarce. A European organism (either an already existing one, such as the JRC, for instance, or a newly created dedicated one) could gather the regulatory policy, procedures and processes which were developed in Group 1 countries, select the best practises and design a set of ready-to-use regulatory policy, procedures and processes. Among this set of pre-prepared documents each CA, mostly from Group 2 or even more from Group 3 countries, could select the most relevant regulatory policy, procedures and processes and adapt them to the specific situation of offshore activities in each MS.

An alternative that might be considered is to develop policy, procedures and processes at a regional level/ country group level.

4.3 Description of the different options

4.3.1 Option 1: Baseline: MS CA have a fully resourced CA including offshore expertise, technical and knowledge systems and regulatory systems.

Definition of the baseline option 1

The baseline option describes an ideal situation where **MS' CAs will manage to have a fully resourced CA including offshore expertise, technical and knowledge systems and regulatory systems through recruitments, development and training**.

In other words, the baseline solution to address the resource gaps is to **combine recruitment and training** to build capacity and meet the resource needs at country level and Member States **are not using any external expertise** (e.g. experts from the industry).

The key assumption behind the baseline solution is based on the hypothesis that each Member State needs to rely on its own resources and capacity building already planned. These resources refer not only to the human resources which are difficult to be shared without a legislative framework, but also to other organisational arrangements which can be transferred (at least partially) without significant technical or legal barriers (e.g. guidelines and manuals).

During the 8th EUOAG meeting, MSs have confirmed that both recruiting and training would be essential elements for addressing their needs of offshore safety related specialist. However, these two options should not be discussed separately, but rather the combination of recruiting and training has become necessary in many cases. In addition, the CA regulation needs to be put in a specific political context. Even if it concerns an experienced CA from a country with mature offshore development, this person may not be able to take up the same inspection tasks in a different country due to the difference in constitution and regulation procedures. Therefore, dedicated training will be needed even if recruiting has been undertaken.

Below, we will describe several potential sub-options that may be considered to cover different sources of recruitment and models of personnel training. We will focus on recruitment matters (sub-option 1a

and 1b) and on training challenges (sub-option 1c and 1d). It has to be noted that sub-options 1a and 1b are not exclusive of options 1c and 1d: recruitment can be organised according to sub-options 1a or 1b, while training can be organised according to sub-options 1c or 1d.

A. Recruitment: option 1a vs. option 1b

- **Option 1a:** Recruitment of discipline specialists from the offshore industry and other relevant sectors to train them in regulatory topics.

This option refers to secondment of discipline specialists from the offshore industry that are operating in the MS in question or from other relevant sectors to fill the short-term resource needs in the CA. This type of recruitment targets at highly qualified specialists in specific disciplines, who however need to receive training on the regulation procedure in order to carry out missions for national CAs. For instance, the UK has already tried to recruit discipline specialists from private sectors as well as from organisations. Over the past 2-3 years, UK CA borrowed 2-3 engineers from oil and gas companies to work with the CA. To ensure the independency of these engineers, they are not allowed to work on any safety issues related to the companies where they worked before. The CA has also used organisation expertise on several occasions. An alternative source for recruitment being considered is military. For instance, the UK is currently looking to recruit and train personnel from outside the sector including the military to begin to address the identified pressure points[18].

There are several barriers in association with this recruiting option:

1) Financial barrier

As mentioned previously, the salary gaps between the public and private sector may create a strong barrier that prevents the CA from recruiting technical specialists from the offshore industry. In fact, as shown in the JRC consultation, several countries, including, Greece, Poland, Ireland, Cyprus and Malta have already put forward the serious issues of their funding limitations. The Netherlands has also raised the difficulty for them to recruit more staff for the CAs due to the high salaries required. Therefore, it is essential that the MS CA should be able to come up with tailored cost recovery plan to overcome the financial barrier. Moreover, it is important to address again that the Offshore Safety Directive includes the requirements of the MS to fully resource CAs, which requires MS to review these financial barriers and take actions to permit the recruitment of disciplined expertise.

2) Political barrier

Even if not being limited to the funding availability for recruitment, some MSs may find their public regulative bodies impose barriers that could prevent them from hiring specialist private sectors. For instance, the Irish CA has the cost recovery capacity to leverage funds to provide an attractive salary to private sector specialists, however the hiring will be unlikely approved by the authority, as it is considered unappropriated and unfair to provide an exceptionally high salary to only the CA department of the government. Although only Ireland has reported this type of barriers by far, similar situation may arise in other MSs as well, in particular those MSs at their early stage in terms of offshore activities.

3) Technical barrier

The technical barrier mainly concerns the barrier for regulatory aspects related to the CA task. CA staff should have combined technical and regulatory skills that will allow them to carry out

[18] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/175480/bis-13-748-uk-oil-and-gas-industrial-strategy.pdf

inspection tasks, but technical experts from the private sector usually have not received regulatory training before joining the CA and therefore do not have the technical competencies to perform inspection tasks of the CA. For instance, over the past years, the UK has tried to second a few wells specialists from private company to support the CA tasks for a contracted period of time. These specialists have highly qualified expertise in the relevant area, but often they have no background/knowledge in regulatory responsibilities of the CA, therefore they cannot carry out immediately a mission designated by the CA without any specific training. However, this barrier can be overcome by specific regulatory trainings, which on the other hand will require the MS to have an infrastructure within to support such trainings when technical resource is brought in.

- **Option 1b:** Recruitment or develop from within CA of persons who are not technically competent to fill the role of the offshore specialist; this will include technical training and development in the specialist field.

This option refers to recruiting or developing personnel within the CA function by providing specific technical training and development opportunities to those who are not technically competent to fill the role of the offshore specialists or training CA personnel in all competences so that they can take up many roles in the CA (e.g. France). However, in the latter case, it should consider a reasonable increase of salaries for these CA personnel who have also increased their working load.

It must be pointed out that in several cases **Member States do not use expertise from a single CA but from several public authorities** (see table below). For example, Cyprus plans to use expertise from the onshore CA which has been set to fulfil the requirements of the SEVESO Directive. In Italy, the diving services are provided by the Italian Coast Guard and the Italian Navy. In these situations, it is important to be clear whether these resources are fully dedicated or proportionally available to offshore regulation, as they will affect whether the CAs are adequately resourced to facilitate the regulator activities to strengthen the offshore safety. Moreover, these CA personnel should also receive dedicated trainings enabling them to conduct regulation tasks concerning offshore safety issues.

Table 18: An overview of CAs at MS level for 2014 (existing) and 2016 (planned)

Country	Current Regularity Authority 2014	Planned Regulatory Authority in 2016	Comments
Belgium	N.A.	N.A.	N.A.
Bulgaria	N.A.	N.A.	N.A.
Croatia	Croatian Hydrocarbon Agency	Croatian Hydrocarbon Agency	N.A.
Cyprus	Department of Labour inspection	Department of Labour inspection	For safety and environmental issues: technical advisory committee consisted by departments of: environment, fishery and maritime and coordinated by the department of Labour inspection. For licensing issues: Ministry of Interior

Country	Current Regularity Authority 2014	Planned Regulatory Authority in 2016	Comments
Denmark	DEA, DEPA,DMA	No decisions have yet been made regarding the future regulatory authority. DEA will become the licensing authority and will therefore not be part of the new CA. DMA will also not be a part of it, as it has been put under the Ministry of Enterprises and Growth. By the end of 2014 the situation would probably be clearer.	N.A.
Estonia	N.A.	N.A.	N.A.
Finland	N.A.	N.A.	N.A.
France	Ministry of ecology, sustainable development and energy, and especially the General Directorate for Risks Prevention and the regional offices responsible for regulating offshore activity (DREAL)	Ministry of ecology, sustainable development and energy, and especially the General Directorate for Risks Prevention and the regional offices responsible for regulating offshore activity (DREAL)	N.A.
Germany	Landesamt für Bergbau, Energie und Geologie (LBEG)	Landesamt für Bergbau, Energie und Geologie (LBEG)	The licensing division and the supervision division belong to the same institution, but are considered to be separate
Greece	Petroleum Policy Directorate	To be determined	
Ireland	DCENR and CER	Combination of CER and DCENR, the roles of which are yet to be properly defined. Discussions on the final makeup of the new CA are still ongoing	Currently, CER deals with major accident safety related to both people and the environment
Italy	Italian Coast Guard, the Italian Navy, National Civil Protection Service.	Italian Coast Guard and the Italian Navy	In regard to environmental controls, skills and staff are guaranteed by the access to all of the national resources in case of need. Diving services are guaranteed by Italian Coast Guard and Italian Navy. Evacuation and Emergency Response, Marine & Aviation Operations services are ensured by Italian Coast Guard and National Civil Protection Service.
Latvia	N.A.	N.A.	N.A.
Lithuania	N.A.	N.A.	N.A.
Malta	Continental Shelf Department	This will be confirmed following the transposition of the Offshore Directive into Maltese legislation	N.A.
Netherlands	SSM	SSM	N.A.
Poland	State Mining Authority and Maritime Administration	State Mining Authority and Polish Maritime Administration or State Mining Authority and Territorial Authority (ongoing discussions)	If “the regulatory authority” means organs fulfilling regulatory functions according to the art. 8 and art. 9 of the Directive 2013/30/EU, it is proposed to set up CA consisting of the President of State Mining Authority and the Directors of Maritime Offices in Gdynia, Słupsk and Szczecin

Country	Current Regularity Authority 2014	Planned Regulatory Authority in 2016	Comments
Portugal	DGEG: Direção Geral de Energia e Geologia	ENMC	In 2016, there will be a new CA (Entidade Nacional para o Mercado de Combustíveis, E.P.E. – ENMC). A department of DGEG (i.e. the current regulatory authority) will be a part of it
Romania	N.A.	N.A.	N.A.
Spain	Ministry of Industry, Energy and Tourism Ministerio de Fomento – Direccion General de Marina Mercante	Ongoing discussions	Discussions on the new regulatory authority are still ongoing. With the current number of installations and low level of activity, there is no need for Spain to have a separation between the Safety & Environmental Protection authority and the licensing authority. Nevertheless, Spain is making plans in order to arrange competences in an independent way, thus avoiding conflicts of interest.
Sweden	N.A.	N.A.	N.A.
United Kingdom	HSE (for safety issues) and DECC (for environmental issues and licensing)	HSE/DECC	Too early stage to give an official reply for 2016
Norway	PSA, NEA	PSA, NEA	N.A.
Iceland	N.A.	N.A.	N.A.
NB: N.A.= info is not available			

Similar to option 1c, this option has also several barriers that prevent it from being operational.

1) Political barrier

Whether it is feasible to relocate resources from other CAs to the offshore activities depends on the political systems of the MS. The same option may be easier to operate in some political structures than others. Moreover, this option also requires strong cooperation between different CA departments in order to have a clear picture regarding whether required resources are fully dedicated or proportionally available to offshore regulation and whether the CAs are adequately resourced to facilitate the regulator activities to strengthen the offshore safety. For instance, countries like Italy and France are known for the complexity of their bureaucratic systems comparing to some other countries, therefore it might require these countries to put strong effort develop options to eliminate the potential political barrier. Lessons may be learned from countries like the UK, where government efficiency are most valued.

2) Technical barrier

The technical barrier mainly concerns the barrier for regulatory context related to the CA task. CA staff from other department may have acquired technical expertise from other duty stations, but they may not have a comprehensive understanding of the offshore regulatory issues. Therefore, specific training will need to be provided to offshore CA staff who are seconded from other CA departments before assigning them for any specific regulatory missions. Apparently, this barrier can be overcome by specific regulatory trainings.

Finally, it is important to note that both of the two recruitment options presented above exclude the possibility of recruiting fresh graduates from engineering schools and training them to be CA specialists. This may be a fundamental solution for the median- to long-term to address the increasing needs of offshore expertise in the EU and globally. However, this option will not be considered in the present study, as it seems unrealistic to turn fresh graduates into experienced offshore specialists in 2 years of time to meet the level of MS expected activity in 2016.. In addition, to meet the long-term needs of

human resources, the oil and gas sectors and the relevant CA should be able to benefit from government's encouragement of career orientation by providing guidance to students on the essential subject areas to take courses in engineering related subjects. This will increase the total number of annual engineering graduates and therefore prepare qualified candidates for filling increasing gaps of CAs on the supply side. This may eventually contribute to reducing the unemployment rates of young people in the EU.

B. Training: option 1c vs. option 1d

Moreover, in addition to recruitment, **another option to increase the resource capacity of CAs is to raise the knowledge and expertise levels of current staff**.

This could be done by organising more training opportunities and workshops by inviting offshore specialists from private industries or other CAs to give lectures on specific competencies in order to provide. These actions could provide current staff with more extensive knowledge of all competencies, which could cut costs. This is for instance the case of France, where all the personnel working in their CA is being trained in all competences on a regular basis. In order to maintain regular training activities and workshops, it is essential to secure a certain amount of budget. Training could be organised through two "models":

- **Option 1c:** Training collectively organised by the European Commission or other competent body.

Trainings collectively organised by a centralised EU training infrastructure in charge of organising the training activities on different topics at a regular basis. Outcomes of the 8th EUOAG meeting suggests that although MSs are keen on Regulatory workshops, Regulatory training schemes and training courses, EC as the coordinator of training services may not be properly perceived by the MS. Alternatively, it might be possible to create an **Offshore Centre of Expertise** that could be managed by an EC appointed person (possibly an ex-experienced senior manager of a CA). Costs of organisation of the training workshops should be collectively contributed by the Member States based on the level of their respective offshore activities (see option 3 below for further information on cost-sharing agreements).

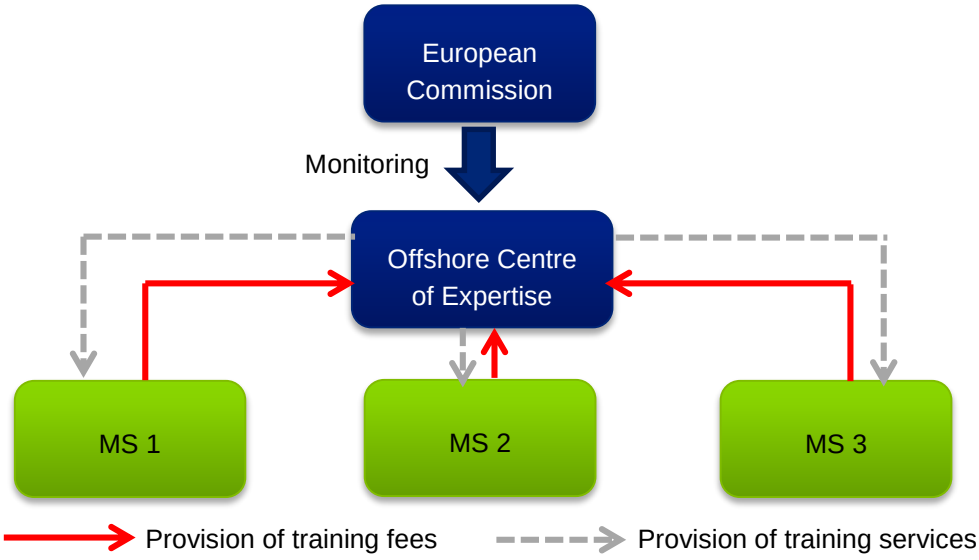

Figure 7: Training through an offshore centre of expertise

The figure above shows that Member States can provide training fees to the OCE who can then organise and provide training services in the competency areas for all of the Member States at a regular basis. This collective training model can reduce the individual financial burden for each

Member State while ensuring the quality and content of the training for all different competency areas of the CA. However, it might be less efficient in terms of addressing the specific requirements of certain types of competencies in some countries.

The OCE should also be able to provide courses to trainees at different levels, e.g. entrée and advanced courses, to cover the diverse levels of the trainees and allow trainees to obtain progressive training in specific competencies. In this training model, all trainings are short-term and changing on a yearly basis, therefore it is not necessary to provide different training courses to personnel who are on short-term or permanent contracts. However, it is important to take into account the different years of expertise as a reference for assigning trainees into either primary or advanced level of training. Moreover, it is recommended that permanent staff should take trainings in broader competency areas whereas contract staff should take trainings relevant to the tasks that they are hired for.

In terms of the organisation of the training courses, trainers are topic specialists coming from MSs CA, other relevant sectors or industry, depending on the specific topics to be addressed. In terms of the arrangement of teaching agenda, MSs may rotate to provide sufficient source of trainers to ensure the stable supply of training courses. The procedure of organising the training course may be set up as follows. First, requests and prevision of training topics will be submitted by the MS' CAs in every third quarter of the year. Then, the OCE will evaluate these requests and coordinate among all MSs, and provide a training programme for the coming year, which is supposed to balance the supply and demand of different topics, along with detailed budget needs for running the planned courses. Next, the proposal of a final training programme should be approved by the OCE and the final programme should be informed to MS in every fourth quarter of the year.

- **Option 1d** shared training organised by specific MS

Trainings individually organised by the Member States to address their specific expertise needs. This model of training is more flexible than **Option 1c** and each Member State could organise its own training workshops and invite highly specialised expertise from other Member States and relevant organisations to give lectures on specific areas where competencies are lacking. This type of training is offered on request, and thus may be more cost-effective for specific subjects or dealing with tangency.

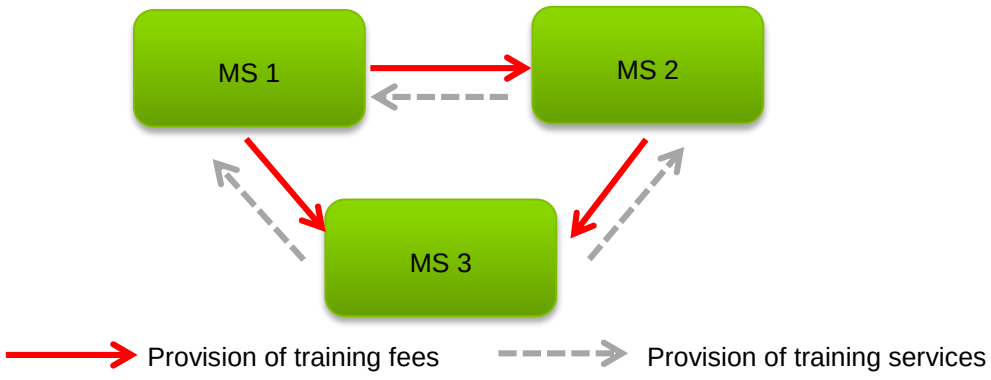

Figure 8: Training through agreements between MS

In this case, the training organiser is also the training demander. It sets up its own training programme and hires trainers from other MSs CA, other relevant sectors or private companies, depending on topics. Here, the training organiser may consider different training programmes to its contracted and permanent CA personnel. For the contracted short-term staff, they are most probably some specialists that are hired to take up some specific tasks of the CA, however, since

they are not familiar with the regulatory background and procedures, the training courses may be provided in a concentrated period of time and focus on regulatory regimes and procedures. On the other hand, for permanent staff, the training courses should focus on improving the overall knowledge and skill of personnel in all competency areas related to the CA, and be provided regularly.

Regarding the training costs, it should be noted that this model requires MS to individually cover their own training expenses rather than the collective contributions described under **Option 1c**. Therefore, it requires the MS to set up different cost recovery plans for both contingency and long-term request. This training option may be more costly compared to Option 1c, as in the latter option, costs related to training organisation are shared by other MS. In order to reduce the financial burden of EU MS, Option 1c and Option 1d may be combined to cover all training aspects.

In the next section, the applicability of these potential options in addressing CA resource needs will be further explored in the specific contexts, i.e. the 3 specific country groups mentioned above.

Option 1 as a sourcing option for different country groups

In the baseline scenario, the use of balance sheets is useful for specifying the resources which are required on the same year for an adequate transposition of the Directive. The outcome of the balance sheet shows, at the Member State level, the feasibility of providing the necessary resources (e.g. experts, knowledge systems, and interaction strategies) at the level of MS expected activity in 2016. This section will focus on discussing how option 1 can be used for different country groups under consideration.

- **Group 1 countries**

Many countries in this group are facing increase of resource needs for the CA activities that are planned for 2016 and beyond. In particular, it is expected that the overall resource need to assess ROMH will pick for the period between 2016 and 2018/2019 as a result of implementing the OSD. The resource requirements will fall back if the MS offshore activities remain constant. For this reason, it may be more reasonable for this country group to consider recruiting specialists on a 3-5 year contract instead of a permanent one to meet the short-/medium-term resource requirement. In addition, to address the short-term resource need, these countries may consider outsourcing assessment for RoMH, while recruiting/retaining numbers sufficient for inspection and investigation. Additional challenges are faced by this country group is that their current CA staff are aging quickly and some are approaching to their retirement age. Therefore, the CA overall may face severe shortages of personnel in the short-/medium-term, which has to be addressed in the short-/medium-term planning of resource recruitment.

It is important to note that as this country group has relatively more experience in their offshore activities and established knowledge systems, it is very likely that these CAs will become the key sources of trainers to support other CAs in their capacity building, either through a collective training or decentralised individual MS training model.

- **Group 2 countries**

Group 2 countries with some imitated offshore activities are facing a general lack of resources in their CAs. Therefore, to ensure their CAs are fully sourced for the future activities that are planned for 2016, they will need to consider to recruit more permanent staff, who can develop and grow professionally with the CA and become key experts in different competency areas. Therefore, these countries may consider recruiting permanent staff as their dominant sourcing strategy to meet the increasing need of staff for not only the short-term but also the long run.

In terms of training, this country group would mainly be a training requestor than a provider. Since they have developed certain levels of offshore activities, these countries may need both training options 1c and 1d to cover all knowledge area and for both temporary and permanent staff.

➢ Group 3 countries

Group 3 countries have no offshore activities at the moment, and therefore it can be considered their experience in the area is quasi-zero. Therefore, they will not only need to set up a complete recruitment plan, but also systematic trainings that will help them with their capacity building in terms of both technical expertise and regulatory systems. Similar to group 2 countries, it is recommended that this country group should focus on permanent staff recruitment, and develop cost recovery strategy to cope with the respective resource needs.

Regarding training, this country group are mainly the training requestors, who will fully rely on the technical support of other MS and sharing of best practices to build their own carrying capacity in the offshore safety issues. For this country group, the most effective training model is probably the collective one that is managed indirectly by the Commission. A more dedicated training program may be developed in a later stage when these countries will begin their offshore activities and have more practical problems to be resolved.

To conclude, Option 1 serves as a fundamental option for all countries to resolve their sourcing problems in terms of the median-/long-term needs of resources for implementing the OSD. However, it should be recognised that all these options will rely heavily on a robust cost recovery power, which may not be developed in an intermediate term. In other words, developing a cost recovery system that is able to fulfil the funding requirement for recruitment and training options will need time. Before, the MS may rely on alternative solutions that can be proposed to address resources gaps based on the assumption of certain levels of cooperation at either regional or EU levels, or with third party expertise. However, another question is in what format can these external independent experts collaborate with the national CAs and how could this external expertise be efficiently allocated to the places of need? It must be highlighted that the survey conducted by JRC shows that certain Member States are already using third party expertise, e.g. Ireland.

4.3.2 Option 2: Intra-EU expert transfer and knowledge sharing between MS

Definition of option 2

Option 2 assumes that **the identified resource gaps will be only addressed by expert transfer and knowledge sharing through either bilateral or multilateral sharing arrangements** between certain different CAs of the same MS that have common implementation difficulties or between different MS governments when certain expertise is rich in one country and lacking in the other. The transferred experts can complement or cover deficits of another CA or MS.

Similar transfer mechanisms have been considered for transferring renewable energy produced in one MS to others under the RES Directive[19]. Based on interviews with EU Member States and a literature review, the Ecofys' 2014 report identified the Member States engagement in cooperation mechanisms, barriers for a broader application of cooperation mechanisms and potential remedies to overcome these barriers. Their research showed that while only few Member States actively pursued cooperation mechanisms so far, many Member States indicated that they might consider applying cooperation mechanisms in the future. In practice, cooperation mechanisms have only been used by Sweden/Norway so far. UK and Ireland had a very concrete initiative and already signed a memorandum of understanding. Several Member States have started consultations, but with a lack of urgency, as these policy initiatives are not yet high on the political agenda. Uncertainty on design and cost-benefit allocation aspects as well as key political barriers also hinder the implementation of cooperation mechanisms even among the Member States that have expressed an interest in cooperation.

In the context of offshore safety, collaboration among MS, such sharing arrangements could help facilitate the transfer of locally scarce specific expertise from an offshore sector mature country to other immature countries. For instance, the lack of expertise in HPHT (High Pressure, High Temperature) and

[19] Ecofys (2014) Cooperation between EU Member States under the RES Directive.

Ultra Deepwater drilling has been highlighted by Italy and Denmark during a consultation conducted by JRC in 2014[20]. Expert sharing/transfer can be carried out through many forms, such as borrowing senior experts (from another CA within the country or from CAs of other countries) for dealing with specific safety issues in less mature countries for a particular season, training junior experts from these countries, and helping them build formal technical and knowledge systems and improve stakeholder interactions. This type of expertise transfer has been discussed in Option 1 in the forms of both recruitment and training. Regardless of the format of and difficulties related to intra-EU expert transfer, the arrangements of these transfers have to follow two types of contract: **bilateral agreements (Option 2a)** or **multilateral agreements (Option 2b)**.

A bilateral agreement or multilateral agreement refers to a reciprocal arrangement between two nations (bilateral) or more than two nations (multilateral) where all involved parties promise to perform on agreed common ground that facilitate and strengthen international collaborations among governments, academia, institutions and industries in the research areas of offshore safety issues.

The purpose of these agreements has been for:

(i) exchange of offshore safety information/knowledge;
(ii) exchange of regulatory specialists/technicians for training under the projects;
(iii) joint execution of projects that improve offshore safety in common waters;
(iv) organisation of joint meetings, seminars, workshops, symposia in identified subjects of cooperation.

As part of the knowledge sharing agreements between Member States, countries could focus on developing **common training schemes** for the lacking expertise. In the EU, these deficiencies do not necessarily concern all Member States. Group 2 and 3 countries with a rather limited offshore infrastructure and incomplete control mechanisms are facing more severe expertise deficiencies compared to the Group 1 countries. Therefore, knowledge transfer should not only focus on the transfer of experts of Group 1 countries, but also experiences and best practices of these countries and transplant these best practices to deal with or prevent from safety disasters incurring in other country groups. Detailed training arrangements are discussed in Option 1c & 1d.

It should be noted that both types of sharing arrangements (bilateral agreements or multilateral agreements) have advantages and disadvantages (see Table 19). Therefore, every transfer arrangement is case-specific. The MS have the flexibility to choose the transfer arrangement that is best suited to address their needs. Moreover, as far as the costs are concerned, in addition to the transaction costs, it should be agreed by all the parties signing the contract who shall bear the costs of personnel. If it concerns agreements between two or more MS, it shall be discussed whether the costs of personnel will be shared or born solely by the countries in better financial situations. If it concerns different CAs within one country, the question is probably simpler as all personnel working for the CAs are usually hired by the public bureaucracy system; nonetheless, specific agreements will be needed.

[20] JRC (2014) National expert resources for overseeing offshore safety in the EU.

Table 19: Different types of sharing agreements between countries

Type of agreement	Number of countries involved	Advantages	Disadvantages
Option 2a. Bilateral agreement	2 (at country level)	• Early implantation possible; • Lower transaction cost; • No preconditions; • May benefit from the use of a common language; • A long term-cooperation can be settled based on the development of pilots.	• Not sufficient for the overall shortage of experts in one country; • Greatly increase transaction cost if more than 1 bilateral agreement is required; • Might be difficult for MS with limited number of offshore industry and general lack of overall expertise; • Lack of availability of the required expertise in terms of time requirement, efforts needed, etc.
Option 2b. Multilateral agreement	> 2 (at regional level)	• Suitable for large-scale collaboration; • Better risk-sharing between MS; • Significantly reduce certain costs (e.g. travelling costs) at regional level; • May benefit from the use of a common language; • Precondition: including all necessary parties.	• Potentially high transaction costs; • Long implementation process.

Although such transfer agreements could provide access to otherwise unavailable expertise, it is expected that they would differ depending on the nature and amount of resources available and shared, thus they would not ensure consistency across all Member States. Moreover, it might not be sufficient to support the emergency needs of certain expertise during a major risk event. Therefore, other cooperation options may also be considered.

Option 2 as a sourcing option for different country groups

The JRC survey has clearly shown that **expertise transfer was considered as a favourite option by many MSs**, in particular those that are facing severe technical and funding constraints. However, in the 8th EUOAG meeting held in Brussels in November 2014, many Group 1 countries (e.g. the Netherlands) have clearly stated that Group 2 & 3 countries should not rely too much on the support of other countries to transfer technical experts to help them implement the OSD, as all EU MS will be facing shortfall of resources with the offshore activities planned for 2016 and beyond. Instead, it might more reasonable to share the best practices to help Group 2 & 3 countries develop their own institutional structure and resource capacity to carry out regulatory duties. Moreover, a cost recovery plan that is most suitable for the country should also be in place for addressing the resource needs. To assess the applicability of this option in practice, it is important to put the option in the context of different country groups.

- **Group 1 countries**

It is considered that Group 1 countries are in a better position in terms of sharing expertise with other two country groups, due to their accumulated expertise and established knowledge system in the offshore safety area. However, the gap analysis suggests that this country group will be also facing resource constraints. In particular, the Netherlands has already raised the difficulty for them to recruit more staff for the CAs due to the high salaries required. This situation will become severer in the scope of future offshore activities and resources required by the CA to implement the OSD. Therefore, for this country group, expertise transfer between countries within the group for the purpose of knowledge and

experience exchange is feasible. These countries may also lend their experts for training purposes to support either collective or individual training requests (see details about training options discussed under Option 1c and 1d). Depending on the occasion, the format and contents of agreements will be negotiated between parties involved accordingly. For long-term collaboration between MS, it is important to develop appropriate MS legislative systems to deal with them.

Furthermore, specific agreements may be arranged by a network of MS based on the specific regulatory services to be supported collectively. For instance, for assessment, it might be worth designate a specific team consisting of members from all MS in the network for assessment of a RoMH whether non production or production. For inspection, the network may agree on supplying a team to carry out a specific thematic inspection. For investigation, the network may agree on supplying part of or a complete investigation team for a specific incident. In addition, other supportive actions may be taken by a designated person or team to help set up a CA through assisting development of policy, procedures and processes as well as stakeholder engagement arrangements for workforce consultation or industry forums within a new MS.

- **Group 2 countries**

This country group will reply on the knowledge transfer from Group1 countries and may also exchange learning process and share best practices within Group 2 countries, which are also in the process of building capacity to strengthen the offshore knowledge systems and interaction with stakeholders. However, this country group should not expect that Group 1 countries will be able to support them with direct technical experts due to already existing resource constraints. Alternatively, they should focus on developing their independent engineering expertise through improved domestic educational system, which will be able to provide young engineers to work in the oil and gas sectors.

- **Group 3 countries**

Similar to Group 2 countries, Group 3 countries are also in need of knowledge and expertise transfer from other countries in order to carry out all the regulatory duties. Unlike Group 2, Group 3 countries are more dependent on external support due to their extremely limited experience in offshore activities. The quick learning process for these countries will be to copy an existing knowledge system that has been implemented in other MS and adapt it to their specific political context. In this case, they may consider building up a bilateral agreement with individual group 1 counties as part of national strategies for the public relations. Furthermore, this country group should also focus on developing their independent engineering expertise through improved domestic educational systems.

4.3.3 Option 3: Creation of a network of 3rd party experts and a dedicated mutual facility for each authority spread between MS or further afield

Definition of option 3

This option assumes that **resource gaps can be addressed by bringing together existing centres of third party technical expertise/engineers** from private industries or research institutes in at the EU and global level. Such centres can refer to both the private oil and gas industries and the public sector organisations working on the following areas:

- Technological R&D;
- Standards development;
- Technical certification;
- Forensic investigation;
- Academic and technical institutions (to be considered as a secondary solution).

Cooperation between oil and gas industries is common in particular for some common interests, such as HSE (Health, Safety and Environment) collaboration to avoid major hazard events. Nevertheless no

evidence was found that would indicate a sharing of experts between the members of the public sector organisations mentioned above.

In terms of possible cooperation structure among different experts that are very often belonging to certain types of organisation, Wagner *et al.* (2000) indicated that a set of drivers can affect the formulation of international cooperation and networks tied to funding and intellectual organization, based on a database collected from research collaborations. Figure 9 adapts the four key drivers proposed by Wagner *et al.* (2000) and suggests four possible ways of creating a network of offshore safety experts for the EU MS. The vertical represents organising features related to funding, from highly organised "top down" activities to spontaneous or "bottom up" activities initiated by experts themselves. The horizontal represents the location of experts, from widely distributed to highly centralised locations. The juxtaposition creates four quadrants that we explore in four sub-options as organising imperatives influencing the creation of a network of 3rd party expertise for the EU.

Figure 9: the structure of offshore expert network in the EU[21]

- **Option 3a: centrally controlled/managed by the European Commission**

Option 3a represents a highly organised-centralised international cooperation scheme that falls in the "**centrally controlled/managed by the European Commission**" quadrant (Figure 9), where **EU-based experts collaborate at or around a central facility developed and ultimately managed by a person or organisation appointed by the European Commission**.

The funding for supporting the establishment of such a facility can be gathered from difference sources. A primary funding solution could be discussed between the EC, potential donor and/or industry sponsorships. Secondly, MS can also directly contribute to a common fund with agreed percentage of annual offshore-related tax revenues generated in the country. The funds can be managed by the person or organisation, who is in charge of the central facility.

As an illustrative example, such a central facility may be established on the basis of the development of a web-based expert register in order to respond to major accident investigations at the EU level. This web register can be built upon the existing EMPOLLEX programme established by the European

[21] Adapted from Wagner C., Staheli, L., Silberglitt, R., Wong, A. 2000. Linking Effectively: Learning lessons from Successful Collaboration in Science & Technology, The RAND Corporation, Santa Monica

Maritime Safety agency (EMSA) that has been focusing on exchanges of expertise in five major areas within the field of at-sea preparedness & response which are suggested areas of focus for the exchange to take place. The five major areas for experts exchange include:

- ✓ Coordination & incident management: (inter)national coordination, decision-making, crisis management & communication.
- ✓ Technical expertise / response operations: response to pollution by oil or Hazardous and Noxious Substances (HNS) at sea, including aerial & satellite surveillance, health & safety, response equipment & waste management aspects.
- ✓ Contingency & emergency planning: national & regional marine pollution contingency planning, preparedness & response aspects.
- ✓ Legal & financial aspects: enforcement & prosecution of deliberate marine pollution, claims, cost recovery.
- ✓ Scientific & environmental expertise: environmental, impact evaluations or studies, remote sensing, mathematical modelling, monitoring & oil sample analysis, net environmental benefit analysis.

Under the extended web-register system, all EU-experts working both at public research institutes and private industries and related to the offshore oil safety and inspections will be requested to register themselves in the EU database (obviously, all personal information should be kept extremely confidential by the European Commission).

The development of a pool of experts within the European Maritime Safety agency (EMSA) is the first step. Furthermore, the central facility could function as a talent agent to oversee the needs of offshore specialists and regulatory experts at the MS level, provide MS with access to the offshore specialist database, and establish dialogue between the experts and the MS, in order to help facilitate collaboration between MS and the third party experts.

This way of organising the experts have a few advantages:

1. It is a centralised system which allows the Commission to have a comprehensive overview of the existing resources at both national and EU levels and can embrace both offshore and onshore installations. In particular, the market of some staff categories is particularly competitive without a need for a full time recruitment (especially in countries with a small-sized offshore infrastructure), the implementation of this solution could also generate significant cost-savings (especially transaction cost) for CAs.
2. It is more efficient if the Commission acts as a data centre, coordinating and mobilising resource among different member states, in particular in the case of emergency events. In addition, the coverage at EU level would justify full-time recruitments, thus eliminating potential conflict of interests that might occur in cases where such experts work also for private operators.

However, the centralised top-down approach might be very difficult to implement in practice for a few obvious reasons: First, it will greatly increase the financial burden of the Commission to run such a mega-database of experts from 28 (or at least 16 or 18) MS and coordinate between countries. Second, the independency of experts in such a system may not be guaranteed, as there might be potential conflicts of interest between private sectors and the CAs in certain action areas. Alternatively, pooling experts may be achieved at regional level, where a few member states may choose to cooperation under a **joint support scheme (Option 3b)**.

- **Option 3b: International cooperation through joint support scheme**

In the highly-organised-distributed **"Joint support scheme" quadrant**, **the network of 3rd party expertise can be built upon some international cooperative mechanisms which already exist among some Member States** (most possibly neighbouring countries who have already begun to

collaborate under certain cooperative mechanisms) **and with other non-EU countries** such as Australia, Brazil, Canada, Mexico, New Zealand and the USA. Different from Option 3a, the international cooperation mechanisms can be used to explore resource availability at a global scale to address the shortfalls of offshore safety expertise, such as regulatory specialists & Safety Management systems, diving specialist, mechanical engineering and process engineering experts, in different EU regions. These cooperative mechanisms can be created based on:

- Existence of common implementation issues (see previous solution);
- Existence of organisations that could accommodate such centres (e.g. regional marine conventions);
- Existence of similar initiatives on other areas of intervention (e.g. safety on onshore installations).

This way may allow the creation of a common source of expert database to be shared among some Member States. Several obvious advantages can therefore be identified. In particular, the use of existing or the development of new arrangements would enhance synergies, reduce the duplication of efforts, lower the administrative burdens and reduce inconsistencies in the emergency planning between Member States. As a matter of fact, the findings of the JRC study indicate that such arrangements have already been established at regional level and many EU countries have been already connected by several cooperative mechanisms of which they become a member. In addition, there have been ongoing exploratory talks in North European countries to develop such joint support schemes. Examples of such transnational cooperative mechanisms are presented in the table below.

Table 20: Examples of existing transnational cooperative mechanisms in the EU

Name of the cooperative mechanism	Participating countries (by 2013)
International Regulators' Forum (IRF)	Australia, Brazil, Canada, Denmark, Mexico, the Netherlands, New Zealand, Norway, the UK and the USA.
International Committee on Regulatory Research and Development (ICRARD)	Australia, Brazil, Canada, Mexico, the Netherlands, New Zealand, Norway, the UK and the USA.
North Sea Offshore Authorities Forum (NSOAF)	Denmark, the Faroes, Germany, Ireland, the Netherlands, Norway, Sweden and the UK
European Diving Technology Committee (EDTC)	AT, BE, CZ, DK, EE, FI, FR, DE, IT, LV, NL, NO, PL, PT, ES, SK, SE, CH, TR, UK
Offshore Mechanical Handling Equipment Committee (OMHEC)	Denmark, the Netherlands, the UK and Norway

Source: Petroleum Safety Authority Norway (PSA), 2013 Final report.

At a broader scale, the mechanism may also benefit from some existing international expert exchange forums, such as IRF, ICRARD, and NSOAF (Table 20). One important network of offshore expertise resources, from which CA can benefit, would be the International Association of Oil and Gas Producers (OGP), founded in 1974 with the aim to develop effective communications between the upstream industry and an increasingly complex network of international regulators. In particular, its missions include the following:

- Facilitating continuous improvement in HSE, security, social responsibility, engineering and operations;
- Undertaking special projects and developing industry positions on critical issues affecting the industry;
- Creating alignment between oil & gas E&P companies and with relevant national and international industry associations;

- Advancing the views and positions of oil & gas E&P companies to international regulators, legislative bodies and other relevant stakeholders;
- Providing a forum for sharing experiences, debating emerging issues and establishing common ground to promote co-operation, consistency and effectiveness.

Today, OGP encompasses most of the world's leading publicly-traded, private and state-owned oil & gas companies, industry and national associations and major upstream service companies (see Table 21) and could serve as an important source of offshore safety specialists to the EU regulators. The liaison between the OGP and the EU regulators could be strengthened through joint venture between the European Commission and the OGP European supplement office in Brussels. From the viewpoint of cost-effectiveness, it could be an interesting option for many Member States to limit their financial burden, as the activities of OGP are fully funded by its member companies. The fees are paid annually and calculated based on production levels, geographical spread of upstream interests and a European supplement (where applicable). As compensation to the secondment arrangement, MS may consider remuneration to organisations who supply secondees or services, which should be included in MS cost recovery plan.

Table 21: OGP member companies by 31st October 2014

Type of members	List of companies:
Upstream companies	• Genel Energy • Hess Corporation • Husky Oil Operations Ltd • INPEX Corporation • Kosmos Energy • Kuwait Oil Company • Maersk Olie og Gas AS • Marathon Oil Company • MOL plc • Murphy Oil • Nexen Energy ULC • Noble Energy • North Caspian Operating Company (NCOC) • OMV • Origin Energy • Pan American Energy • Papuan Oil Search Ltd • Perenco Holdings Ltd • Petróleo Brasileiro SA (Petrobras) • Petróleos Mexicanos (Pemex) • PETRONAS Carigali Sdn Bhd • PLUSPETROL SA • Premier Oil • PTT Exploration and Production Public Company Ltd (PTT EP) • Qatar Petroleum • Ras Laffan Liquified Natural Gas Company Limited (RasGas) • Repsol • RWE Dea AG • Sasol • Shell International Exploration & Production BV • Statoil • Suncor • Talisman Energy Inc. • Total • Tullow Oil • Wintershall Holding GmbH • Woodside Energy Ltd • Yemen LNG Company Ltd

Type of members	List of companies:
	• Zakum Development Company (ZADCO)
National & other associations	• American Petroleum Institute (API) • Asistencia Recíproca Petrolera Empresarial Latinoamericana (ARPEL) • Association of German Oil & Gas Producers (WEG) • ASSOMINERARIA • Australian Petroleum Production & Exploration Association • Canadian Association of Petroleum Producers (CAPP) • Consejo Colombiano de Seguridad (CCS) • Energy Institute • Insituto Brasileiro de Pétroleo, Gás e Bioconbustíveis (IBP) • International Association of Drilling Contractors (IADC) • International Association of Geophysical Contractors (IAGC) • International Petroleum Industry Environmental Conservation Association (IPIECA) • Irish Offshore Operators' Association (IOOA) • Netherlands Oil and Gas Exploration and Production Association (NOGEPA) • Norwegian Oil and Gas • Oil Gas Denmark • Oil & Gas UK
Associated members	• Baker Hughes Incorporated • Schlumberger

The **benefit of using external specialists from outside the EU is particularly important** for certain areas of expertise for which there is a general lack at the EU level. This is particularly the case for expertise in diving, electrical & control systems, pipelines, and naval architecture & engineering. At the time being, most of the EU countries with high level of offshore activities are already part of some established abovementioned collaboration forums for decades. However, more efforts might be required at the EU level to help countries with small-sized offshore infrastructures to get involved in such international forums in order to generate significant cost-savings for CAs. It would also promote a consistent and even enforcement of the Directive across Member States in terms of international collaboration with external EU countries, and thus create a level-playing field by strengthening coordination and transparency at a global scale. In addition it would promote an effective response to major offshore accidents with broadest international supports.

This type of solution imposes **less initial political barriers compared to establishing new sharing arrangements between Member States** (discussed in Option 2) particularly as regards the establishment of a legislative framework. Nevertheless it would be still difficult to define a burden-sharing (cost-sharing) mechanism and to ensure that the required resources will be available in cases of regular safety inspections and major hazard events. For example, challenges in establishing an equitable cost-sharing agreement between Member States include:

- Determining the overall costs of implementing the option, and deciding how to equitable share the costs between the Member States concerned, e.g. based on the production quantity per Member State, based on offshore activity projects, Member States' GDP, take into account contribution and use of national experts, etc. Furthermore, it would be important to ensure that the final cost-sharing agreement is a fair one that explicitly delineates the terms of the agreement for all of the parties involved. The agreement should define each partner's spending obligations as well as provide details on agreed-upon procedures and work flow, parameters for responsibilities, and mechanisms to measure progress and results.
- An equitable cost-sharing agreement would also need to be able to consider all of the different types of "costs" concerned. For example, this would include operating costs that would be used to fund salaries, travel, equipment, supplies, and other allowable direct costs, as well as other

costs such as the amount of efforts committed e.g. to lead meetings and initiatives, contribute expertise and experts and facilities & administrative costs.

- All transactions that take place in the context of a cost-sharing agreement must be properly documented, reported on and made transparent. This would require a very organised and efficient secretariat in order to prevent inadequate systems, which are unable to properly document the cost share incurred. This could also imply the need for regular audits to verify accounts and transactions.

The legal status of the cost-sharing agreement would need to be decided upon: would it be mandatory or voluntary? In the case of non-payment or non-commitment, would there be sanctions in place and if so, what would the appropriate level of sanctions be?

Finally, while relying expertise provided through the private industry associations, the EU Member States should be aware of the **potential conflicts of interests between the CA and industry**. It is important to ensure that the way networks and organisations used are independent and do not provoke conflicts of interests. Other organisations worth considering for leading this type of body include the Joint Research Centre of the EU and the Health and Safety Laboratory (HSL) of the UK. In addition to these regulators, associations and forums, there also exist other professional associations that provide a global forum to both companies and regulators for identifying and sharing best practices to achieve improvements in aspects related to health, safety, the environment, security, social responsibility, engineering and operations. Therefore it is extremely important to use the specialists in a "neutral" manner, i.e. just for their knowledge and expertise and not as an opportunity for them to communicate their own private interests. It might be useful to develop some standard legislative procedures for engaging international experts at regional level. In particular, the legislative procedures shall be able to ensure the independency of experts seconded from private sectors who will be engaged to perform the regulatory duties. Moreover, as already discussed, the specialists' comments and reports must be provided through assessment, inspection and investigation functions, but with a restricted range of organisations, i.e. independent of their employer.

- **Option 3c: Bottom-up centralised "resource dependence" organisation model**

This option refers to **centralised collaboration of experts who are employed by private oil and gas companies and bounded together by the private forces to work on safety related projects together**.

Many large oil companies have their self-organised R&D research centres, such as Eni's research centre for oil and gas[22], GE Global Research in Europe[23], where highly specialised experts can collaborate together to develop new ideas and share complementary capabilities within the bottom-up organisations. In fact, it is common that some Oil and Gas companies may collaborate together in R&D and/or HSE programme to avoid potential risks that may be caused by major hazard accidents, as safety issues are often considered as outside the competition field between Oil and Gas companies. Moreover, costs of exploration & production are so high that it is very often dealt with by joint ventures between different Oil and Gas companies. So they are quite used to share data, or at least expertise and procedures. Therefore, it is plausible to assume that private companies can be very collaborative in terms of providing funds and technical expertise to support the work of CAs, as they fully understand the legal consequences that may result from any major offshore safety accidents. As far as Intellectual Property (IP) is concerned, the Member State CA might establish individual sourcing agreements with each of these public research centres and private companies under the conditions of Non-Disclosure Agreements (NDA).

[22] http://www.eni.com/en_IT/innovation-technology/research-centres/san-donato-milanese/san-donato-milanese.shtml

[23] http://www.geglobalresearch.com/locations/munich-germany

In this scenario, the **personal costs to the national CAs are very low**, as all experts are full-time employees at research centres or private companies, and the time they contribute to public service can be considered at "free of charge", though the CAs may be responsible for reimbursing total or part of the expenditures incurred in the course of the mission, including travel costs, hotel, etc. In addition, the national CAs can also receive industry seconded experts on a short-term contract (ranging from 1 to 3 years) to address the special needs of certain expertise. During this period, the secondment should be paid under the CA's contract, in order ensure the independence of these experts from their former employer while conducting regulatory duties. The possible funding sources for supporting such type of contract have been presented and discussed in the cost recovery section. Alternatively, it may be appropriate to have some early contact with IADC, IMCA and IOGP to test the waters for industry to provide CA MSs with short term contracted engineering/marine/drilling disciplines

When implementing this sourcing option, MS should be particularly aware of the **potential conflict of interests** with this type of arrangement. As already mentioned previously, one of the main issues in associated with seconded experts from private sectors is how to ensure both independence of experts seconded from industry and power of the inspectors of the CA. Some countries with more mature systems have already developed their own approach to deal with such problems. For instance, in the UK, a wells engineer was seconded from industry through Step Change (industry association) and acted as a specialist inspector with limited legal powers. The specialist inspector will provide only specialist comments and report through assessment, inspection and investigation functions, but with a restricted range of organisations i.e. independent of his employer. Lessons learned from these countries could therefore help other countries to find their own solutions that fit the best of their situations.

- **Option 3d: Bottom-up distributed organisation based on auto-participatory principle**

This option involves the **auto-participatory collaboration existing among researchers, who are not organised by any forms of formal organisations**.

These researchers are self-select collaborators, who choose to participate in some unofficial information exchange platforms, simply because they want to network with other experts who offer new ideas or complementary capabilities, share knowledge and experience and better develop their technical skills. This type of bottom-up participatory collaboration commonly exists among disciplined researchers, software developers, etc. As for oil & gas specialists, this type of collaboration option mainly refer to informal professional forums, which allow experts to share information with others, concerning the opportunities of training, conferences and webinars for professionals. Examples of this type of collaboration include the Flemingeurope forum[24], the Society of Petroleum Engineers[25], the Expert Forum in Europe[26], etc. Although this type of "loose" or informal organisation may not be directly used as an option to address the resource gaps in the CAs, through these self-registered forums, Member States might be able to have access to info about human resources that are otherwise inaccessible to the CAs. Thus, this scenario should not be used as an major collaboration mechanism for addressing the resource gaps in the offshore safety area, but it could be considered as a supplementary option to other options 3a, 3b & 3c.

Option 3 as a sourcing option for different country groups

Option 3 explores a broad range of international cooperation mechanisms that are useful for exploring the large existing 3rd party expert resources in private sectors and international organisations dealing with the offshore safety issues. In particular, these resources are potential expert pool that can be

[24] http://www.flemingeurope.com/about-us/Profile

[25] http://www.spe.org/

[26] http://www.export-forum.com/europe-machines.html

explored to address the shortfalls of particular expertise of a MS. However, the use of these experts requires caution due to the potential conflict of interest, if these experts are seconded from private companies. In addition, although these disciplined specialists are usually highly qualified experts, they will need to receive formal training in terms of regulatory policy, procedures and processes before carry out independent regulatory duties. Nonetheless, the development and implementation of these options are at different levels in the three country groups concerned, and therefore need to be discussed in particular contexts.

- **Group 1 countries**

Most of the Group 1 countries have already been involved in various international cooperation mechanisms in oil and gas related issues, including the regulatory issues related to offshore safety. In particular, the utility of options 3b and 3c for addressing the current resource gaps has already been investigated by some countries, e.g. the UK. Therefore best practices regarding the use of external expertise in this country group can set up examples for other countries to follow, in particular in terms of ensuring the independency of external experts and the CAs. Moreover, this country group may also benefit from the establishment of a centrally managed database of all EU-based 3rd party experts.

- **Group 2 & 3 countries**

These two country groups do not yet have an active role in the international cooperation regarding offshore safety issues. Therefore, this is an important option for these countries to explore, in particular in search of temporary technical expertise for addressing the CA resource gaps. More efforts need to be put on the design of the term and duration of collaboration contracts between the CA and individual experts. In this regard, lessons should be learned from the group 1 countries in order to ensure the independency of the external short-term contacted experts. In addition, considerable trainings related to regulatory policy, procedures and processes will need to be provided to these experts. The type of training and cost recovery possibility has been carefully discussed in option 1 previously.

4.3.4 Option 4: A mix of different options to address the resource gaps at different levels

It is important to point out that each of the above mentioned design options could be useful for addressing the resource gaps for some of the technical experts (e.g. environmental protection & oil spill response and legal staff that have an overall surplus at the EU level), but it might not be sufficient to cover all missing expertise at the EU level, e.g. the significant shortage of diving staff, or to cover in the most cost-effective and efficient way. For this reason, **a mix of different options (options 1 to 3) might be considered feasible for countries to cover its CA's needs for all required technical experts**.

This fourth option assumes that neither self-recruitment nor third party expertise support alone could fill the resource gaps identified in this study, therefore **a combination of different options could be a cost-effective way to maximise the resource availability within the MS's funding limitations**. In particular, it is assumed that countries with more active offshore activities (more than 10 offshore installations) are those who have both more expertise and more funding available for self-recruitment (except the Netherlands and Croatia), whereas countries with less or zero offshore activities (between zero and ten installations) are those who also have not only less expertise but generally also less available funding to recruit specialists to meet their CA resource needs. Taking into account the different resource availabilities and requirements in the three country groups, Option 4 proposes different option mixes that may fit the needs of each of the country groups.

- **Group 1:** In this group, no general lack of expertise has been identified, although difficulties in recruiting and attracting specific qualified personnel because of salary reason has been pointed out in the Netherlands and Croatia. It may be considered that for the countries in this group, maybe over 80% of the missing technical expertise, such as HPHT and Ultra Deepwater drilling expertise in Italy and Denmark, can be addressed through self-recruitment and training (Option

1). Moreover, for Norway, it is unrealistic to fill its significant deficit of staff through the support of third party expertise. The CA in Norway will need to sort of funding solutions for self-recruitment. The rest may be addressed by transferring highly qualified specialists from the third party expertise provided by private oil and gas companies and public research centres domestically or from other EU countries or external EU countries through some existing collaboration mechanisms (Option 3).

Furthermore, most of the group 1 countries have established their own technical knowledge systems, with only a few systems that would require significant improvements, e.g.:

- Assessment of Reports on Major Hazards (Italy);
- Well notification assessment procedures (Denmark, the Netherlands);
- Offshore technical and regulatory internal guidance (Denmark, Italy).

Again, the missing expertise may be addressed by either directly recruiting specialists for the needs of CAs, or relying on the collaboration with third party experts from CAs in other MS or from outside EU. The collaboration may be facilitated through approached described in Options 2 and 3.

Finally, the personnel needs for the interaction with stakeholders are globally well established in Group 1 countries, except that a significant improvement is still foreseen for Italy. This might be resolved by recruiting more staff in the national CA.

- **Group 2:** In this group, a general shortage of personnel has been identified. It should be noted that, based on the revised gap analysis, some of the identified resource needs for certain Member States may change. In particular, the widest gaps have been identified in the Regulatory specialists & Safety Management systems competence for countries like Bulgaria, Germany, Greece and Poland. Based on the Member State questionnaire responses and gap analysis, Germany has sufficient funding for recruiting specialists, whereas Greece and Poland have significant funding limitations. Therefore Greece and Poland may consider leveraging resources from elsewhere or seeking alternative methods for increasing funds to meet their resource and capacity needs. Some options have been identified above under section 4.2.3. Nevertheless, it seems less feasible for these two countries to transfer expertise from other CAs, since there is a lack of interactions with other Competent Authorities and with Industry Associations. In fact, if the situation can improve, then the calculated gaps might be partially filled by external consultancy services and agreements with other Competent Authorities, which is the case of Ireland.

  Finally, for Greece, the current CA should get connected with national and international technical standards committees by some forms of sharing agreements discussed in Option 2. In particular establishing good connection with Group 1 countries will not only make it possible to transfer expertise for meeting some temporary lack of expertise, but also allow Greece to learn best practices from other countries to improve its system capacity and save costs at the same time. However, it shall be noted that several countries (Greece, Poland) in this group may face difficulties in collaborating with third party systems due to the lack of interactions with them, which may require more efforts and resources to improve the existing system.

  All in all, it is clear that Group 2 countries have strong needs for capacity building in order to improve their procedures to interact with stakeholders, including other CAs and industry associations. Developing carrying capacity within this group of countries could also benefit from the exchange of inspectors and specialists from the Group 1 countries, which have higher level of offshore activities and are more mature in their offshore development. The lessons learned from the large CAs in developing their interaction with stakeholders would be extremely valuable for smaller CAs to avoid preventable mistakes and overcome communication barriers.

- **Group 3**: Opposed to Group 2 countries, no overall gaps were identified for Group 3 countries at an aggregated level. But due to the lack of experience in offshore activities, many countries in this group encounter a lack of resources for almost all the offshore safety related activities and systems, such as Malta and Cyprus. France is also found to generally lack all expertise except Regulatory specialists & Safety Management Systems. In comparison, Portugal has significantly more expertise in several areas, such as Regulatory specialists & Safety Management Systems, Wells, Structural Integrity & Verification, legal and administrative staff. The significant shortfalls of expertise and functional systems, as well as the significant funding limitations in most of the countries in this group, may create a significant technical barrier for these countries to plan their future offshore activities. Therefore, these countries need established CAs to address these resource gaps along with formal systems for activities such as well notifications and RoMH for drilling rigs. The CAs would need access to appropriate specialists in place to deal with infrequent drilling campaigns which may or may not lead to transformational discoveries e.g. Cyprus. The use of personnel and training expertise through the support of other countries could therefore be a short to mid-term solution for these countries during the interim period before the establishment of dedicated CA (Option 0). However, without a formal system to regulate offshore activities, it is unclear to what extent the Group 3 countries can rely on third party resources from either CAs in other countries, national private industries or external EU countries to fill their resource gaps free of charge. This will therefore lead to significant uncertainties on the sustainability of this solution in a long-term perspective.

Addressing the resource gaps identified in different EU MS may require some flexibility in the use of different sourcing options. Depending on the accessible and available resources for the country, different souring options may be considered to fill the specific resource gaps. Moreover, whether these collaborations can be facilitated in a cost-effective matter will largely depend on the structure under which these collaborations may be coordinated. This will be the focus of the next steps of the present study.

4.4 Feasibility Analysis of the options

4.4.1 Methodology

The feasibility analysis is conducted following four steps:

1. **Criteria identification**. A total of 15 feasibility criteria are carefully selected for assessing the technical, political and financial feasibilities of each proposed sourcing option respectively. These criteria represent the level of resource gap to be addressed, the administrative and financial capacity of the MS to implement these options in practice, the level of accessible resources, technical feasibility, and time dimensions, etc.

Table 22: Criteria used or the feasibility analysis

Technical feasibility criteria
1. Is the option likely to address the resource gaps for specific competences at the MS level?
2. Is the option likely to address the resource gaps of general lack of certain expertise at the EU level?
3. Is the option in accordance with the requirements and timeframe of the Directive?
4. Are there removable technical barriers (knowledge, skills) for MS to implement the option?
5. Do MS have sufficient technical or staff support from other CAs

6.	Do MS have built carrying capacity (e.g. knowledge system) to identify their critical resource needs?
7.	Is there a high level up to which an access to the required technical knowledge is safeguarded?
Political feasibility criteria	
8.	Is there available administrative / infrastructure capacity (skills, staff) sufficient to implement and enforce the option endorsed by the MS authorities?
9.	Are there removable political barriers for MS to implement the sourcing option?
10.	Is there cooperative mechanism in place to facilitate transfer and cooperation between MS and with third party sourcing facilities, if applicable?
11.	Is there political commitment (political will) in place to make it happen?
12.	Is there a high level of consistency across Member States
13.	Is there regulative system and law available for regulating the behaviour of seconded experts and ensuring their independence from private sectors?
Financial feasibility criteria	
14.	Are there sufficient funds available for the MS to implement the option?
15.	Is there cost recovery power in place for supporting MS to implement the Directive?

2. **Scoring.** The options are valuated against 15 feasibility criteria at different administrative levels: at country level when the best info is available for a MS, at regional level, if little info is available for a MS. Feasibility criteria are assessed according to three different levels as shown below (the higher the score, the more feasible is the option against the criterion):

Table 23: Score scale

Scale of the score	Interpretation of the score
0 = result of the criteria analysis is negative	This means the situation described by the criteria does not exist or uncertain.
1 = moderately positive result	This means the situation described by the criteria very likely exists.
2 = strongly positive result	This means the situation described by the criteria exists.

For each feasibility criterion, the maximum score is 2, which leads to a highest score of 14 for technical feasibility (7 criteria), 12 for political feasibility (6 criteria) and 4 for financial feasibility (2 criteria), respectively.

3. **Aggregation**. Ideally, for each MS, the criterion under each proposed option will be given a score based on the information provided by MS during the JRC consultation and the 7th and 8th EUOAG meetings. These scores for the same criterion and option are then averaged at the country group levels in order to obtain a general image for the specific country group under consideration. This is particularly the case of Group 1 countries. However, for Group 2 & 3 countries, this approach is not feasible as the information for many countries are unavailable. Therefore, we had to apply different approaches. For Group 2 countries, we scored Germany and Ireland only, and gave an average score to the remaining countries in the group; for Group 3 countries, we had to give a group average score directly, as crucial data are missing for most of these countries.

4. **Comparative analysis.** The aggregated scores for three types of feasibility under consideration are compared between three different country groups. The result can show

clearly which option is more technically, politically, and financially feasible in which country group.

4.4.2 Results

The feasibility assessment results are aggregated at group level and presented in the figures below in terms of technical, political and financial feasibility, respectively.

The detailed figures resulting for this feasibility analysis are listed in annex III.

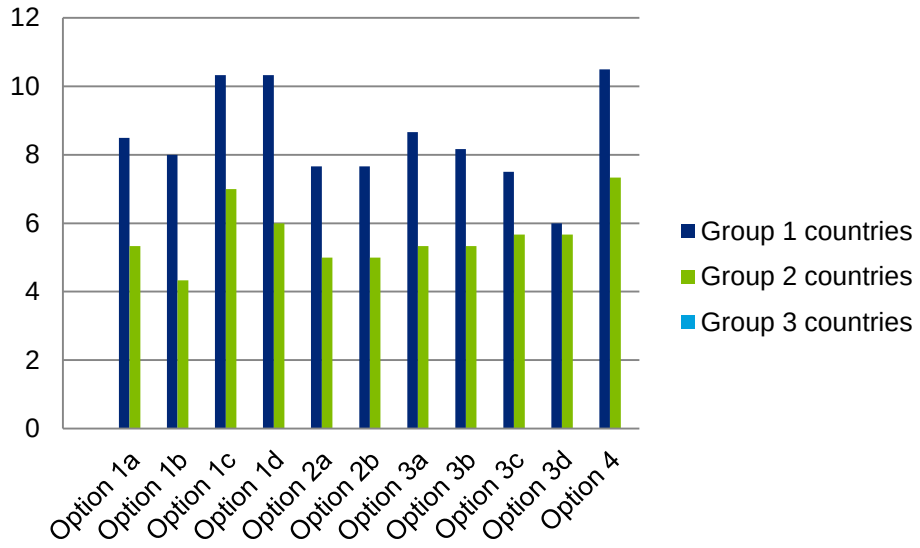

Figure 10: Technical feasibility assessment for all sourcing options

The figure above shows clear disparity of technical capacities among the three country groups. Not surprisingly, the Group 1 countries on average overweigh all other country groups in terms of technical feasibility of implementing the proposed sourcing options. However, it should be noted that difference exists between countries within Group 1 countries too - Figure 11. Countries, such as Denmark, Norway and UK have considerable higher technical capacity than other countries to meet the resource requirement under the OSD, mainly due to the relatively smaller resource gaps identified for 2014 and 2016, the functioning structure of the existing CA, as well as the proactive position in some existing large cooperative schemes. Moreover, the technical capacity observed in these countries is also seen as a foundation for offering technical support, in terms of knowledge transfer or training, to other country groups.

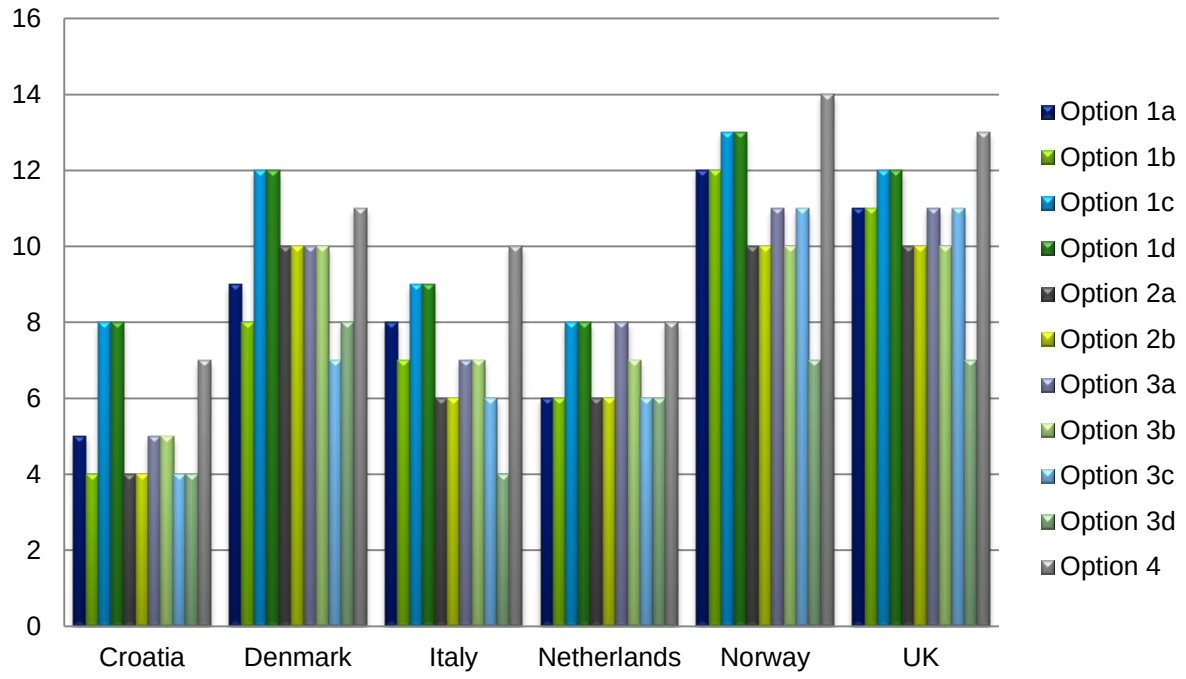

Figure 11: Technical feasibility comparison between Group 1 countries

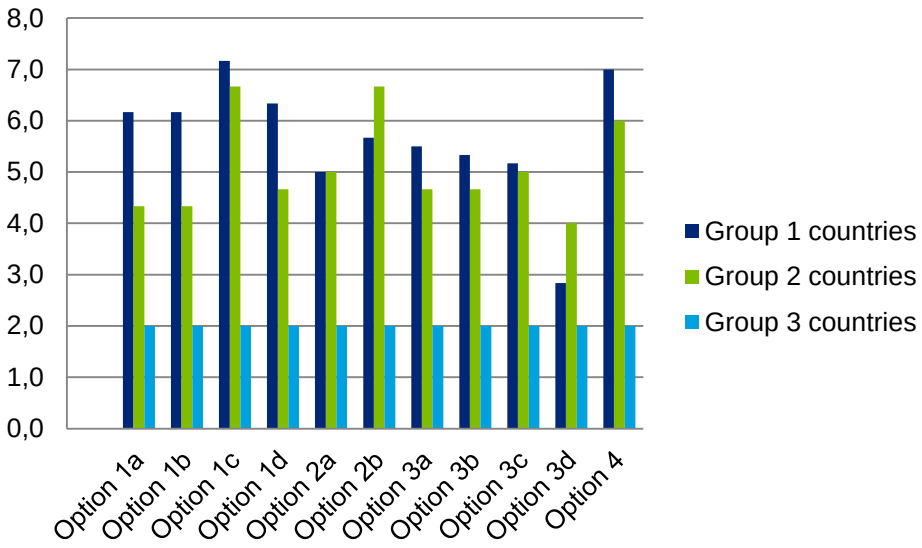

Figure 12: Political feasibility assessment for all sourcing options

Figure 12 shows a political feasibility assessment across the three country groups. Again, our results show that on average, Group 1 countries have better political conditions that allow facilitating the proposed sourcing options, in particular for options concerning recruitment (option 1a & 1b), training (option 1c & 1d), and the use of third party experts (Option 3a-d) and the mix of all other options (Option 4). The exception is concerning Option 2, where the transfer of disciplined expertise is less supported by Group 1 countries, but more by Group 2 countries. This result may reflect the fact that many Group 2 countries welcome technical support from Group 1 countries to build their own carrying capacity on offshore safety regulation; however Group 1 countries do not have a strong political will to support such initiative, as some MS have clearly pointed out their own resource constraints to meet the respective regulation responsibilities. Finally, Group 3 countries have shown an average low score concerning the political feasibility assessment, mainly due to the lack of sufficient information for this country group.

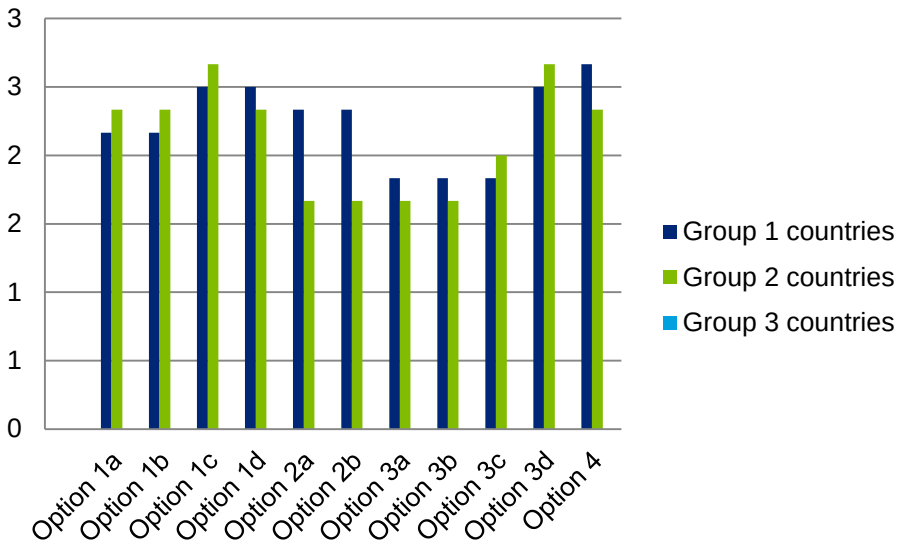

Figure 13: Financial feasibility assessment for all sourcing options

Figure 13 presents the financial feasibility assessment of the three country groups. It is clear that Group 3 countries either have indicated significant resources constraints or did not indicate any information regarding their cost recovery capacity. On the other hand, Group 1 & 2 countries together present a rather mixing result, where Group 1 countries on average can envision financial capacity or cost recovery power to facilitate the sourcing options proposed, in particular for training, expert transfer, using external 3rd party experts, or the mix of different souring options. It is important to note that even though the feasibility scores for recruitment in this country group are rather lower than Group 2 countries, it is strongly recommended that careful consideration will be needed before any concrete conclusions can be drawn from this result. This is mainly because of the lack of data for most of the Group 2 countries (expect Ireland and Germany).

To conclude, caution will be needed when interpreting the results of all feasibility assessments and using it for policy decision making. The results can be significantly improved, if better data will be provided by all the MS in the future.

5. Analysis of the costs and benefits of the proposed options

This section describes the costs and benefits of each of the options in order to evaluate and prioritise the best solutions. It should be noted that detailed quantitative information for certain aspects of the options was not available in some cases. In such cases, assumptions and estimations are made based on similar examples, where relevant and possible.

For each proposed option, an overview of the costs incurred by public authorities (the CAs) in providing the oversight necessary to effectively implement the Directive) (administrative burdens, recruitment and training costs, operating and implementation costs, etc.) are provided to the extent that information is available. The benefits of each of the options are also described (job creation, level playing field, access to otherwise unavailable or out-of-reach expertise and consistency, etc.). Much of the costs information is based on figures and results from the gap analysis, data received from certain CA (e.g. UK and Norway) and literature review including the impact assessment of the OSD.

It should be noted that in the aftermath of the Deepwater Horizon oil spill, according to the JRC, there is heightened public pressure for a "no expense spared" response to further offshore disasters and that the potential costs associated with future spills could rise as a result which should be taken into account when assessing costs[27]. In this context, it should be expected that Member States, the industry and the Commission may all face changes to levels of financial and administrative burden in implementing the Offshore Safety Directive. The benefits that the policy option provides in terms of lower risks or prevention of oil spills and/or improved emergency response will be weighed against the additional burden imposed. Therefore, the cost of the options is modest in comparison to the benefits they will secure in terms of significantly decreasing the risks of accidents.

The project team developed cost and benefit indicators to help guide the assessment of the costs and benefits of the proposed options, which are listed in the table below. The development of such indicators also allows for easier comparison of the options in terms of their associated costs and benefits see section 5.7 for the results of the comparison.

Table 24: List of cost and benefit indicators

Costs
Administrative burden/cost to EU authorities and agencies
Administrative burden/cost to MS competent authorities
Costs of training of administrative personnel/capacity building
Costs of implementation e.g. one-off start-up costs
Costs of expert salaries/costs of recruitment
Running costs e.g. travel/subsistence costs, costs for use of ad-hoc expertise
Benefits
Job creation and innovation
Improving effectiveness (e.g. quality) of inspections
Environmental benefits e.g. decreased risks in accidents and spills that could damage the marine environment

[27] Impact assessment

Social and health benefits e.g. Reduction of safety risks and number/frequency of accidents and death to workers
Willingness to participate/acceptability and availability of stakeholders or experts

5.1 Funding possibilities for the proposed options

Before delving into the detailed costs and benefits of the proposed options for strengthening offshore safety and expertise, it is important to **discuss the different funding possibilities**.

As the previous sections have shown, the offshore oil and gas sector is fundamental, not only for the EU's economy but also to meet the population's energy demands. The value of the EU offshore sector is very high in terms of national economies (revenues and employment) and its contribution to security of supply. However, it also poses potentially dangerous risks to workers and the environment, requiring highly specialised and technical expertise to ensure safe and efficient offshore operations. It is therefore important to keep these elements in mind when considering the cost implications and funding possibilities in terms of recruitment and training in the sector.

There are several different funding possibilities available to provide the necessary funding needed to finance the options. In particular, four main funding mechanisms have been identified:

i. Funding from the European Commission e.g. through special grants or budgets
ii. Funding from MS public budgets
iii. Donors
iv. Direct funding from the Offshore O&G industry owners and/or operator of the activity to be regulated

A. Funding from the European Commission e.g. through special grants or EC funding programmes

The European Union provides funding for a broad range of projects and programmes covering areas such as:

- regional & urban development
- employment & social inclusion
- agriculture & rural development
- maritime & fisheries policies
- research & innovation
- humanitarian aid

The majority of the EU budget is managed in partnership with national and regional authorities through 5 major funds - the Structural & Investment Funds. Collectively, these help to implement the Europe 2020 strategy:

- European Regional Development Fund (ERDF) – regional and urban development
- European Social Fund (ESF) – social inclusion and good governance
- Cohesion Fund (CF) – economic convergence by less-developed regions
- European Agricultural Fund for Rural Development (EAFRD)
- European Maritime and Fisheries Fund (EMFF) [28]

Of the above listed funds, the CF appears to be the most relevant in terms of funding activities to strengthen offshore oil and gas safety and expertise – especially for those MS who may not have the same financial resources as other MS but who have similar if not more urgent human resource needs. The Cohesion Fund is aims to reduce economic and social disparities and to promote sustainable

[28] European Union website on EU funding: http://europa.eu/about-eu/funding-grants/index_en.htm

development. It is aimed at Member States whose Gross National Income (GNI) per inhabitant is less than 90 % of the EU average. For the 2014-2020 period, the Cohesion Fund concerns Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia. In the context of this study, Croatia (Group 1), Bulgaria (Group 2), Poland (Group 2), Greece (Group 2), Romania (Group 2), Cyprus (Group 3), Malta (Group 3), and Portugal (Group 3) would be eligible for Cohesion Funds[29]. The Cohesion Fund allocates a total of € 63.4 billion to various activities. It particular, the Cohesion Fund supports projects related to energy or transport, as long as they clearly benefit the environment in terms of energy efficiency, use of renewable energy, developing rail transport, supporting inter-modality, strengthening public transport, etc.

Finally, potential funds could also be made available for training purposes through the Civil Protection Financial Instrument (CPFI). The Civil Protection Financial Instrument supports and complements the efforts of Member States for the protection, primarily of people, but also of the environment and property, including cultural heritage, in the event of natural and man-made disasters, acts of terrorism and technological, radiological or environmental accidents. It also intends to facilitate reinforced co-operation between Member States in the field of civil protection. The following general actions are eligible for financial assistance:

- Studies, surveys, modelling and scenario building to facilitate the sharing of knowledge, best practices and information, and to enhance prevention, preparedness and effective response;
- Training, exercises, workshops, exchange of staff and experts, creation of networks, demonstration projects and technology transfer to enhance prevention, preparedness and effective response;
- Monitoring, assessment and evaluation actions;
- Public information, education and awareness raising and associated dissemination actions, so as to minimise the effects of disasters on Union citizens and to help Union citizens to protect themselves more effectively;
- Establishment of a programme of lessons learnt from interventions and exercises in the context of the Mechanism, including on areas relevant to prevention and preparedness;
- Communication actions and measures to promote the visibility of the European civil protection work in the areas of prevention, preparedness and response.
- Developing and maintaining a surge capacity through a network of trained experts of Member States, who can be available at short notice to assist in the monitoring, information and coordination tasks of the Emergency Response Center (ERC)[30]

B. Funding from MS public budgets

Another option for funding could stem from Member State budgets and public spending dedicated to areas such as training activities, safety and disaster prevention programmes.

The OSD also provides for cost recovery schemes that MS are allowed to use in order to cover the costs of implementing the Directive. Detailed information on cost recovery schemes are provided in section 4.2.3.

C. Funding from Donors

Funding from donors is another possibility that could be exploited to help fund the options proposed to strengthen offshore safety and expertise. Some of the main sources of funding from donors could include:

[29] In other words, 8 out of 18 countries or 44 % of the MS concerned by the OSD could potentially get funding to help implement the OSD and meet the associated requirements by 2018.
[30] https://www.eutrainingsite.com/2014-2020.php?id=149

- Funding from multilateral and bilateral donors e.g. third countries and EU MS: the development and cooperation budgets of donor countries could be made available to fund and develop capacity programmes. This support could help specific MS countries build up their offshore safety and human resource capacities to not only strengthen the actions towards accident prevention but also to work towards more level playing field in the EU. A specific example includes the bilateral grants provided by the EFTA (Economic Free Trade Association) described in Box 1 below:

Box 1: Example of bilateral funding provided by EFTA[31]

Strengthening Bilateral Ties: The EEA Grants and Norway Grants seek to strengthen relations between the donors and the beneficiaries. In more than half of the programmes, public bodies from Iceland, Liechtenstein and Norway are involved as partners to the programme operators. In the EEA Grants, Norway provides around 94% of funds, Iceland close to 5% and Liechtenstein just over 1%. The Norway Grants (EUR 800 million in 2014) are financed by Norway alone.

To strengthen bilateral ties in all programme areas, 1.5% of each programme's allocation is set aside to promote such cooperation in the relevant areas. At national level, a further 0.5% of the beneficiary country's allocation is earmarked for strengthening bilateral relations. Networks developed through the Grants are expected to create sustainable partnerships in the political, institutional, cultural and academic fields.

In the period 2009-2014, 993 million EUR were provided by the EEA Grants and 800 in million EUR by the Norway Grants. The beneficiary countries included: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovak, Republic, Slovenia and Spain

The project areas that funds will go towards include: environmental protection and management, climate change and renewable energy, carbon capture and storage, green industry innovation, civil society, human and social development, protecting cultural heritage, academic research and scholarship, promotion of decent work and tripartite dialogue, and justice and home affairs

The grant schemes are negotiated and agreed between the EEA EFTA States and the European Commission on a five year basis.

- Funding from international organisations e.g. the UNEP (via the Regional Seas Programme or the Global Environment Facility (GEF)), the IMF, World Bank, IMO, etc. Such organisations often have dedicated programme budgets to fund capacity building projects. For example, the IMO has multi-donor Trust Funds (MDTFs) that are aimed at encouraging contributions targeted on specific issues and are used to support specific technical co-operation programmes which address these issues.
- Funding from the research community: funding may also be available from universities and research institutions for training and recruitment purposes, especially if carried out in the context of a partnership that would promote the recruitment of qualified graduates from research community donors.
- Funding from private individuals: citizens may also want to personally contribute towards the capacity building activities in the offshore oil sector of their Member States.
- Funding from private companies – funding could also come from private companies that are not directly part of the Offshore O&G industry but have an invested interest in ensuring that the

[31] EFTA (2014), This is EFTA: www.efta.int/sites/default/files/publications/this-is-efta/this-is-efta-2014.pdf

offshore installations are properly operated and protected against accidents e.g. the transport industry

- Funding from environmental NGOs and foundations e.g. Greenpeace, Oceana, Birdlife who strongly support a more secure and harmonised offshore safety environment and who may be willing to provide funding towards that goal

D. Direct funding from Offshore O&G industry

Direct funding for the proposed options could also come from the offshore O&G industry. Numerous oil and gas industry associations, groups and initiatives exist within the EU as well as internationally (see Table 21 for some examples). Undoubtedly, the offshore oil and gas industry are the most important actors in terms of ensuring that on the ground operations and procedures of offshore installations are safe and compliant. In this sense, it is logical and justified to expect that some funding to further ensure and strengthen the safety of offshore installation and capacities also come from businesses active in (and profiting) from the sector.

The OPOL (The Offshore Pollution Liability) agreement for example is a regional private liability scheme which provides reimbursement mechanisms for claims in order to compensate damages or reimburse remedial measures taken by public authorities after an oil discharge from an offshore installation[32]. It was established in 1975 by the industry as a "reflection of the responsible attitude of the offshore oil industry to ensure that harm is not caused by its operations and a "demonstration" that the industry can properly organise its affaires. [33] As such, it could be argued that contributing to a fund that would help to recruit and train more people to ensure the safety of offshore installations would fall within the scope of their mission and activities.

Another industry initiative, the IMF/IPIECA Global Initiative has worked for more than 15 years to enhance oil spill preparedness and response capacity for marine spills at priority locations around the world. This Global Initiative aims to "assist countries in preparing for major oil spills and encourage and enable ratification and implementation of oil spill related international conventions" – however concentrates activities on preparedness and response only – not on prevention[34]. Therefore, it would be necessary to expand its mandate to include prevention activities as well, which could also include associated funding possibilities.

Finally, direct funding could come from the owners or operator of the activity to be regulated. This action overlaps somewhat with certain cost recovery schemes (see section 4.2.3), which some Member States such as the UK and the Netherlands already have in place.

The following sections describe in detail the potential costs and benefits for the proposed options.

5.2 Cost of staff requirements

The following tables show rough estimates of staff costs borne by authorities to fill the required gaps, both in 2014 and 2016. Table 25 includes the cost estimates of the baseline scenarios and Table 26 the

[32] Members include Shell U.K. Limited, Total Oil Marine Limited, BP Petroleum Development Limited, Amoco Exploration Company located in ten States and territories: United Kingdom of Great Britain and Northern Ireland, Denmark, the Federal Republic of Germany, France, Greenland, the Republic of Ireland, the Netherlands, Norway, the Isle of Man and the Faroe Islands.
[33] Rochette, J., Wemaëre, M., Chabason,L. Callet, S. (2014). Seeing beyond the horizon for deepwater oil and gas: strengthening the international regulation of offshore exploration and exploitation, Studies N°01/14, IDDRI, Paris, France, www.iddri.org/Publications/Collections/Analyses/ST0114_JR%20et%20al._offshore%20EN.pdf
[34] Rochette, J., Wemaëre, M., Chabason,L. Callet, S. (2014). Seeing beyond the horizon for deepwater oil and gas: strengthening the international regulation of offshore exploration and exploitation, Studies N°01/14, IDDRI, Paris, France, www.iddri.org/Publications/Collections/Analyses/ST0114_JR%20et%20al._offshore%20EN.pdf

ones of the high-production scenarios. As data on salaries in competent authorities are not available, the costs have been estimated based on salary ranges in the UK and the annual net earnings as follows:

Average salary in country X =

average salary in UK x annual net earnings in country X / annual net earnings in UK

The salary in the UK has been estimated at approximately 98,400 € per year. This figure corresponds to a weighted average of senior managers, team leaders of inspectors and inspectors and is based on HSL data. The salaries of the administrative staff correspond to the annual earnings of employees in public administration.[35]

Specifically for well experts it is assumed that the salaries are fixed without a variation between Member States. Specifically, due to the low supply of this discipline it is assumed that the salaries are not affected by national salary levels. In the present study the salary of well experts corresponds to the average annual salary of different grades of drilling experts (78,400 €).[36]

Table 25: Estimated gaps in competent authorities - Baseline Scenario (€)

Country	Gap in 2014	Gap in 2016
Bulgaria	10,898	15,637
Croatia		
Cyprus	95,194	94,639
Denmark	235,262	
France		
Germany	192,982	167,989
Greece	304,809	
Ireland	199,802	
Italy		
Malta	85,351	84,843
Netherlands		327,830
Poland		
Portugal		
Romania	228,825	
Spain	124,598	168,048
United Kingdom	1,962,017	1,894,062
Total	**3,439,739**	**2,753,049**

[35] Eurostat (2014), Annual Earnings of employees in public administration and defence, in 2010

[36] Hays (2013), Oil and Gas, global salary guide 2013, available at http://hays.clikpages.co.uk/Oil_and_Gas_Salary_Guide_2013/

Table 26: Estimated gaps in competent authorities (€); High Production Scenario

Country	Gap in 2014	Gap in 2016
Bulgaria	67,868	72,407
Croatia		
Cyprus	357,508	355,985
Denmark	696,161	352,161
France		
Germany	569,296	541,538
Greece	397,767	7,831
Ireland	468,568	225,380
Italy	243,392	426,040
Malta	256,963	255,197
Netherlands	21,382	800,796
Poland	15,068	36,227
Portugal		
Romania	270,197	
Spain	127,010	170,329
United Kingdom	2,019,763	1,952,010
Total	**5,510,944**	**5,195,901**

The overall staff costs in the high-production scenario are higher than in the baseline scenario (by € 2.07 million in 2014 and by € 2.44 million in 2016). This is explained by the higher resource gaps of the high-production scenarios. The highest costs are borne by the UK where the highest gaps are observed. However as mentioned in section 3.1 in this country, the required staff for most of the categories has been estimated by HSE according to which, UK has significant gaps (approximately 21 FTEs, including administrative and legal staff which have been estimated in the present study). In addition the cost to fill the gap is largely affected by the average salaries of the counties which in 2012 ranged between 2,710 € per year in Bulgaria to 25,700 € in the Netherlands.

5.3 Costs and benefits of option 1 (Baseline) – dedicated expertise for each CA

Option 1 or the baseline option proposes solutions to fulfil resource gaps based on the results of the gap analysis. The gap analysis identifies the resource needs in terms of staff costs for each CA in order to comply with the Directive for 2014 and 2016 (see respectively Table 25 and Table 26). In particular, option 1 proposes four main sub-options that address two main resource gaps that need to be fulfilled: recruitment (options 1a and 1b) and training (options 1c and 1d). As mentioned in the previous chapter on the description of the policy options, both of the recruitment options 1a and 1b would also require the trainings described in options 1c and 1d to ensure that staff are kept up to date with the most recent technology, safety, and regulatory developments as well as to contribute to capacity building among existing staff resources.

5.3.1 Costs and benefits of recruitment options (options 1a & 1b)

Option 1a: Recruitment of discipline specialists from the offshore industry and other relevant sectors

Costs

Under this option, it is assumed that CAs would recruit specialists from the offshore industry to fill the resource needs in order to meet the 2014 and 2016 requirements of the Offshore Safety Directive. There is some indication (based on the MS questionnaire replies from the JRC report) that some Member States are already using private contractors and experts to compensate for the lack of experts from the public domain. For example, in the UK, experts hired from industry are paid based on an agreed rate with industry that reflects fixed costs and salary costs. It should be noted that based on the salary figures collected from the UK CA, the average salary of inspectors in the public sector in the UK (107 028 €) is actually higher than the local average annual salary in the private oil and gas sector (93 400 €) and the imported average annual salary (93 100 €).

As can be seen in Table 15 in the previous section describing the options, in some MS there are significant salary differences between the average salary for inspectors, the local average annual salary in the private oil and gas sector and the imported average annual in the private oil and gas sector. This is especially the case for Poland, Portugal and Romania. **For option 1a, it is assumed that the salaries of specialists recruited from the offshore sector would reflect those from the industry.** This is because realistically, it is unlikely that experts from the private sector would accept positions within the CA for significantly lower pay. Furthermore, the cost recovery powers of MS should allow them to recover the additional costs of recruitment from the private sector. As data on private sector salaries was not available for all of the MS covered by the study, estimations were made based on the using the average differences in percentage between the domestic private and public sector salaries. Imported private sector salaries for the oil and gas sector are not included in the estimations due to differences in salary averages, which were too significant to use for balanced results. Table 27 below provides estimations on the estimated average recruitment costs of specialists from the offshore industry to fulfil the projected resources gaps in 2014 and 2016. Salary costs are based on the average domestic industry salaries (private sector) for each MS covered (using data from the Hays Oil and Gas, global salary guide 2013). It should be noted that the private sector salary costs are the average of all technical positions. In the cost estimations provided below, it is also assumed that staff recruited from the private sector would be not holding senior management or administrative positions (rather more technical expertise positions), therefore the private sector staff costs below excludes senior management and administrative posts.

Table 27: Estimated average recruitment costs (salaries) of specialists from the offshore industry for 2014 and 2016 (€)[37]

Country	2014	2016
Bulgaria	14,801	21,608
Croatia		
Cyprus	67,013	65,503
Denmark	225,384	
France		
Germany	332,150	315,993
Greece	420,912	

[37] Private sector staff costs (€) = Gaps in technical disciplines (excluding senior management and administrative, FTE) X annual average private sector salaries (€).

Country	2014	2016
Ireland	252,857	
Italy		
Malta	70,912	70,234
Netherlands		
Poland		
Portugal		
Romania	400,984	
Spain	105,218	141,188
United Kingdom	1,675,270	1,559,865
Total	**3,565,502**	**2,174,391**

In addition to the considering private sector salary costs, other trends and observations from industry should also be taken into account. Based on the literature reviewed, the average base salary of specialists working in the private offshore industry in 2013 has grown to $83,000 (€68,800), showing an 8.5 per cent increase compared to the previous year and is expected to continue to increase in the coming years. Some of the explanations behind this significant increase in the salaries of those working in the oil and gas industry and other notable trends include:

- The proliferation of non-conventional field developments and the route to energy independence has increased the hiring of oil and gas professionals around the world. However, many countries discovered that **the skills needed did not exist, at least not in their own country**. This resulted in their first steps onto the global recruitment market.
- In general, 2013 saw increases in salaries for most countries as the global energy industry remained buoyant. The markets are becoming more efficient, with national borders less restrictive to skilled migration, and the movement of people more prevalent.
- However, some parts of Europe continued to suffer from the debt crisis with relatively flat demand, i.e. Spain; and in Poland the environmental lobby combined with a number of drilling campaigns halted shale gas developments and in turn on local salaries.
- Of the countries covered by this study, employees of the (private) offshore sector in Norway appear to have to largest salaries. This is because Norway has **limited skilled labour pools and significant workloads**, which result in very high pay rates. In particular, Northern Europe's increasing salaries reflect a lack of skills to meet burgeoning demand. Demographic issues contributed to this shortage, as well as a 'brain drain' of professionals overseas, which is especially seen in the UK. The relative low salary levels in the UK also contribute to this.
- Confidence levels in the industry on **staffing demand remains high**, in line with rising salary costs. It appears that similar to the situation in many CAs, skill shortages are also becoming a major concern for employers in the industry.
- Finally, it is worth considering that if skills remain in short supply, the **cost of safety expertise will most likely increase** – this is especially the case in the private sector. Private oil and gas companies are already starting to outbid each other for skilled safety personnel. If this continues, then the cost of that specialised labour will increase and also effect rising production costs. Therefore, attracting people to study the right courses at university is a long-term challenge, especially as interest in these areas has been low in recent years.[38]

[38] Hays (2013), Hays Oil & Gas Guide 2013 on Global salaries and recruiting trends.

The staff costs related to administrative tasks (costs to run the recruitment and hiring process – writing up the contracts, etc.) have also been estimated based on the results of the gap analysis (see Table 28 under option 1b). The administrative costs are expected to be similar for both option 1a and 1b as it is assumed that administrative positions would not be filled by private sector hires (therefore not based on private sector salaries). However, option 1a may require more administrative efforts in terms of external recruitment processes compared to internal recruitment.

Finally, according to the impact assessment carried out on the Regulation on safety of offshore oil and gas prospection, exploration and production activities[39], the annual budgets of EEA offshore regulators are estimated at around € 85 million in total.[40] This would be expected to increase under this option under the assumption that salaries would increase due to recruitment from the private sector or due to an alignment of current public sector salaries to reflect those of the industry.

Benefits

The principal benefit of this option is that it provides CA greater chances of finding the expertise needed to meet the resource requirements of the Directive, especially since it is likely that in certain MS, the skills required is not available or does not exist within the public sector. Therefore CAs would need to "outsource" their needs by recruiting staff from the private sector. However, as seen in Table 15, the cost of imported expertise from the private oil and gas sectors can be significantly higher than local salaries in the public sector in many cases (although not all). Nonetheless, it is important to remember MS have the option to recover such costs through cost recovery powers included in the Directive. Furthermore, several funding options exists that could be used towards recruitment.

Moreover, in addition to recruiting additional human resources, it will also be necessary to ensure that hired staff from the private receive proper **regulatory training** in order to effectively and efficiently carry out their duties. It is assumed that they would have some the technical competence required but not necessarily the regulatory background needed to carry out regulatory duties (if called upon to do so). Further details on the costs of training are provided under options 1c and 1d.

Option 1b: Recruitment from the public sector or develop additional capacity from within the CA to fill the role of the offshore specialist

Costs

Under this option, it is assumed that CAs would recruit employees from their other public authorities e.g. those working on onshore installations, transportation authorities, other energy sectors such as nuclear plants, etc. or use current available staff (or planned hires) from the CA to meet the required resource needs.

Results from the gap analysis in provide the estimated staff costs borne by authorities to fill the required gaps, both in 2014 and 2016 (see respectively Table 25 and Table 26). Based on these results, the countries that would experience staff costs in relation to meeting the required resource needs in 2014 include: Bulgaria, Cyprus, Denmark, Germany, Greece, Ireland, Malta, Romania, Spain and the UK. For 2016, the same countries will experience additional staff costs to meet required resource needs with the exception of Denmark, Greece, Ireland and Romania. In particular, the UK is expected to face significant staff costs in terms of recruitment needs to meet the resource requirements of the Directive in 2016.

With the above staff cost information in mind, it should be recognised that for some MS authorities, it is a challenge to recruit and retain suitably qualified staff since in most cases they operate in the same

[39] European Commission (2011), Commission Staff Working Paper, Impact Assessment, Annex 1, Accompanying the document: Proposal for a Regulation of the European Parliament and of the Council on safety of offshore oil and gas prospection, exploration and production activities, http://ec.europa.eu/energy/oil/offshore/doc/ia_annexes_20122-1292.pdf

[40] European Commission questionnaire data collected from Italy, the Netherlands, and the UK

market-place as industries capable of offering significantly higher remuneration levels.[41] In addition to salaries, there are other factors that affect recruitment and retention including career progression and advancement opportunities. Box 2 below describes the recruitment and training situation in the US in the aftermath of the Deepwater Horizon accident.

Box 2: Recruitment in the US following the Deepwater Horizon accident

In the US, the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE) are the organisations responsible for managing environmentally and economically responsible development of the nation's offshore resources and the safety and environmental oversight of offshore oil and gas operations, including permitting and inspections, of offshore oil and gas operations. In the aftermath of the Deepwater Horizon accident, in the US, the BOEM and the BSEE are overseeing a new training program that has been designed for inspectors, whose number has risen to 58, with seven new hires pending. The plan is to add a total of 30. One of the major obstacles that have been identified is that the agency is **restricted by federal salary guidelines and cannot offer competitive pay to attract highly educated inspectors.** Salaries for most inspectors start at $47,448 (37,400€). This is a challenge that may also be relevant for many CAs and their EU offshore activities.

In the table below, the staff costs related to administrative tasks (costs to run the recruitment and hiring process – writing up the contracts, etc.) has been estimated based on the results of the gap analysis.

Table 28: Estimated staff costs related to administrative tasks

Country	2014	2016
Bulgaria	-554	-906
Croatia		
Cyprus	-6,552	-7,541
Denmark	-6,119	-6,115
France	-4,294	-4,733
Germany		
Greece	-19,851	-104
Ireland	-32,867	-38,770
Italy		
Malta	-1,825	-2,011
Netherlands	-53,878	-135,593
Poland	-8,288	-10,703
Portugal		
Romania	-9,465	13,691
Spain	-5,892	-8,863
United Kingdom	-65,000	-133,238
Total	**-214,586**	**-348,578**

[41]UK Government sponsored Review Panel (2011), Offshore Oil and Gas in the UK - an independent review of the regulatory regime: www.gov.uk/government/uploads/system/uploads/attachment_data/file/48252/3875-offshore-oil-gas-uk-ind-rev.pdf

It is important to note that in addition to recruiting additional human resources, it will also be necessary to ensure that the hired staff receives proper **technical training** specific to the offshore oil and gas sector in order to effectively and efficiently carry out their duties. Staff from other competent authorities may have the regulatory experience required to work on the offshore safety sector but not necessarily the technical competence, if needed. Further details on the costs of training are provided under options 1c and 1d.

Benefits

As expected, the staff costs in terms of recruitment of option 1a are higher than for 1b due to the generally higher salaries of specialists in the offshore industry compared to public sector experts. However, this is not the case for all MS and each MS have different resource gaps in specific technical areas. Furthermore, the magnitude of such gaps vary from 2014 and 2016 based on their planned strategies for recruitment and capacity building.

In terms of the administrative burden, option 1b would be less burdensome to implement than option 1a as the internal recruitment process would most likely be easier to carry out compared to running an external recruitment campaign. Regulatory employment can be quite attractive compared to the private sector due the relative stability and work-life balance, however In order to recruit good and effective regulators and retain them, remuneration and employment packages should be competitive.

Table 29 below provides a hypothetical comparison of the magnitude of salary differences between the public and private sector based on the findings of the gap analysis. Several assumptions need to be taken into account when reviewing the table:

- The private sector salaries were taken from an industry report[42]and include the average salary of a technical competent employee in the offshore industry per country. In other words, the average salary figure takes into account all technical positions. This should be noted as salary ranges can vary within different categories of technical expertise in the private sector.
- For the average public sector salary costs, technical expertise related to well specialists are based on private sector salaries and not the public sector.
- The private sector salary costs do not include the expected recruitment needs in administrative or senior management positions as it is assumed all hires from the private sector would fulfil the resource gaps in technical competences and not in management or administrative positions.

[42] Hays (2013), Hays Oil & Gas Guide 2013 on Global salaries and recruiting trends.

Table 29: Comparative table of staff costs between option 1a and option 1b

	2014		2016	
Country	**Public**	**Private**	**Public**	**Private**
Bulgaria	10,898	14,801	15,637	21,608
Croatia				
Cyprus	95,194	67,013	94,639	65,503
Denmark	235,262	225,384		
France				
Germany	192,982	332,150	167,989	315,993
Greece	304,809	420,912		
Ireland	199,802	252,857		
Italy				
Malta	85,351	70,912	84,843	70,234
Netherlands			327,830	
Poland				
Portugal				
Romania	228,825	400,984		
Spain	124,598	105,218	168,048	141,188
United Kingdom	1,962,017	1,675,270	1,894,062	1,559,865
Norway			**2,753,049**	
Iceland			15,637	
Total	**3,439,739**	**3,565,502**		**2,174,391**

5.3.2 Costs and benefits of training options (options 1c & 1d)

In addition to the estimated recruitment costs described above, training is another important cost factor and requirement to meet the resource needs of the Directive. Options 1c and 1d describe the associated costs and benefits of the training options under the baseline scenario.

Option 1c: Trainings collectively organised by an Offshore Centre of Expertise (managed by an EC appointed person)

Under option1c of the baseline, an Offshore Centre of Expertise (OCE) would be created and managed by an EC appointed person. The OCE would be responsible for coordinating training activities, workshops, best practice, guidance, etc. among the CAs with the aim of supporting capacity building. Furthermore, costs of organisation of the training workshops would be collectively contributed by the Member States based on the level of their respective offshore activities.

In the impact assessment carried out on the Proposal for a Regulation of the European Parliament and of the Council on safety of offshore oil and gas prospection, exploration and production activities, and analysis was carried out on a specific measure that proposes a similar structure to Option 1c. The measure described in the impact assessment would establish an EU-wide regulatory dialogue through the creation of a Commission-led EU Offshore Operators Group (Measure 3 under Option 2 “EU Best

Practices Model").[43] The purpose of such a group would be to support the inculcation and maintenance of regulatory best practices and facilitate periodical cross border exercises to verify the effectiveness of internal (industry) response plans approved within the envelope of the Major Hazards Report (MHR). The impact assessment estimated that the **running costs (the on-going operational cost) of such a structure would total 594,000 € in annual running costs.** It is assumed that the annual running costs would be shared by the CAs. The one-off costs (the initial investment needed to update practices with the regulation) of setting up the group was not provided by the impact assessment.

For comparison, in 2013, the European Union Network for the Implementation and Enforcement of Environmental Law (IMPEL) received annual financing of **400,000 €** from the Commission through LIFE + funds[44]. In 2012 and for 2014, the funding amount was the same. Funding is complemented by member donations and annual member fees of 2,000 to 5,000 € (depending on the Member State). IMPEL is an informal network of environmental inspectors, a forum of cooperation. IMPEL carries out two main tasks: activities and projects. Activities focus on elaborating the objectives of IMPEL and on disseminating knowledge and information through meetings and conferences. Projects have involved a wide range of subjects but have usually covered at least one of the following areas of EU environmental law and implementation/enforcement:

- Training of environmental inspectors;
- Exchanging experience and information on implementation and enforcement activities;
- Fielding and relaying views on the coherence and practicality of current and prospective EC environmental legislation; and
- Enforceability and practicability of new or existing environmental legislation[45]

To summarise, the running costs information provided for the two examples described above (EU Offshore Operators Group and IMPEL) cover many of the same activities and scope that an OCE would – centrally organised, headed by an EU appointed person, provision of training activities and workshops, forum for exchange of best practice, etc. Assuming that the functioning of the OCE for training needs would operate in much the same way as the two examples provided above, we could roughly estimate that the overall cost of this option would be around **500 000 €** per year – to be shared amongst the Member States. Costs could be divided equally across the MS concerned (approximately 32 000 € per MS based on 16 – 17 countries) or based on their share of offshore oil and gas activity. The running costs would include the costs to coordinate and run the training workshops e.g. booking of the conference room and training materials, costs of administrative support functions e.g. a secretariat, costs of communication and dissemination activities, travel and subsistence costs for training participants, where relevant and if budget allows, etc.

The advantages of this option is that it would be less costly to implement compared to option 1d (shared costs as opposed to MS bearing individual training costs based on their needs). Furthermore, it would be more cost effective in terms of being able to meet the specific training needs of several MS through a centrally organised training session or programme (as opposed to each of the MS individually organising their own training sessions). However, option 1c would probably be less effective in terms of targeting the very specific training needs of individual MS, especially if particular national contexts and conditions needed to be taken in account e.g. national laws, conditions of the local O&G sector, etc. Finally, it would be important to ensure that the programme of planned training activities under the OCE would ensure the balance between particular MS needs e.g. to not discourage smaller or less active CAs.

[43] European Commission (2011), Commission Staff Working Paper, Impact Assessment, Annex 1, Accompanying the document: Proposal for a Regulation of the European Parliament and of the Council on safety of offshore oil and gas prospection, exploration and production activities, http://ec.europa.eu/energy/oil/offshore/doc/ia_annexes_20122-1292.pdf

[44] Commission Decision C (2013)776 of 15 February 2013 concerning the adoption of 2013 work programme in the Environment policy area, serving as a financing decision http://ec.europa.eu/environment/funding/pdf/Final%20-%20publication%20EU.pdf

[45] BIO (2013), Evaluation of the IMPEL network and its work

Option 1d: Shared training organised by specific MS

Under option 1d, rather than designating a centrally organised body to organise CA training needs (option 1c), trainings would be individually organised by the Member States to address their specific expertise needs. Based on information received from the PSA (Norway CA), the HSE report (UK CA) and results from the gap analysis, **training accounts for approximately 9 % of annual staffing resources**. Furthermore, using the assumptions from the JRC, it is also assumed that Group 1 countries would need to increase their efforts on training by 20% to meet the requirements of the Directive. For Group 2 and 3 countries, the additional efforts on training correspond to 50%. These assumptions have also been integrated into the calculations. Using this figure and assumptions, and based on the staff costs of public sector salaries, the average training costs to address resource gaps per MS for 2014 and 2016 were estimated. Results are included in Table 30.

Table 30: Average estimated training costs to meet Directive requirements for 2014 and 2016 (€)

Country	2014	2016
Bulgaria	-1,785	-2,616
Croatia		
Cyprus	-8,767	-8,692
Denmark	-35,380	-826
France	-464	-512
Germany	-38,715	-36,832
Greece	-51,207	-11
Ireland	-33,026	-4,191
Italy		
Malta	-8,815	-8,753
Netherlands	-7,280	-18,321
Poland	-896	-1,157
Portugal		
Romania	-46,913	
Spain	-13,566	-18,306
United Kingdom	-267,596	-258,988
Norway		
Iceland		
Total	**-514,410**	**-359,206**

Regarding the training costs, option 1d requires MS to individually cover their own training expenses rather than the collective contributions described under Option 1c. Therefore, this training option may be more costly compared to Option 1c for certain MS who may require more training needs compared to other CAs e.g. the UK, Spain and Denmark, Germany and Ireland. On the other hand, as this type of training is offered based on request/need, it could be more cost-effective for some MS who require less training needs.

Additionally, option 1d describes the possibility of shared training, which implies that in organising their own training programmes MS may need to request highly specialised expertise from other Member States and relevant organisations to give lectures on specific areas where competencies are lacking.

For countries such as the UK, who may have very experienced regulators within their CA, as seen in Table 30, the UK would also require significant trainings to meet the OSD. These types of situations would need to be carefully considered when establishing agreements on shared training. Prior agreements on the use of experts from other MS CA and organisations to hold trainings for other CAs would need to be agreed upon – including the terms of remuneration and associated costs. It is assumed that the system of shared training would function under the same rules and conditions specified under the Commission Decision of 12.11.2008 laying down rules on the secondment to the Commission of national experts and national experts in professional training (more details of the rules of the agreement are described below under option 2).[46] In this case, it would not require that the CA requesting training from another CA pay for the training services of the expert, other than reimbursement of associated travel and subsistence costs. Otherwise, this may entail additional training costs to pay for the external experts to lead such trainings. For example, according to the HSE report, in the UK, training can be organised through training workshops/courses at an approximate cost of £360pp/day.[47] This cost can increase quite significantly in the case of a large number of participants and trainings that last several days or weeks. Finally, it is assumed that training provided "in-house" would not incur additional costs as providing trainings could be considered part of regulators' active job duties – especially in the case of senior management and inspectors.

According to the Petroleum Safety Authority of Norway (PSA), a particular challenge related to training in the sector is the **length of time** it takes to train people in the appropriate safety skills- and the fact that there is no quick way to "buy experience".[48] This is a challenge that many MS will probably face and should be considered in the context of both of the training options – options 1c and 1d. In this context, it would be worthwhile to consider the possibilities of integrating inexperienced or new recruits into mature CAs through secondment programmes aimed to provide them with the experience and experience needed to contribute to the regulatory tasks under the OSD.

5.4 Costs and benefits of option 2: Inter-EU expert transfer and knowledge sharing

Option 2 describes inter-EU expert transfer and knowledge sharing. Option 2 assumes that **the identified resource gaps will be only addressed by the exchange of experts and knowledge sharing through either bilateral or multilateral sharing arrangements** between certain different CAs of the same MS that have common implementation difficulties or between different MS governments when certain expertise is rich in one country and lacking in the other. Option 2 is divided into two sub-options: Option 2a: Bilateral agreements and Option 2b: Multilateral agreements.

Based on the results of the gap analysis, several scenarios could be envisioned for exchange of experts. For example, within the Group 1 countries, it appears that Italy has possibilities to contribute their resources in Regulatory Specialists & Safety Management Systems and Electrical & Control Systems to other countries who are facing a deficit in resources in these particulars areas e.g. the UK, Romania and Poland (for Regulatory Specialists & Safety Management Systems) and the Netherlands (Electrical & Control Systems). Similarly, Portugal appears to have surpluses in well specialists who could be transferred to countries such as the UK, Greece, Ireland and Cyprus to fulfil the resource gaps in this area.

Overall, based on the results of Table 31, there are relatively significant resource deficits to be expected in **the UK** (particularly in the areas of Environmental Protection & Oil Spill Response, wells,

[46] Commission Decision of 12.11.2008 laying down rules on the secondment to the Commission of national experts and national experts in professional training: http://ec.europa.eu/civil_service/docs/regime_end_en.pdf
[47] Website on Norwegian Offshore HSE Regulations: http://www.nmms.co.uk/training/courses/Pages/NORWEGIAN-OFFSHORE-HSE-REGULATIONS.aspx
[48] "Safety Factor", 3 September 2008", Accessed 01/12/2014: www.offshore-technology.com/features/feature41080/

organisational and human factors and specialists on structural integrity and verification), **Greece** (particularly in the areas of Regulatory Specialists & Safety Management Systems, diving, wells and administrative) **and Romania** (particularly in the areas of Regulatory Specialists & Safety Management, diving and process engineering). Potential resource surpluses can be expected in **Croatia** (particularly in the areas of Regulatory Specialists & Safety Management and diving), **Netherlands** (particularly in the areas of Environmental Protection & Oil Spill Response and evacuation and emergency response) and **Portugal** (particularly in the areas of Structural Integrity & Verification and Regulatory Specialists & Safety Management).

Table 31: Estimated resource gaps and surpluses for the baseline scenario, 2014

	Regulatory Specialists & Safety Management Systems	Process Engineering & Risk Assessment	Mechanical Engineering, Materials & Corrosion	Diving	Environmental Protection & Oil Spill Response	Electrical & Control Systems	Wells	Structural Integrity & Verification	Pipelines	Evacuation and Emergency Response	Occupational Health	Naval Architecture & Marine Engineering	Organisational & Human Factors	Legal	Administrative	Other	**Totals**
Croatia	-0.2	1.6	0.7	-0.3	0.6	-0.2	1.9	2.7	0.8	-0.2	0.9	-0.2	1.8	1.8	1.5	0.0	13.2
Denmark	-0.9	-0.8	-1.1	-1.1	1.0	-0.6	-0.7	-0.6	-0.6	-0.6	1.7	-0.3	0.1	2.2	-0.1	0.0	-2.4
Italy	1.9	0.7	-1.4	-2.0	-1.0	1.5	0.6	-0.3	-1.4	-1.6	1.0	-1.3	2.7	1.7	2.3	1.0	4.6
Netherlands	0.8	-0.5	0.5	-0.8	4.8	-2.1	4.3	-2.1	-0.1	1.7	0.6	-0.7	-1.7	-0.8	-1.1	5.0	7.6
United Kingdom	-4.0	-1.0	1.0	3.0	-4.0	0.0	-4.0	-3.0	0.0	-1.5	0.0	-2.0	-4.0	-0.6	-1.7	0.0	-21.8
Total group 1	**-2.4**	**0.0**	**-0.3**	**-1.2**	**1.3**	**-1.4**	**2.1**	**-3.3**	**-1.3**	**-2.2**	**4.1**	**-4.5**	**-1.1**	**4.4**	**0.9**	**6.0**	**1.2**
Bulgaria	-0.2	-0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-1.0
Germany	-0.7	-0.2	-0.1	-0.1	-0.2	0.0	-0.3	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.3	0.0	-1.7
Greece	-0.9	0.3	-0.6	-0.4	-0.7	-0.3	-0.7	-0.5	-0.3	0.1	-0.2	-0.3	-0.3	0.2	-0.8	0.0	-5.4
Ireland	2.4	-0.6	-0.5	-0.4	-0.6	-0.3	-0.7	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2	0.0	-0.7	0.0	-2.9
Poland	-1.5	0.2	0.0	-0.4	6.1	0.4	0.5	0.4	0.2	-0.3	-0.2	-0.2	-0.2	0.1	-0.6	0.0	4.5
Romania	-3.6	-1.3	-1.0	-0.8	-1.2	-0.6	-0.4	-0.9	-0.6	-0.7	-0.4	-0.5	-0.5	-0.5	-1.5	0.0	-14.5
Spain	-0.5	-0.2	-0.1	-0.1	-0.2	-0.1	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	0.0	-1.9
Total group 2	**-5.1**	**-1.9**	**-2.4**	**-2.2**	**3.2**	**-1.0**	**-1.6**	**-1.7**	**-1.2**	**-1.3**	**-1.1**	**-1.4**	**-1.4**	**-0.3**	**-3.6**	**0.0**	**-23.0**
Cyprus	0.3	-0.1	0.0	-0.2	-0.1	0.0	-0.7	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.2	0.0	-1.6
France	6.6	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	0.0	5.2
Malta	-0.4	-0.1	-0.1	-0.1	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	-0.1	-0.2	0.0	-1.8
Portugal	2.6	-0.1	-0.1	-0.1	-0.1	-0.1	2.7	2.9	-0.1	-0.1	0.0	-0.1	-0.1	0.9	0.8	3.0	12.2
Total group 3	**4.5**	**-0.5**	**-0.3**	**-0.4**	**-0.4**	**-0.2**	**1.3**	**2.5**	**-0.3**	**-0.3**	**-0.1**	**-0.3**	**-0.3**	**0.8**	**0.3**	**3.0**	**14.1**

To get an idea of costs of Option 2 on inter-EU expert transfer, several assumptions must be made to ensure the most realistic cost estimations. Firstly, it is assumed that the system of exchange of experts would closely follow the EC rules on the secondments of national experts (SNE), which is addressed by Commission Decision of 12.11.2008 laying down rules on the secondment to the Commission of national experts and national experts in professional training.[49] The aim of the arrangement is to supply the Commission with expertise that is not available internally. Similarly, for the employers seconding experts, the arrangement is an opportunity for international training and hands-on experience in policy areas of the EU that are important to their staff. **Therefore, in relation to Option 2, the main difference is that rather than providing expertise to the European Commission, SNEs would provide expertise to other CAs during a defined amount of time.**

With the above Commission Decision as a guideline, the following are the conditions that would need to be considered under this option in terms of exchanging experts between MS:

- The initial period of secondment may not be less than six months or more than two years. It may be renewed once or more, up to a total period not exceeding four years.
- In order to ensure that the Commission's independence is not compromised by private interests, seconded national experts must be employed by a national, regional or local public administration or an IGO, who are seconded to the Commission so that it can use their expertise in a particular field. **Exceptionally and where justified** by the interest of the service, the Member of the Commission responsible for personnel matters may authorise the secondment of an SNE by an employer that does not meet the above criteria.
- **The SNE's employer shall undertake to continue to pay his salary, to maintain his administrative status (permanent official or contract staff member) throughout the period of secondment**. The SNE's employer shall also continue to be responsible for all his social rights, particularly social security and pension.
- Except where the Director-General for Personnel and Administration grants a derogation, an SNE must be a national of an EU or EFTA Member State or a country with which the Council has decided to open accession negotiations and which has concluded a specific agreement with the Commission on staff secondments.

An SNE shall be entitled, throughout the period of secondment, to a daily subsistence allowance and a monthly subsistence allowance. The daily subsistence allowance for Brussels and Luxembourg is €119.39. The monthly subsistence allowance is indicated below in the table below. Travel expenses are reimbursed in accordance with the relevant rules and conditions in force at the Commission.

Table 32: Monthly subsistence allowance for Seconded National Experts[50]

Distance between place of origin and place of secondment (km)	Amount in €
0-150	0
> 150	76.74
> 300	136.42
> 500	221.71
> 800	358.14

[49] Commission Decision of 12.11.2008 laying down rules on the secondment to the Commission of national experts and national experts in professional training: http://ec.europa.eu/civil_service/docs/regime_end_en.pdf
[50] Commission Decision of 12.11.2008 laying down rules on the secondment to the Commission of national experts and national experts in professional training: http://ec.europa.eu/civil_service/docs/regime_end_en.pdf

Distance between place of origin and place of secondment (km)	Amount in €
> 1 300	562.80
> 2 000	673.67

Therefore, although CAs would not be expected to pay the SNE salaries, travel expenses and daily/monthly allowances would need to be accounted for. Further, depending on whether the SNE is on a bilateral or multilateral agreement, costs and administrative burdens could differ. For example for bilateral agreements (Option 2a), it is likely that it would incur lower transaction costs as the agreement would only concern two MS as opposed to several MS, which would imply more efforts and resources to organise. Under a multilateral agreement (Option 2b), higher transaction costs could be expected due to a larger number of actors to organise, however if an efficient cost-sharing mechanism is implemented, it could reduce costs for MS by equally distributing the costs.

5.5 Costs and benefits of option 3: Creation of a network of 3rd party expertise available on demand for each authority spread between MS or further afield

Under option 3, it is assumed that the **resource gaps would be met by third party technical expertise/engineers** from private industries or research institutes at the EU and global level. Several scenarios are possible in terms of how the third party expertise would be organised and overseen. They have been developed into 4 sub-options:

- Option 3a – Scenario 1: Network of 3rd party expertise, with a central facility organised and controlled by the EC
- Option 3b – Scenario 2: Network of 3rd party expertise in a joint support scheme, with organisms shared by several MS
- Option 3c – Scenario 3: Network of 3rd party expertise based on resource dependence using experts from the industry
- Option 3d – Scenario 4: Network of 3rd party expertise through self-selection in some technical forums on specific Oil & Gas related topics

The principal difference between Option 2 and 3 is that Option 2 concerns the transfer of CA staff from within the MS or from other MS, whereas Option 3 concerns the use of 3rd party experts either from inside or outside EU. These 3rd party organisations include experts from the private sector or research institutes.

Option 3a – Scenario 1: Network of 3rd party expertise, with a central facility organised and controlled by the EC

In Option 3a the network of third party expertise would be overseen by a centrally organised body, either within the EC or EC appointed. Option 3a could work similarly to the European Free Trade Association EFTA programme on seconded national experts. EFTA is an intergovernmental organisation set up for the promotion of free trade and economic integration to the benefit of its four Member States (Iceland, Liechtenstein, Norway and Switzerland). According to EFTA, there are approximately 1 000 national experts seconded to the European Commission from the 28 EU Member States, the EFTA States and other countries. The aim of the arrangement is to supply the Commission with expertise that is not available internally and to be a tool for the European Union to increase and spread knowledge of the European institutions and decision-making process. The EEA EFTA States contribute to the

administrative costs of the European Commission. This contribution is negotiated individually for each programme on an annual basis. The administrative cost contribution is both financial and in kind. The financial cost contribution is towards the fixed overhead costs of the Commission, such as rental of offices, expenses of missions, meetings and publications. The in kind contribution refers to the EEA EFTA States' **supply of human resources to the European Commission through the secondment of national experts.** These experts are employed in the different directorates-general of the European Commission in charge of the programmes with EEA EFTA participation. These experts are cost-free for the European Commission as their salary and benefits are covered by their employer in their home countries. EEA EFTA national experts fall into two categories depending on their connection to the EEA Agreement:

- EFTA in-kind experts are directly linked to the EEA Agreement as they are part of the EEA EFTA States' annual contribution to the administrative costs of the EU budget, within the framework of EEA EFTA participation in various EU programmes, agencies and undertakings. All administrative procedures linked to their recruitment, prolongation and replacement are handled by the EFTA Secretariat in Brussels, with the exception of the experts seconded to Eurostat in Luxembourg.
- Bilateral experts are seconded by each EFTA State to the EU outside the EEA EFTA budget. All administrative procedures linked to their recruitment, prolongation and replacement are handled by the EFTA States' respective missions in Brussels.[51]

Although EFTA provides some information on its website on their annual budget and activities, the budget data is not broken down into enough detail to distinguish the amount of the Secretariat's budget that is allocated to activities related to operating and maintaining the activities and database on national experts. In 2014, EFTA's total annual budget was 22 369 000 CHF (18 600 400 €).[52] The Approximately 6.2 % of the annual budget is allocated towards administration and management carried out the EFTA Secretariat (3 658 000 CHF or 3 000 000 €). The EFTA Secretariat employs approximately 100 staff members.

Although more detailed costs information from the EFTA example was not available, a range of costs have been identified that allows us to make some estimations on the costs of this option. Option 3a describes an organisational structure (centralised) similar to option 1c on training (Trainings collectively organised by an Offshore Centre of Expertise). However, rather than organising and coordinating training activities for CA staff, the designated body would be responsible for coordinating 3rd party expertise to meet the resource needs of the CAs. Several different assumptions must be made to come up with some estimated cost information for this option. We assume that the organisation would be set up in the same way as the IMPEL network, which is described in option 1c. IMPEL is an **informal network of environmental inspectors**, that was established as a forum for regulatory authorities of EU Member States to meet and discuss issues connected with implementation and enforcement of EC environmental legislation. The core of the IMPEL activities concerns awareness raising, capacity building, peer review, exchange of information and experiences on implementation, international enforcement collaboration as well as promoting and supporting the practicability and enforceability of European environmental legislation. The Association undertakes its activities primarily within a project structure. IMPEL has at present one full time role whose job it is to coordinate the network's activities, arrange Board and General Assembly meetings, support the projects and project managers, manage the finances of the network and maintain internal and external communications such as the website or with other relevant networks and organisations. Therefore, it seems reasonable that Option 3a would entail setting up a structure similar to IMPEL. In this case, the annual running costs would be around 400 000 € (the same as IMPEL's annual operating budget), which would include the costs of a

[51] EFTA National Experts website: www.efta.int/eea/efta-national-experts
[52] EFTA website: www.efta.int/about-efta/efta-budget

Secretariat, locating and selecting experts, costs due to the application and selection process, developing a database of experts and keeping it up to date, costs of drafting of contracts between the home country and host country, etc.

The annual running costs of Option 3a would probably be lower than Option 1c (trainings organised by a centralised facility), because in Option 3a, the centralised facility would not be organising and coordinating training workshops (which would require costs related to renting out venues and the travel and subsistence costs of participants). However, it is likely that the administration burdens would be higher in option 3a compared to option 1c based on the following aspects and assumptions:

- Need to draft up the work contracts between the different SNEs and their host countries that specifies the type of expertise sought out, length of amendment, cost arrangements, ensure there are no conflicts of interest, etc.
- Need to identify and start communications with the relevant 3rd party experts (as opposed to option 1c, where it is assumed that trainings would be given by relevant experts from MS CA)
- Need to monitor and follow-up on amendments to ensure that missions are running smoothly and the expected objectives are being met.
- Need to regularly check and update the register/databased on 3rd party experts

Within the European Commission, the provisions of using external expertise are set in the Commission document "Rules for Commission Expert Groups"[53] and "Guidelines on the collection and use of expertise by the Commission".[54] Several factors are taken into account to select the members of a Commission expert group. For example, for individuals, they are chosen according to a selection process that guarantees a high level of expertise, avoids conflicts of interests, as well as to ensure geographical and gender balance, when possible. The Commission and its departments can also issue public calls for applications. Members can be appointed for either a fixed (possibly renewable) or unlimited period. According to the EC's guidelines on using external experts, **external experts are not usually paid for their work;** only travel and subsistence costs expenses are provided; and only in duly justified cases are experts provided a special additional allowance. Therefore, it would be necessary to identify relevant experts/develop agreements where the SNE's employer continues to pay their salaries while on a secondment mission at a CA. Similar practices currently exist for example in the UK, where experts from industry are used within the CA and salaries are compensated through a specific cost recovery mechanism in agreement with the industry. Without similar agreements, this option would be a significant barrier to using high-level experts who require high fees. On the other hand, in the past it has been observed that such experts are often willing to work for the Commission, despite low compensation due to the high-level recognition they receive by working for the Commission. This would also provide mutual benefits for both the expert in question and the Commission (by receiving the needed expertise). Finally, it is important to consider that external third party experts would probably need to have a certain level of expertise on the regulatory systems of the MS in order to be able to perform the necessary functions needed. If not, options for training would need to be envisioned (see options 1c and 1d).

The principal benefits of this option include the possibility to cover all areas of expertise that are currently lacking within EU resources. Furthermore, a single EU regulatory body to oversee CA expertise needs would also ensure EU-wide coherence and a level playing field. It would also be less of an administrative burden on individual MS as they would seek guidance and recommendations from the regulatory body. However, to ensure the effectiveness of this option, it would be important to avoid any unnecessary duplication of measures or roles already taken by national authorities. Another particular benefit of this

[53] Communication from the President to the Commission: Framework for Commission Expert Groups: Horizontal Rules and Public Register: http://ec.europa.eu/transparency/regexpert/PDF/C_2010_EN.pdf
[54] Communication from the omission on the Collection and Use of Expertise by the Commission: Principles and Guidelines: "Improving the knowledge base for better policies": http://ec.europa.eu/governance/docs/comm_expertise_en.pdf

option would be that it would promote information exchange and cooperation between national authorities and between national authorities and the Commission. The Commission would also be able to obtain very specific and in particular comparable information on the expertise required in Member States. Over the years DG ENER would be able to build up significant knowledge on the type of resources needs that exist within the offshore sector and would gain a better understanding of how to tackle them.

Option 3b – Scenario 2: Network of 3rd party expertise in a joint support scheme, with organisms shared by several MS

Option 3b is similar to Option 3a with one major difference – rather than being operated by a centralised body, the network of 3rd party expertise would be built upon already **existing international cooperative mechanisms** among some Member States and with other non-EU countries such as Australia, Brazil, Canada, Mexico, New Zealand and the USA.

In terms of determining the overall costs of implementing the option, some cost figures can be taken from the impact assessment to estimate the potential costs of this option. The Danish offshore health and safety authority indicates that it spends around **60 000 € on international and other cooperation annually.** With a staff of 22, the Danish offshore health and safety authority's expenditure on international cooperation works out at around 2 730 € per staff member per year.[55] This includes participation in international arenas, aid projects, etc. In addition to this, costs will also need to be attributed to creating and running a database of the available expertise from the international networks. Therefore, with this in mind, the project team assumes a rounded up figure of 3 000 € per staff member or FTE towards international cooperation, which also includes the creation and maintenance of the expert database. In terms of managing the database, MS CA could take turns on a yearly basis so that the tasks related to operating the database and keeping it up to date is shared equally among the CAs. It is expected that the cost of creating the database would be a one-off cost.

Assuming that the other MS would contribute the same proportion of efforts based on the number of staff members at the CA, some estimates of costs can be made, which are included in the table below.

Table 33: Estimated costs per MS for international cooperation activities under Option 3b

MS	Total current FTE (2014)	Estimated (staff) costs for international cooperation activities (€)[56]
Croatia	18	€ 54,000
Cyprus	2	€ 6,000
Denmark	17.5	€ 52,500
France	7	€ 21,000
Germany	1.95	€ 5,838
Greece	3	€ 9,000
Ireland	4.25	€ 12,750
Italy	42	€ 126,000
Netherlands	59	€ 177,000
Poland	10.6	€ 31,800

[55] Impact Assessment
[56] Based on the assumption that international cooperation activities account for approximately € 3 000 in staff resources (staff costs) per FTE

MS	Total current FTE (2014)	Estimated (staff) costs for international cooperation activities (€)[56]
Portugal	14	€ 42,000
UK	127.5	€ 382,500
Norway	195	€ 585,000
Total	**501.796**	**€ 1,506,000**

It should be noted that not all countries are included in the table above. The current FTE for each MS is based on the MS responses received from the JRC questionnaire that was sent out to MS on their offshore resources. Therefore, data for some countries are missing either because they did not respond to the questionnaire or the answer was too unclear for a concrete response. For example, in Spain, providing figures for staff proved particularly challenging. Spain knows exactly how many resources they have; however knowledge and expertise is also spread among various departments, therefore it is very difficult for Spain to assess where the resources are, to which department they actually belong, and how much time is devoted to specific tasks. Similar to the situation in Spain, in Romania, no figures on current staff could be estimated as the CA composition is not clear. Finally, in Malta: there are currently no staff working full-time on offshore safety issues as there are no offshore production installations in Malta.

In order for the joint scheme to work efficiently, it would be necessary to define a burden-sharing (cost-sharing) mechanism and to ensure that the required resources are available. In Option 3c, a cost-sharing system could be envisioned for the creation and maintenance of the expertise database, As shown in the table above, costs estimates have been calculated based on the number of staff working at the CA as it indicates to the some extent the efforts made in international cooperation activities. This could be one option in terms of cost sharing e.g. determining an amount to contribute based on the number of staff members per CA. Other options on cost sharing could be based on the production quantity per Member State, offshore activity projects, Member States' GDP, take into account contribution and use of national experts, etc. Furthermore, it would be important that the management of the database and other administrative tasks e.g. organising any meetings and initiatives, facilities & administrative costs is designated on a rotational bases among the CAs involved, which could be done at a 6 month or yearly interval. For all other costs related to funding expert salaries, travel expenses, equipment, supplies, and other allowable direct costs, it is assumed that the individual CA would be directly responsible for these costs – and based on whether or not an agreement has been made with an expert identified through the network. This is similar to what has been explained in the above options on cost recovery powers and agreements on SNE.

The main benefits of this option is that it would allow the creation of a common expert database to be shared among some Member States, which could enhance synergies, reduce the duplication of efforts, lower the administrative burdens and reduce inconsistencies in terms of expertise needs and emergency planning between Member States. Furthermore, the possibility of **using external specialists from outside the EU is particularly important** for certain areas of expertise for which there is a general lack at the EU level. It would also promote a consistent and even enforcement of the Directive across Member States in terms of international collaboration with external EU countries, and thus create a level-playing field by strengthening coordination and transparency at a global scale.

Option 3c – Scenario 3: Network of 3rd party expertise based on resource dependence using experts from the industry

This option refers to a centralised collaboration or network of **experts employed by private oil and gas companies** with the aim of working together on R&D and/or HSE practices to effectively avoid potential risks that may be caused by major hazard accidents. The purpose of the network would be to

bring together the relevant experts, best practices and knowledge from the private sector in order to work with regulators from the Competent Authorities to agree on possible actions that would help the MS meet their required resource needs. A few examples exist of **ad-hoc** or **on-demand** systems of expertise, which are seen within EMSA and the EU Civil Protection Mechanism at the EU level. Other examples include the IRF, the ICRARD, NSOAF, EDTC and the OMHEC. Tools used by EMSA to provide ad-hoc assistance and expertise in the marine safety sector include pollution response and monitoring assistance:

- Oil recovery vessels and equipment
- The CleanSeaNet (CSN), which is a satellite system for oil spill & vessel detection
- Dispersants usage tool (DUET: Dispersant Usage Evaluation Tool – developed by EMSA) and expertise available on site.

It should be noted that the availability of oil recovery vessels and equipment is ensured through a **public-private-partnership, using a public procurement procedure**. A fixed price is agreed in advance with the ship owners, who are required, in case of an accident and request for assistance by a Member State, to mobilise within 24 hours, otherwise significant penalties apply.[57] The costs of vessel mobilisation and response are covered by the requesting Member State. All requests for EMSA mobilisation are made through the EU Mechanism for Civil Protection at the Monitoring and Information Centre (MIC) in DG ECHO.

In terms of the costs of this option for industry, the initiative described under option 3c could fall under the time and resources these companies already spend on R&D activities. Many oil and gas companies already participate in similar industry working groups and collaborations due to the high risk specificities of the oil and gas sector. This is possible because safety issues affect all players in the industry and are often considered as outside of competition field between Oil and Gas companies. Therefore, industry has an invested interest in working together to avoid such risks and accidents by sharing their knowledge, data and best practice.

It would be important to have an intermediary person or body (e.g. an industry group such as IADC, IMCA, IOGP, etc.) to oversee the network and mediate negotiations and agreements between the private sector network and the CA's. Furthermore, it could be envisioned that Option 3c work in parallel with the previous Option 3b by ensuring that both networks are connected – either through a harmonised database or through periodic meetings and updates. It is expected that this would not incur additional significant costs for the CAs.

Option 3c would most likely be established under the form of a voluntary initiative as it is unlikely that a legal measure would be accepted by private stakeholders, which would oblige them to "collaborate". However, the risk of a voluntary measure is not getting full participation or an unbalanced representation of industry actors. On the other hand, as a voluntary measure, companies that join are indicating their willingness to participate in strengthening the safety conditions of the offshore sector and would be more likely to volunteer their time and expertise in helping CA meet their resource needs.

In terms of costs for national CAs, option 3c is expected to be the least costly in terms of staff costs for CAs compared to the other sub-options of Option 3. This is because it is assumed that all experts are full-time employees at research centres or private companies, and the time they contribute to public service can be considered as "free of charge". This would work in the same way that the secondment of national experts has been described in options 2 and options 3a and 3b above. In such cases, CAs would probably be responsible for reimbursing total or part of the travel and subsistence expenses incurred in the course of the mission. In the case that CAs are also responsible for the salary of the expert while on mission or secondment, salary costs can be recovered though the cost recovery

[57] http://euoag.jrc.ec.europa.eu/files/attachments/euoag_2nd-meeting-4dec2012-summary-record-approved.pdf

mechanisms that are allowed under the Directive (also examples of cost recovery agreements made with industry in section 4.2.3).

This option could also hold cost benefits for oil and gas companies. For example, sending out experts to work in the regulatory setting of the offshore sector could help them gain valuable experience and knowledge that they could bring back to the company to better improve their own practices related to regulatory requirements. Furthermore, the existence of an organized network would strengthen the industry's legitimacy, credibility and commitment in using the safest practices and safeguards to prevent and prepare for any emergency situations – especially in terms of public opinion, which has been negatively impacted since the Deepwater Horizon oil spill.

A key challenge that must be considered in this option is to ensure that there is not a conflict of interest in using the seconded expert from industry. It is important to ensure that the way networks and organisations used are independent and do not provoke conflicts of interests. CAs would have to make sure that such experts have limited legal powers, while still being able to provide specialist observations, assessment, inspection and investigation functions. Another challenge is to ensure that the expert is available for a sufficient amount of time. Other challenges relate to obtaining not only the acceptance to participate from experts, but also ensuring experts are available. The above mentioned challenges would also apply to all of the sub-options under Option 3. Moreover, as described under option 1a, it is important to consider that the industry is expecting a steady growth in staff and skill demands, but are highly concerned about meeting those employment demands in the future. Therefore, this could also have a potential impact on the possibilities of using experts from the **private sector who may also experience resource shortages themselves**.

Option 3d – Scenario 4: Network of 3rd party expertise through self-selection in some technical forums on specific Oil & Gas related topics

Finally, option 3d involves an auto-participatory collaboration among researchers, who are not necessarily organised by any forms of formal organisations. This option is not expected to cost CA any financial or human resources as Option 3d is not considered to be a stand-alone option but more as a complementary option to the options described above. It would come under the form of a voluntary agreement or informal arrangement among the research community to try and assist CAs to meet any other remaining gaps in expertise. Member States could gain access to info about human resources that are otherwise inaccessible to the CAs and those involved in the informal network could obtain information about possible opportunities and requirements needed at CAs.

5.6 Costs and benefits of option 4: a mix of different options to address the resource gaps at different levels

Option 4 proposes a mix of the previous options to address the identified resources gaps by taking into account the different resource availabilities and requirements of the three country groups. The previous options described above may address the resource gaps for some of the technical experts (e.g. environmental protection & oil spill response and legal staff that have an overall surplus at the EU level), however may not be able to cover all lacking expertise at the EU level, e.g. the significant shortage of diving staff. For this reason, **a mix of different options (options 1 to 3) could be considered for countries to cover its CA needs for all required technical experts**.

In terms of the costs of this option, the cost implications would differ based on the group that the MS falls into. Country groups have been designated based on the estimated level of resources that are lacking. In other words, it is assumed that since Group 1 countries (HR, DK, IT, NL, NO, UK) have the greatest level of expertise; the additional resources needed to meet the requirements of the Directive

are lower compared to Group 2 (BG, DE, GR, IE, PL, RO, ES) and Group 3 (CY, FR, Iceland, MT, PT) countries, who would require the greatest uptake of additional expertise in order to fulfil the 2016 requirements under the Directive.

The main assumptions under Option 4 is that countries with more active offshore activities (more than 10 offshore installations) are those who have both more expertise and more funding available for self-recruitment (except the Netherlands and Croatia), whereas countries with less or zero offshore activities (between zero and ten installations) are those who have less available expertise to meet their CA resource needs. Option 4 proposes different option mixes that may fit the needs of each of the country groups by taking into account the different resource availabilities and requirements in the three country groups:

- **Group 1:** In this group, no general lack of expertise has been identified, however difficulties in recruiting and attracting specific qualified personnel because of salary differences between the private and public sector has been pointed out in the Netherlands and Croatia. Much of the required resources could be addressed through self-recruitment and training (Option 1) or by transferring highly qualified specialists from the third party expertise provided by private oil and gas companies and public research centres domestically or from other EU countries (Option 3a or 3c) or external EU countries through some existing collaboration mechanisms (Option 3b).

- **Group 2:** In this group, a general shortage of personnel has been identified, which could be addressed by some of the sub-options under option 3. Ideally, these countries (Greece and Poland in particular) would receive expertise from other CAs and third party networks (option 2 and option 3); however relationships and interactions with other Competent Authorities and Industry Associations would need to be improved. **Group 2 countries have strong needs for capacity building** in order to improve their procedures to interact with stakeholders, therefore in this context, training would be particularly important to reinforce capacity building (options 1c and 1d).

- **Group 3**: In this group, no overall gaps were identified at an aggregated level, however due to the lack of experience in offshore activities, many countries in this group encounter a lack of resources for almost all the offshore safety related activities and systems e.g. Malta and Cyprus. **These countries would need established CAs** to address these resource gaps along with formal systems for activities such as well notifications and RoMH for drilling rigs. According to the impact assessment, **the creation of a single competent authority to regulate offshore activities would result in one-off costs amounting to 20-50% of EEA regulators' average annual budgets in the first year of implementation i.e. €17.5-43.9 million**[58]. Furthermore, in terms of benefits, the national authorities would gain in operating efficiency, with an estimated 1.5-3% in regulatory cost savings, resulting in economic benefits of around €1.3-2.6 million annually. Regarding drilling campaigns in particular, the use of personnel and training expertise through the support of other countries could be a short to mid-term solution for these countries during the interim period before the establishment of dedicated CA (Option 1c or 1d).

[58] European Commission (2011), Commission Staff Working Paper, Impact Assessment, Annex 1, Accompanying the document: Proposal for a Regulation of the European Parliament and of the Council on safety of offshore oil and gas prospection, exploration and production activities, http://ec.europa.eu/energy/oil/offshore/doc/ia_annexes_20122-1292.pdf

5.7 Comparison of proposed solutions with respect to the baseline option

The assessment of costs and benefits has been carried out at different levels of quantification as well as qualitatively due to the unavailability of certain data needs. The following paragraphs summarise the main costs and benefits of each proposed option, including a summary comparison table.

Member States, industry and the Commission will all face changes regarding the levels of financial and administrative burden in implementing the proposed options in order to meet the OSD requirements. However, it is important to remember that all of the options aim to meet the resource requirements of the Directive and reduce the risk of accidents like the Deepwater Horizon spill. By fulfilling the requirements of the Directive, MS and industry and the EU would be avoiding the costs of possible offshore accidents, which the impact assessment estimates at around €50 million in terms of average property damage cost. In the case of large blowouts in European waters (over 500,000 tonnes), the estimated quantifiable costs for clean-up and compensation are between €5 billion and €30 billion.[59] This does not include all the lives that would also be saved, for which a monetary value cannot be given. Furthermore, the Deepwater Horizon disaster is proof of the very serious and far-reaching consequences of a single accident affecting maritime and coastal pollution – the loss of 11 lives and an estimated 4.9 million barrels (660,000 tonnes) of oil spilled into the sea. The oil spill required a response effort involving 48,000 people, 6,500 vessels and 125 aircraft. Therefore, in this context, the principal benefit of the options is strengthening offshore expertise and safety so that dangerous and expensive accidents do not occur.

For the recruitment options (Option 1a and 1b) under option 1 (Baseline option), there would be a beneficial impact on job creation and employment opportunities for both experts in the public and private sector. In terms of the staff costs of recruitment, option 1a would be more costly for MS compared to option 1b, based on the assumption that the majority of private sector salaries are higher than those in the public sector. Further, depending on the MS, some have significant recruitment needs compared to others, e.g. the UK, Denmark, Greece, Ireland, Romania and Germany. Concerning administrative burdens, option 1b would probably be easier for MS to carry as it would entail internal recruitment as opposed to external recruitment processes. The training options under Option 1 (option 1c and 1d) would also be beneficial in terms of reinforcing capacity building actions and developing much needed expertise to staff currently (or planned) employed in CAs. It is expected that shared training (option 1d) between CAs would result in less costs and administrative burdens compared to organising training needs under a single umbrella organisation (option 1c). Even so, option 1c would ensure more coherence and a level playing amongst the MS.

Under option 2, the sharing arrangement would entail relatively little costs for CAs as the main idea is to **share already available resources (between CAs**). In other words, rather than seeking to recruit new hires, certain MS would instead partake in an expert exchange programme to utilize already existing resources. However, any additional staff costs may likely be borne by countries with more advanced offshore activities, compared to countries with more significant lacks in resources because these countries would also need to ensure they have sufficient expertise at home before sending over experts to other countries. This could even be a barrier for certain MS e.g. Group 1 countries from sending their national experts to other CAs. Further, establishing bilateral or multilateral agreements and implementing rules and a framework to oversee such agreements would entail certain administrative costs. The transferred expertise would come from CAs, either other CAs within the MS in question or from other MS. Although Option 2 would entail lower overall costs compared to the recruitment options under Option 1, the overall potential effectiveness of the option in terms of fulfilling the identified resource gaps is lower due to the fact that the required transfer agreements or training schemes would differ

[59] European Commission (2011), Commission Staff Working Paper, Impact Assessment, Annex 1, Accompanying the document: Proposal for a Regulation of the European Parliament and of the Council on safety of offshore oil and gas prospection, exploration and production activities, http://ec.europa.eu/energy/oil/offshore/doc/ia_annexes_20122-1292.pdf

depending on the nature and amount of resources available and shared, thus they would not necessarily ensure consistency across all Member States. Moreover, it might not be sufficient to support the emergency needs of certain expertise during a major risk event. Therefore, other cooperation options would need to be considered.

Concerning the sub-options of Option 3, Option 3a would be more costly to implement for the EC as well as for MS due to the necessity of establishing a body or system to oversee the use of international experts compared to the other sub-options. The EU level body would need to be able to identify the available international expertise and gain their support and participation in the scheme. The cost of using international experts is also uncertain, although it is assumed that overall subsistence costs would be higher compared to EU experts due to the greater distances travelled and longer duration of visits. Furthermore, the transaction costs to create such a resources centre (e.g. establishment of a web-based expert register at the EU level) would be more expensive compared to the other scenarios. However, it might be more consistent in terms of the expertise that could be provided and the accessibility to all MS. Options to lower costs could be to work with ESMA and the EMPOLLEX programme – which already works with national expert centres. Further, the centralised database of third party expertise could entail significant costs to set up and administer, without necessarily guaranteed results because of several challenges that would need to be overcome: particularly related to securing the necessary international expertise and ensuring that they could be made available when needed. Due to these constraints and challenges, the effectiveness of option 3a is uncertain as it would greatly depend on the availability and willingness of international experts to participate in the scheme.

Option 3b would be applied at a more regional level and could entail the participation of a few neighbouring Member States. This option could allow for the creation of a common source of expert database to be shared among some Member States, which would impose less initial barriers compared to a **formal sharing arrangement** between Member States (option 2) or a dedicated facility (option 3a). Such arrangements already exist in practice, which could reduce the duplication of efforts, lower the administrative burdens and reduce inconsistencies in the emergency planning between Member States. Option 3b would require less costs and resources for MS CAs to implement compared to Option 2 because the idea is to build upon already existing third party expertise networks and resources, rather than risking resource shortages in a particular MS due to expert secondments to another CA. Furthermore, all sub-options under Option 3 would function on an “ad-hoc” basis only meaning that expertise requests would be on-demand when needed, rather than functioning as a continuous knowledge/expert exchange programme, which would require more regular maintenance and monitoring (Option 2). Nevertheless, similar to Option 3a, in Option 3b it would be difficult to ensure that the required resources are available in the case of emergencies. Although less costly to implement than option 3a, option 3b holds a greater risk of accessibility for certain MS (e.g. those that are not part of the joint-scheme or regional agreement). Finally, under option 3b, CAs would need to be more involved compared to the other sub-options of Option 3 due to the existence of the joint-scheme agreements amongst neighbouring countries.

Option 3c and Option 3d would be the least costly for MS to implement as the sub-options would depend on the funding and participation of the private oil and gas sector and researchers. These sub-options require very little administrative costs for CAs as the experts are full-time employees at research centres or private companies, and the time they contribute to public service can be considered as “free of charge”. However, the CAs may be responsible for reimbursing total or part of the expenditures incurred in the course of the mission, including travel costs, hotel, etc. Although it is common that Oil and Gas companies work together to avoid potential risks, there is a risk of reduced transparency compared to other options and scenarios due to confidentiality and competition aspects between competing companies. Nonetheless, the offshore oil and gas sector is unique in that the risk of fatal accidents is much higher compared to other industries, therefore those concerned have an accrued interest to cooperate and be informed of the most up to date knowledge, developments and best practices.

Finally, for Option 4, although this option proposed a mix of solutions based on the overall resource needs of each country group, the cost implications are expected to vary widely based on the country group. For Group 1 countries, the costs would mainly entail additional recruitment of staff to fulfil the relatively small remaining resource gaps. For Group 2 countries, a more significant recruitment of in house staff or use of 3rd party expertise and training would be needed to fulfil their resources gaps compared to Group 1 countries. Finally, for Group 3 countries, the most significant costs would be expected as they currently experience the largest lack of resources needed to meet the 2016 resource requirements under the Directive and would need to consider the establishment of a dedicated competent authority.

In Table 34, the different costs and benefits of the various options are summarised and compared. The summary comparison table indicates the impacts of the different options compared amongst each other, including the baseline option.

Legend for Table 34

+++	very beneficial effect
++	substantial beneficial effect
+	slight beneficial effect
0	No effect
-	negative effect
- -	substantial negative effect
- - -	very negative effect

Table 34: Comparative table of the options

	Option 1				Option 2		Option 3				Option 4		
	Option 1a	Option 1b	Option 1c	Option 1d	Option 2a	Option 2b	Option 3a	Option 3b	Option 3c	Option 3d	Group 1	Group 2	Group 3
Costs													
Overall administrative burden to EU authorities and agencies	0	0	- - -	0	0	0	- - -	0	0	0	0	0	0
Overall administrative burden to MS competent authorities	- -	-	-	- to - -	-	- -	-	- -	-	0	-	-	- - to - - -
Costs of training of administrative personnel/capacity building	0	0	- -	- -	-	-	0	0	0	0	-	- - to - - -	- - to - - -
Implementation costs e.g. one-off costs	0	0	- - -	- to --	-	- -	- - -	- -	-	0	¨-	- - to - - -	- - to - - -
Running costs	- -	-	- - -	- -	-	- -	- - -	- -	-	0	-	- -	- - to - - -
Costs of expert salaries (staff costs)	- - -	- -	- to --	- to --	-	- -	- -	-	- -	-	- -	- -	- - to - - -
Benefits													
Job creation and innovation	+++	+++	+	+	+	++	++	+	0	+	+	++	+++
Improving effectiveness (e.g. quality) of inspections	++	++	++	++	+	++	++	++	+ to ++	+	++	++	++
Environmental benefits e.g. through decreased risks in accidents and spills that could damage the marine environment	++	++	++	++	+	++	++	++	+ to ++	+	++	++	++
Reduction of safety risks e.g. decreased number of accidents and death to workers	++	++	++	++	+	++	++	++	+ to ++	+	++	++	++
Acceptability and availability of stakeholders or experts	- -	-	-	- to --	- to - -	- to - -	+	+ to ++	+ to ++	+ to ++	- to - -	- to - -	- to - -

6. Conclusion

Data and assumptions from previous studies (those by HSL and JRC) were analysed and challenged, a.o. based on the assessment of the organisation of Norwegian Competent Authorities. This analysis led to the calculation of an updated gap analysis for 2014 and of a new one for 2016.

This gap analysis was analysed in detail: detailed analysis, with, a.o. the calculation of staff costs per gap, the split of current and required time into functional time, the calculation of time required for development and maintenance of technical and knowledge systems and stakeholder interaction, etc.

To address these gaps, 4 main options (11 in total when counting sub-options) were described and analysed: the baseline option (option 1), three alternative solutions and a final one, which is a mix of the previous ones. The feasibility and potential costs and benefits of each of these options were assessed and the options were compared among each other.

The results of the 2nd Stage of the study (Design of Support Organisation) are presented in a separate report.

Annex I: Data sources

Literature review
JRC Study Part 3
Database and specialised internet sites
Oil & gas industry directory (www.rigzone.com)
Natural Gas Europe (www.naturalgaseurope.com)
Offshore installations inventory, OSPAR commission (www.ospar.org/content)
Health and Safety Executive, Energy Division (http://www.hse.gov.uk/offshore/directive.htm)
Environmental database of UK oil and gas industry (www.iportal.decc.gov.uk)
Emerging Markets Information Service (Deloitte Intranet)
Oil & gas reports and studies
Regional Perspectives Offshore Europe Oil and Gas Market Report To 2017*, Infield, 2013
Risk governance of offshore oil and gas operations, P.H. Lindøe, M. Iaram, O. Renn, 2014
Offshore accidents, regulations and industry standards, R. C. Visser, 2011
A new policy direction in offshore safety regulation, Dr Jan Hayes, 2012
Post-Macondo Comparative Analysis of Offshore Safety and Environmental Regimes of the United States and United Kingdom, Jeffrey Ray, 2013
Post Macondo Recommendation Letter No. 1, Deepwater Horizon Follow-Up, OLF Joint Industry Project, 2011
The Deepwater Horizon Accident – Assessments and Recommendations for the Norwegian Petroleum Industry, Summary, Petroleum Safety Authority, 2011
Deepwater Horizon, Lessons Learned and Follow Up, Summary Report, OLF, 2012
BP: Deepwater Horizon Accident Investigation Report, September 2010
National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling: Deepwater. Report to the President, January 2011; Chief Counsel's Report 2011, Macondo the Gulf Oil Disaster, February 2011

US Coast Guard: Report of Investigation into the Circumstances Surrounding the Explosion, Fire, Sinking and Loss of Eleven Crew Members Aboard the Mobile Offshore Drilling Unit Deepwater Horizon, April 2011
SINTEF report: Deepwater Horizon Accident May 2011
Petroleum Safety Authority Norway: Deepwater Horizon-ulykken- vurdering og anbefalinger for norsk petroleumsvirksomhet [!e Deepwater Horizon accident – assessments and recommendations for the Norwegian petroleum industry], June 2011
BOEMRE: Report Regarding the Causes of the April 20, 2010 Macondo Well Blowout, September 2011
OGP: Deepwater Wells, and Oil Spill Response, global industry response group recommendations, May 2011
National Academy of Engineering: Macondo Well Deepwater Horizon Blowout. Dec 2011
Major hazard risk indicators for monitoring of trends in the Norwegian offshore petroleum sector, Jan Erik Vinnem
Assessing Risk Trends in the Newfoundland and Labrador Offshore Sector: Applying the Norwegian Model, C.D. Vincent
IRF Country Performance Measures, 2012 Data

Annex II: Norway data and reformulation of the baseline

Our project team has collected data on the offshore operations in Norway in order to challenge the current assumptions from the JRC report and attempt to reformulate the baseline of the study. The goal of undergoing this analysis was threefold:

- Identification of any major differences in the required organisational arrangements between UK and Norway and assessment of significant dissimilarities and reasons of occurrence;
- Assessment of the typical effort of Norwegian Authorities which is required to carry-out the requirements of the Directive;
- Investigation of whether recalculating Member States' future requirements by using Norway (or a midpoint between UK and Norway) as a reference would be feasible and relevant.

The following sections describe the outcomes of each of these attempts. Before doing so, the process and experienced challenges in the data collection in Norway are presented.

Data collection

As a first step, the existing data from the JRC model was used in order to fill-in the balance sheet. The remaining of the work was performed in close cooperation with experts from Deloitte Norway who have provided data via two channels:

- Qualitative data was provided by the Norwegian authorities involved in tasks covered by the Offshore Safety Directive. The Petroleum Safety Authority (PSA) is the most concerned by this study; the Norwegian Coastal Administration (NCA) and the Norwegian Environmental Agency (NEA) are also concerned but to a lesser extent, having identified a total of 26 FTEs staff correlated to the organisational requirements of the Directive. Regarding NCA, only 1 FTE (Full Time Equivalent) was considered under the category "Environmental protection and oil spill response".
- Quantitative data was provided by Rystad Energy database and was further analysed in the context of the Directive and JRC model. See table below for detailed information on our research.

Table 35: Type of additional data collected to complete the JRC report (provided by the Norwegian authorities and Rystad Energy)

Qualitative/Quantitative	Type of data
Quantitative	Organisational requirements (number of installations, planned installations and drilling activities, current staff)
Qualitative	Regulatory organisations dealing with offshore inspections and safety
Quantitative	Staff costs and other costs potentially deriving from the system
Qualitative & Quantitative	Share of the overall efforts to develop technical and knowledge systems and to carry out stakeholder engagement arrangements.
Qualitative & Quantitative	Typical efforts provided for frontline tasks and estimations of additional efforts
Quantitative	Number of incidents on platforms (in addition to the information from the International Regulators' forum report)

Organisation of the Norwegian authorities

Three different types of authorities are concerned by the requirements of the Offshore Safety Directive in Norway.

- The Petroleum Safety Authority (PSA) is an independent government regulator involved in safety, emergency and preparedness issues in the petroleum industry. PSA has identified a number of 170 FTEs involved in the technical disciplines of the Directive.
- The Norwegian Environmental Agency (NEA) deals mainly with environmental emergency response and has reported a number of 25 FTEs involved in the tasks requested from the Competent Authority (CA) according the Directive. NEA is in charge of inspections and risk assessments prior to oil spills. The agency also performs regulatory functions (1FTE);
- The Norwegian Coastal Administration (NCA) has limited responsibilities regarding the Directive, being involved in oil spills reporting and handling of incidents. When an oil spill is reported by the PSA, the NCA ensures that the operator handles the incident and performs the follow-up. NCA reports 1 FTE under the category "Environmental protection & oil spill response".

As one of the most concerned by the requirements of the Directive, the PSA was taken as a reference for the qualitative comparison and analysis. PSA is composed of 6 professional disciplines and 6 supervisions groups (instead of 15 technical disciplines as listed in the JRC report) and has adopted a risk-based approach instead of calendar-based inspections. Risk-based supervision consists in giving priority to areas with the highest risk, since it is not possible to supervise all activities at all times. Some further characteristics of PSA organisation are given in the table below.

Table 36: Specificities of the Norwegian authority: typical efforts

Task	PSA specificities
1 RoMH	PSA issues Acknowledgment of Compliance (Aoc) based on the risk analyses and assessments conducted by the operator. All technical disciplines are involved in this task and the portion of FTE involved depends on current operations.
2 Inspections	Inspections are conducted on a risk-based approach; there are no calendar-based inspections. PSA dedicates approximately 120,000 hours/year to inspection.
3 Investigations	The investigation volume varies significantly depending on the accident frequency (the last major accident in Norway was in 1980). 30 employees are trained in investigations.
4 Strategic reporting	All technical disciplines are involved in this task. PSA hosts a great number of seminars and courses for the industry every year and publishes reports on safety, HSE regulations etc.
5 Standards improvement	Various technical disciplines are involved in this task, depending on the focus area. PSA estimates that the required resources are less significant compared to those for the other tasks.

Challenges and limitations

While collecting data from the Norwegian authorities, the project team encountered some challenges:

- Lack of available data for part of the resources: Drilling activities planned in the 5 years after the transposition of the Directive: this information is not easily accessible due to confidentiality issues and the uncertainty of future operations;
- Norwegian authorities have a different organization, which does not correspond to the 15 disciplines enumerated by the JRC report. Therefore, it was not possible to compare precisely the FTE allocation discipline by discipline, as was done in the JRC report. Part of the received data is based on estimates: the FTE staff allocation is a best estimate from the Norwegian authorities. All data provided by Member States follow the 15 disciplines as defined by the JRC study. It was not possible to not possible to adapt the classification to the one used by the Norwegian authorities as this would require the launch of a new survey. In addition the Norwegian classification provides a less detailed break-down (6 disciplines). Therefore the use of the Norwegian classification would reduce the level of detail of the analysis and recommendations provided in the study.
- Use of a different categorisation system, having an impact on the reliability of the figures. For instance, a very high number was reported for Norway under the “Production support & wellhead facilities” category. The figure is attributed to the reporting of the different components of the units (reporting of inter-connected platforms, counting of subsea structures even if connected to an above-sea platform);
- Difficulty in distinguishing the efforts into offshore and non-offshore activities (e.g. refineries, pipelines etc.). Currently the required resources in Norway include both activities.

When the available raw data did not match the criteria from JRC report, assumptions were formulated in order to make use of the available information. The various assumptions made were mainly based on the situation in UK as shown in the following table.

Table 37: Assumptions used for calculating unavailable Norwegian data

JRC	Criteria	Assumption
Q1	Production support and wellhead facilities	Considering that several well head platforms, subsea wellheads and structures, flotels[60], storage units, do not qualify as independent installations, as they are connected by bridges or pipelines back to other installations, this category is considered as zero.
Q2	Large/ Small attended installations	A similar small/large ratio as in UK is assumed to define the share of large and small installations. The ratio is applied only on fixed installations and does not take into account floating installations.
Q3	Planned installations by type	In addition to 7 planned fields, 5 additional fields are being appraised for potentially independent installations with production start-up within 2020. In addition several fields with subsea template solutions are also being appraised. The fields under appraisal are not included in the figures, but the Norwegian authorities will probably have to handle at least some of them in the coming years.
Q4	Drilling activities planned in the 5 years after the transposition of the Directive	Data on the planned drilling activities is not available. All figures have been estimated based on the CAPEX of Norway, UK and Netherlands. Specifically, for each type of activity the following CAPEX figures are considered: - Exploration wells: Exploration CAPEX of UK and Norway; - Appraisal/ Exploitation: Exploration CAPEX of UK and Norway; - Work over: Modification CAPEX of Netherlands and Norway; - Abandon: Abandonment CAPEX of Netherlands and Norway; - Development: Production OPEX of UK and Norway.

Differences in the required organisational arrangements between UK and Norway

As seen in the table below, the number and composition of staff between the UK and Norway vary significantly. It must be noted that estimates for UK correspond to an estimation of required resources for fulfilling the requirements of the Directive and not on the current resources. In Norway the figures corresponds to the current resources of the Norwegian authorities.

Table 38: Currently required resources in Norway and UK, in 2014 (FTE and %)

	UK		NO	
Staff categories	FTE	%	FTE	%
Regulatory specialists and safety management systems	35	22%	16	8%
Process engineering incl. fire, explosion & risk assessment	13	8%	20	10%
Mechanical engineering, material & corrosion	10	6%	15	8%
Diving specialists	14	9%	2	1%
Environmental protection & oil spill response	12	8%	27	14%
Electrical & control systems	6	4%	10	5%

[60] Flotels are living quarters on top of rafts or semi sub platforms. Floating hotels for offshore personnel.

Staff categories	UK		NO	
	FTE	%	FTE	%
Well specialists	10	6%	15	8%
Structural integrity & verification	9	6%	10	5%
Pipelines	6	4%	5	3%
Evacuation and emergency HR response, marine & aviation	6,5	4%	6	3%
Occupational health	4	3%	10	5%
Naval architecture & marine engineering	5	3%	5	3%
Organisational & human factors	5	3%	15	8%
Legal**	5.5	3%	8	4%
Administrative **	16	10%	31*	16%
Total	157	100%	195	100%

* Administrative staff in the Norway includes 6 IT experts

** Estimated

As shown in the table there are significant differences between the organisational arrangements in these the two countries. There is a variety of reasons that can explain these differences, which may include the following:

- Inclusion of time spent on onshore activities in the current resources of Norwegian authorities.
- Differences in the infrastructure – The number of offshore installations in Norway is lower than the one in UK but the production is higher (67 installations for a production of 3,644 kbbl./day in NO vs. 175 installations for 1,488 kbbl/day in UK). In addition PSA is responsible for 15,400 km of pipelines and 8 land installations (linked to offshore wells), which, according to the authority, requires significant supervision effort.
- The different approach followed by the authorities in these two countries – as mentioned above, PSA is composed of 6 professional disciplines and 6 supervisions groups (instead of 15 staff categories in UK) and has adopted a risk-based approach instead of calendar-based inspections (a description of the staff categories is provided below).
- Other aspects that may explain the differences are the use of third party inspections in Norway, reported time used for regulatory purposes that do not fall under the requirements of the Directive, economies of scale achieved by a more efficient organisation in one of the two authorities.

The technical disciplines in the UK represent a higher share compared to the Norway (86% vs 81%). This can be attributed to the fact the approach followed in Norway is more risk-based, with a lower number of inspections required per installation. The mix of specific technical disciplines also vary significantly. For example the lower use of diving in Norway could be explained to the lower number of installations in the country compared to the UK. Similarly, the higher number of well specialists in Norway can be explained to a higher exploitation and drilling activity in the country. As regards the legal and administrative staff, these categories have a higher share in Norway compared to the UK (19% vs 11%). This difference could be explained by the inclusion of non-offshore activities in the Norwegian estimates which increase the administrative and legal-related work of the authorities.

Staff categories in Norway

The description of the staff categories in this section are based on information published in the organisations' website.[61]

The PSA has adopted a matrix organizational structure. Their professional competence is divided into six professional disciplines, to where all professional staff is tagged. Additionally, there are six supervision groups, with responsibility for supervision of different companies involved on the Norwegian continental shelf. Professionals are staffed to upcoming task based on the competence and experience required for that specific task.

Besides the industry professionals, the organization includes a department for legal and regulatory affairs, a communication and public affairs staff and an internal support and development staff. The organization chart below depicts the structure, followed by a more detailed description of the responsibilities of each department and professional discipline.

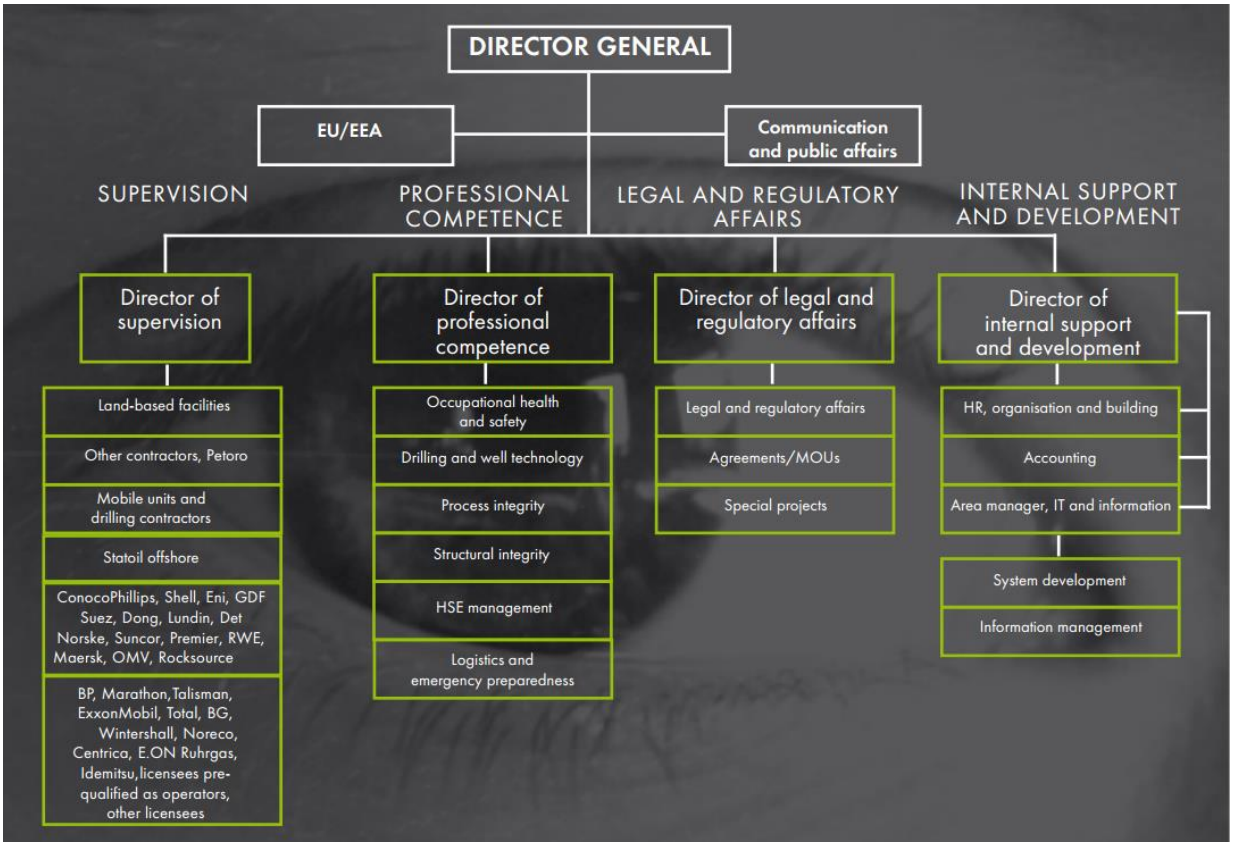

Figure 14: PSA Organization chart (Source: psa.no)

Professional competence

Working environment

This discipline embraces physical, chemical and organisational factors that bear on the working environment, such as

- Noise and vibration;

[61] www.psa.no

- Radiation;
- Chemical health risk;
- Ergonomics.

Others include employee codetermination, working-time arrangements and organisational, operational and human factors from a major accident perspective.

Drilling and well technology

The area covers the development and management of organisation, and expertise and capacity related to drilling and well operations. Specifically, activities in the discipline are directed at drilling and well equipment on fixed installations and mobile units, and at the actual wells on the NCS. They cover the operational life of a well from the start of project planning until it has been finally plugged and abandoned.

HSE management

Concerns management and handling of HSE in the petroleum sector, with attention concentrated on major accident risk. Activities are directed at management and safety economics, maintenance management and acute discharges. A common denominator for these aspects is that other of our disciplines work with or contribute to them, but HSE management coordinates these efforts with regard to company managements.

Structural integrity

This staff category deals with supporting structures and pipelines and subsea technology. It incorporates such aspects as

- Ageing;
- Seabed subsidence;
- Mooring;
- Flexible risers;
- Internal and external loads on pipelines and risers;
- Collision risk;
- Natural forces.

Logistics and emergency preparedness

Covers all systems, equipment, components and work processes (technical, operational and/or organisational conditions) which fall within its scope. The latter includes mechanical handling, diver-assisted subsea operations and emergency preparedness – including contingency planning for deliberate assaults. Also involved are logistics and transport of personnel and freight, including helicopters and vessels, emergency response organisations, and safety and preparedness training. This discipline also has a particular responsibility for investigations and for the operation of our emergency response centre.

Process integrity

Covers such subjects as hydrocarbon processing with the aid of equipment like piping, pressure vessels, valves and rotating machinery. Expertise includes fire and explosions, process control systems and safety systems (emergency shutdown, fire and gas detection, and process security). Knowledge of firefighting, electrical installations, barrier management and risk management are also key capabilities of this discipline

Supervision

Supervision is organised in six main groups. Each of these has a supervision coordinator with product responsibility and formal power of decisions. The players in each of the six groups also have their own

contact person. Professional staff is assigned to tasks based on the competence and experience required for that specific task.

The six supervision groups are responsible for the following companies:

- Group 1: Statoil (shelf based activities);
- Group 2: ConocoPhillips, Shell, Eni, GDF Suez, Dong, Lundin, Det Norske, Suncor, Premier, RWE, Maersk, OMV, Rocksource;
- Group 3: BP, Marathon,Talisman, ExxonMobil, Total, BG, Wintershall, Noreco, Centrica, E.ON Ruhrgas, Idemitsu, licensees prequalified as operators, other licensees;
- Group 4: Statoil (processing facilities onshore), Esso (processing facilities onshore), Shell (processing facilities onshore, Naturkraft, Gassco, Gassnova;
- Group 5: Mobile facilities and drilling contractors;
- Group 6: Entrepreneurs, other contractors and Petoro.

Legal and regulatory affairs

The lawyers firstly contribute to safeguarding the legal quality of regulations, orders and other products where the formal basis must be clear and unambiguous. This is important, for instance to ensure equal treatment of the players in the industry.

Communication and public affairs

The discipline environment reports to senior management and is responsible for media relations, operating our website and preparing printed publications, among other things. The department also answers general questions from the audience.

Internal support and development

The department is responsible for internal operations and organisational development and consists of important support functions within finances, HR, archive function and ICT, in addition to a designated technical library for employees.

Identification of typical efforts in Norway

A particular effort was made to review the typical effort required to carry out various regulatory requirements (see Table 3) as well the additional effort, expressed as a percentage of the frontline effort to the overall effort (see Table 9). PSA was asked to provide their expert opinion based on the typical effort required in Norway to carry out similar activities. Nevertheless, as Norway follows a risk-based instead of a calendar-based approach, the number of days per assessment, inspections, investigations and other regulatory activities varies greatly depending on the case in question. For this reason the aforementioned parameters were not revised based on the efforts in Norway but mainly through a revision of the HSL report and a consultation with the European Commission (section 3.1).

Setting Norway as a reference

An effort to revise the baseline was made on the following aspects by using the currently available staff in Norway as a reference to estimate the gaps across all European countries. Specifically, the organisational requirements in MS were recalculated by using the bottom-up calculations from the JRC model and the results were compared to the initial calculations to decide of the relevancy of replacing the baseline.

Nevertheless, the use of Norway as a reference would not affect the overall results of the study (i.e. total deficits or surpluses) but only the mix of disciplines. The overall results are affected primarily by the typical efforts which are required to fulfil the requirements of the Directive. In addition, as mentioned above there is some uncertainty on the association of the Norwegian classification with the one followed in the UK. The use of Norway to define the mix of disciplines, would transfer this uncertainty to the rest

of the countries and thus, it would hinder the possibility to compare directly the estimated required resources with the current resources that have been reported by Member States based on UK's classification.

For this reason the possibility of using Norway as a reference was abandoned.

Gap analysis of Norway

As mentioned above, the current resources in Norway include efforts spent both on offshore and onshore industry. For this reason the calculation of the resource requirements results to extensive surpluses.

In the 2014 baseline scenario a surplus is observed in all disciplines except of regulators, divers and well specialist which have a deficit of respectively, 7, 3.2 and 1.3 FTEs. The 2014 high production scenario shows similar deficits but at a lesser extent for well specialists (0.4 FTEs). In the 2016 scenarios the deficits and surpluses are very similar. Nevertheless it is assumed that no recruitments will take place between 2014 and 2016.

Annex III: Required resources by functional task

The tables below show the resource requirements per country and group, in the 2014 and 2016 baseline and high production scenarios. The administrative and legal staff is excluded from the estimates. It is assumed that they are distributed equally in the 5 functional tasks.

Table 39: Resource requirements per country in the Baseline Scenario, 2014 (FTE)

Estimated effort per task	No1	No2	No3	No4	No5	Total
Belgium	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria	0.1	0.2	0.1	0.3	0.3	1.0
Croatia	0.4	1.3	1.1	0.6	1.3	4.9
Cyprus	0.9	1.1	0.2	1.1	1.1	4.3
Denmark	2.5	7.6	2.5	2.6	5.6	20.8
Estonia	0.0	0.0	0.0	0.0	0.0	0.0
France	0.4	0.5	0.1	0.5	0.5	2.1
Finland	0.0	0.0	0.0	0.0	0.0	0.0
Germany	0.6	1.0	0.3	1.1	1.1	4.0
Greece	1.6	1.9	0.6	2.5	2.5	9.1
Ireland	1.6	1.6	0.5	2.1	2.1	7.9
Italy	6.5	11.0	7.0	4.8	10.5	39.8
Latvia	0.0	0.0	0.0	0.0	0.0	0.0
Lithuania	0.0	0.0	0.0	0.0	0.0	0.0
Malta	0.4	0.5	0.1	0.5	0.5	2.1
Netherlands	7.1	16.9	9.0	6.7	14.4	54.1
Poland	0.8	1.3	0.4	1.8	1.8	6.2
Portugal	0.4	0.5	0.1	0.5	0.5	2.1
Romania	2.7	2.6	1.1	4.2	4.2	14.9
Spain	0.1	0.5	0.2	0.6	0.6	1.9
Sweden	0.0	0.0	0.0	0.0	0.0	0.0
United Kingdom	19.3	58.7	19.0	19.1	41.3	157.3
Norway	28.8	41.4	9.7	14.0	30.3	124.3
Iceland	0.0	0.0	0.0	0.0	0.0	0.0
Total	**45.6**	**107.3**	**42.5**	**48.9**	**88.2**	**332.5**
Share	**14%**	**32%**	**13%**	**15%**	**27%**	**100%**

Table 40: Resource requirements per group in the Baseline Scenario, 2014 (FTE)

Estimated effort per task	No1	No2	No3	No4	No5	Total
Group 1	35.8	95.4	38.7	33.8	73.1	276.9
Group 2	7.5	9.3	3.2	12.5	12.5	45.0
Group 3	2.2	2.6	0.5	2.6	2.6	10.6
Total	**45.6**	**107.3**	**42.5**	**48.9**	**88.2**	**332.5**

Table 41: Resource requirements per country in the High Production Scenario, 2014 (FTE)

Estimated effort per task	No1	No2	No3	No4	No5	Total
Belgium	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria	1.0	0.8	0.3	1.3	1.3	4.7
Croatia	0.5	1.3	1.1	0.6	1.3	4.9
Cyprus	2.4	1.8	0.5	2.6	2.6	10.0
Denmark	3.7	8.9	2.9	3.2	6.9	25.6
Estonia	0.0	0.0	0.0	0.0	0.0	0.0
France	1.4	1.2	0.3	1.6	1.6	6.3
Finland	0.0	0.0	0.0	0.0	0.0	0.0
Germany	1.6	1.7	0.5	2.2	2.2	8.0
Greece	2.2	2.0	0.7	3.0	3.0	10.8
Ireland	2.6	2.2	0.7	3.2	3.2	11.9
Italy	8.7	12.3	7.4	5.6	12.1	46.1
Latvia	0.0	0.0	0.0	0.0	0.0	0.0
Lithuania	0.0	0.0	0.0	0.0	0.0	0.0
Malta	1.4	1.2	0.3	1.6	1.6	6.3
Netherlands	9.1	17.9	9.4	7.3	15.8	59.6
Poland	2.2	2.4	0.8	3.3	3.3	12.1
Portugal	1.4	1.2	0.3	1.6	1.6	6.2
Romania	3.2	3.1	1.2	4.8	4.8	17.0
Spain	0.1	0.5	0.2	0.6	0.6	2.0
Sweden	0.0	0.0	0.0	0.0	0.0	0.0
United Kingdom	21.7	60.0	19.6	20.1	43.4	164.8
Norway	29.0	41.0	9.9	14.2	30.6	124.6
Iceland	0.0	0.0	0.0	0.0	0.0	0.0
Total	**63.2**	**118.5**	**46.4**	**62.7**	**105.5**	**396.2**
Share	**16%**	**30%**	**12%**	**16%**	**27%**	**100%**

Table 42: Resource requirements per group in the High Production Scenario, 2014 (FTE)

Estimated effort per task	No1	No2	No3	No4	No5	Total
Group 1	43.7	100.5	40.5	36.8	79.6	301.0
Group 2	12.8	12.7	4.4	18.3	18.3	66.6
Group 3	6.7	5.3	1.5	7.6	7.6	28.6
Total	**63.2**	**118.5**	**46.4**	**62.7**	**105.5**	**396.2**
Share	**16%**	**30%**	**12%**	**16%**	**27%**	**100%**

Table 43: Resource requirements per country in the Baseline Scenario, 2016 (FTE)

Estimated effort per task	No1	No2	No3	No4	No5	Total
Belgium	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria	0.2	0.2	0.1	0.4	0.4	1.4
Croatia	1.2	1.4	1.2	0.8	1.8	6.4
Cyprus	0.9	1.1	0.2	1.1	1.1	4.3
Denmark	3.9	7.6	2.6	2.9	6.3	23.3
Estonia	0.0	0.0	0.0	0.0	0.0	0.0
France	0.4	0.5	0.1	0.5	0.5	2.1
Finland	0.0	0.0	0.0	0.0	0.0	0.0
Germany	0.8	1.1	0.3	1.2	1.2	4.5
Greece	2.0	2.0	0.6	2.7	2.7	10.0
Ireland	1.7	1.6	0.5	2.2	2.2	8.3
Italy	10.9	11.2	7.2	5.9	12.8	48.0
Latvia	0.0	0.0	0.0	0.0	0.0	0.0
Lithuania	0.0	0.0	0.0	0.0	0.0	0.0
Malta	0.4	0.5	0.1	0.5	0.5	2.1
Netherlands	12.6	17.2	9.4	8.0	17.3	64.5
Poland	1.2	1.4	0.5	2.1	2.1	7.2
Portugal	0.4	0.5	0.1	0.5	0.5	2.1
Romania	3.3	2.7	1.1	4.7	4.7	16.6
Spain	0.4	0.5	0.2	0.8	0.8	2.6
Sweden	0.0	0.0	0.0	0.0	0.0	0.0
United Kingdom	29.5	59.2	19.5	21.6	46.7	176.5
Norway	31.9	41.6	9.9	14.7	31.9	129.9
Iceland	0.0	0.0	0.0	0.0	0.0	0.0
Total	**69.8**	**108.7**	**43.9**	**56.0**	**101.6**	**380.0**
Share	**18%**	**29%**	**12%**	**15%**	**27%**	**100%**

Table 44: Resource requirements per group in the Baseline Scenario, 2016 (FTE)

Estimated effort per task	No1	No2	No3	No4	No5	Total
Group 1	58.1	96.6	39.9	39.2	84.9	318.7
Group 2	9.5	9.5	3.4	14.2	14.2	50.7
Group 3	2.2	2.6	0.5	2.6	2.6	10.6
Total	**69.8**	**108.7**	**43.9**	**56.0**	**101.6**	**380.0**
Share	**18%**	**29%**	**12%**	**15%**	**27%**	**100%**

Table 45: Resource requirements per country in the High Production Scenario, 2016 (FTE)

Estimated effort per task	No1	No2	No3	No4	No5	Total
Belgium	0.0	0.0	0.0	0.0	0.0	0.0
Bulgaria	1.2	0.8	0.4	1.4	1.4	5.2
Croatia	1.2	1.4	1.2	0.8	1.8	6.4
Cyprus	2.4	1.8	0.5	2.6	2.6	10.0
Denmark	5.2	9.0	3.0	3.5	7.6	28.4
Estonia	0.0	0.0	0.0	0.0	0.0	0.0
France	1.4	1.2	0.3	1.6	1.6	6.3
Finland	0.0	0.0	0.0	0.0	0.0	0.0
Germany	1.7	1.7	0.5	2.3	2.3	8.5
Greece	2.5	2.0	0.7	3.2	3.2	11.7
Ireland	2.7	2.3	0.7	3.3	3.3	12.4
Italy	13.1	12.5	7.7	6.7	14.5	54.4
Latvia	0.0	0.0	0.0	0.0	0.0	0.0
Lithuania	0.0	0.0	0.0	0.0	0.0	0.0
Malta	1.4	1.2	0.3	1.6	1.6	6.3
Netherlands	14.6	18.2	9.7	8.7	18.7	69.9
Poland	2.6	2.5	0.8	3.7	3.7	13.1
Portugal	1.4	1.2	0.3	1.6	1.6	6.2
Romania	3.8	3.1	1.2	5.3	5.3	18.7
Spain	0.4	0.5	0.2	0.8	0.8	2.7
Sweden	0.0	0.0	0.0	0.0	0.0	0.0
United Kingdom	32.0	60.6	20.1	22.6	48.8	184.1
Norway	32.1	41.1	10.0	14.9	32.2	130.4
Iceland	0.0	0.0	0.0	0.0	0.0	0.0
Total	**87.7**	**119.9**	**47.8**	**69.8**	**119.0**	**444.2**
Share	**20%**	**27%**	**11%**	**16%**	**27%**	**100%**

Table 46: Resource requirements per group in the High Production Scenario, 2016 (FTE)

Estimated effort per task	No1	No2	No3	No4	No5	Total
Group 1	66.1	101.7	41.7	42.3	91.4	343.2
Group 2	14.9	12.9	4.6	20.0	20.0	72.3
Group 3	6.7	5.3	1.5	7.6	7.6	28.6
Total	**87.7**	**119.9**	**47.8**	**69.8**	**119.0**	**444.2**
Share	**20%**	**27%**	**11%**	**16%**	**27%**	**100%**

Annex IV: Main features of the different options

Key aspects to be mentioned	Option 1a	Option 1b	Option 1c	Option 1d	Option 2a	Option 2b	Option 3a	Option 3b	Option 3c	Option 3d	Option 4
1) Source of the Offshore Specialist Expertise resource. (must identify where resource will come from and they should be on a formal basis with cost allocation)											
i. recruitment – discuss barriers and options	Targeting at highly qualified specialists in specific disciplines, who however need to receive training on the regulatory policy, procedure and processes	Targeting at disciplined specialists from other CAs or within the same CA	-	-	No	No	-	-	-	-	yes, considered depending on the country groups
i. short or fixed term contracts - discuss barriers and options	Short-term contact. Key barriers include: 1) Financial barrier 2) Political barrier 3) Technical barrier	-	Short-term contract for teaching resources	Short-term contract for teaching resources	yes - short contracted personnel for training purposes only.	yes - short contracted personnel for training purposes only.	-	-	-	Possible	yes, considered depending on the country groups

Key aspects to be mentioned	Option 1a	Option 1b	Option 1c	Option 1d	Option 2a	Option 2b	Option 3a	Option 3b	Option 3c	Option 3d	Option 4
iii. seconded personnel – source and contractual agreement; from other CAs or from private companie.	-	Seconded from other CAs. Key barriers include: 1) Financial barrier 2) Political barrier 3) Technical barrier	-	-	No	No	Secondment from private companies and other sectors can be arranged through the centralised database on offshore expertise that will be managed by an appointed authority by the EU.	Secondment from private companies and other sectors can be arranged through existing cooperation schemes at the EU regional levels.	Secondment from private companies and other sectors worldwidely for the specific needs of certain expertise.	-	yes, considered depending on the country groups
2) Management and support organisation (current 3rd party org, MS CA or a new org)											
i. employment or fixed term contracts	Employment depends on the country group	Employment depends on the country group	Short-term contract	Short-term contract	-	-	-	-	-	Possible	employment or fixed term contracts depend on the country groups
ii. planning and management of regulatory activities (HR issues require organisational arrangements)	-	-	-	-	Through bilateral agreements	Through multilateral agreements	Centralised organised by the European Commission.	Organised by MSs in the same regions.	Arrangement between the MS and private sectors.	-	Both the EC and MS will share certain responsibilities
iii. organisational responsibilities and liabilities	-	-	Responsibility and liability are assigned by the EU to some independent authority	Responsibility and liability are retained by the MS who will be responsible for arranging its own cost	Through bilateral agreements	Through multilateral agreements	Centrally facilitated by a person or organisation appointed by the EC.	MS CAs are responsible for the management the sourcing possibilities based on	MS are responsible for sorting out the relationship with the private sectors and ensure the independence	MS CA can have access to this type of open source information.	Both the EC and MS will share certain responsibilities

Key aspects to be mentioned	Option 1a	Option 1b	Option 1c	Option 1d	Option 2a	Option 2b	Option 3a	Option 3b	Option 3c	Option 3d	Option 4
			who will organise the training activities and manage the budgets.	recovery power and organise the training activities.				their existing cooperation schemes	of the seconded personnel.		
v. training and development (discussion of the time necessary for training and model of financing, possibly best separate consideration of shared v MS v hybrid)	Training needs are discussed separately for different country groups	Training needs are discussed separately for different country groups	Different training models have been addressed	Different training models have been addressed	Through bilateral agreements	Through multilateral agreements	-	-	-	-	Both the EC and MS will share certain responsibilities
3) Application of MS specific OSD related legislation.											
i. If MS CA employed/contracted then regulatory training on MS legislation.	-	-	No. The training concerns more technical competences.	Yes	-	-	-	yes. Seconded experts will need to receive special training on regulatory policy, procedures and processes	yes. Seconded experts will need to receive special training on regulatory policy, procedures and processes	yes. Seconded experts will need to receive special training on regulatory policy, procedures and processes	Yes, all employed or contracted experts coming from private sectors will receive regulatory training on the MS legislation
ii. If shared resource then 2 or more MS legislative systems to deal with.	-	-	Yes	No	-	-	Resources shared among MS	multilateral agreement will be needed	-	-	Both the EC and MS will share certain responsibilities

Key aspects to be mentioned	Option 1a	Option 1b	Option 1c	Option 1d	Option 2a	Option 2b	Option 3a	Option 3b	Option 3c	Option 3d	Option 4
4) Development and Implementation of regulatory policy, procedures and process. (possibly best separate consideration of shared v MS v hybrid)											
i. MS CA own policy, procedures and processes.	The recruited professional has to learn the MS CA own policy, procedures, and procedures.	The recruited professional has to learn the MS CA own policy, procedures, and procedures.	No.	Yes. The training will concern MS CA's experience.	Concerns capacity building.	Concerns capacity building.	-	-	-	-	-
ii. EU or Defined groups shared policy, procedures and processes.	-	-	Yes. The training will concern the shared knowledge at the EU level or defined groups.	No.	-	Yes, it concerns regional management of the offshore safety issues. But the content will be written in the multilateral agreements.	-	-	-	-	Yes, it concerns regional management of the offshore safety issues. But the content will be written in the multilateral agreements.
5) Efficiency and effectiveness of regulatory duties (assessment (this can be carried out remotely), inspection, investigation and strategic activities)											
i. objectivity and independence to carry out their regulatory duties.	Discussed	Discussed	-	-	-	-	-	This has to be regulated by the CA through MS's legislative structure.	This has to be regulated by the CA through MS's legislative structure.	This has to be regulated by the CA through MS's legislative structure.	This has to be regulated by the CA through MS's legislative structure.

Key aspects to be mentioned	Option 1a	Option 1b	Option 1c	Option 1d	Option 2a	Option 2b	Option 3a	Option 3b	Option 3c	Option 3d	Option 4
ii. General efficiency and effectiveness to carryout regulatory duties.	-	-	-	-	-	-	-	-	-	-	-

Annex V: Detailed feasibility analysis for proposed options

Table 47: Questions of the feasibility analysis

Criteria	Full question	Short question
Technical feasibility criteria	Is the option likely to address the resource gaps for specific competences at the MS level?	Addressing specific at MS level?
	Is the option likely to address the resource gaps of general lack of certain expertise at the EU level?	Addressing general gaps at EU level?
	Is the option in accordance with the requirements and timeframe of the Directive?	In accordance with OSD?
	Are there removable technical barriers (knowledge, skills) for MS to implement the option?	Removable technical barriers?
	Do MS have sufficient technical or staff support from other CAs	Sufficient technical or staff support from other CAs?
	Do MS have built carrying capacity (e.g. knowledge system) to identify their critical resource needs?	Carrying capacity to identify their critical resource needs?
	Is there a high level up to which an access to the required technical knowledge is safeguarded?	Safeguarding of technical knowledge?
	Is there available administrative / infrastructural capacity (skills, staff) sufficient to implement and enforce the option endorsed by the MS authorities?	Available administrative / infrastructural capacity?
Political feasibility criteria	Are there removable political barriers for MS to implement the sourcing option?	Removable political barriers?
	Is there cooperative mechanism in place to facilitate transfer and cooperation between MS and with third party sourcing facilities, if applicable?	Cooperative mechanism in place?

Criteria	Full question	Short question
	Is there political commitment (political will) in place to make it happen?	Political commitment?
	Is there a high level of consistency across Member States	High level of consistency across MS?
	Is there regulative system and law available for regulating the behaviour of seconded experts and ensuring their independence from private sectors?	Regulative system and law available?
Cost recovery feasibility criteria	Are there sufficient funds available for the MS to implement the option?	Sufficient funds?
	Is there cost recovery power in place for supporting MS to implement the Directive?	Cost recovery power in place?

Table 48: Detailed feasibility analysis for group 1 countries

Options	Sub-options	Technical feasibility criteria							Political feasibility criteria						Cost recovery feasibility criteria	
		Addressing specific at MS level?	Addressing general gaps at EU level?	In accordance with OSD?	Removable technical barriers?	Sufficient technical or staff support from other Cas?	Carrying capacity to identify their critical resource needs?	Safeguarding of technical know ledge?	Available administrative / infrastructural capacity?	Removable political barriers?	Cooperative mechanism in place?	Political commitment?	High level of consistency across MS?	Regulative system and law available?	Sufficient funds?	Cost recovery pow er in place?
Option 1	Option 1a	1,7	0,0	0,7	0,7	0,3	1,0	1,0	1,3	0,7	0,3	1,3	0,0	0,7	1,3	1,0
	Option 1b	0,7	0,0	0,7	0,7	0,3	1,0	1,0	1,3	0,7	0,3	1,3	0,0	0,7	1,3	1,0
	Option 1c	1,7	1,0	1,0	1,0	0,3	1,0	1,0	1,0	1,0	1,0	1,7	1,3	0,7	1,7	1,0
	Option 1d	1,7	1,0	0,7	0,7	0,3	1,0	0,7	1,0	1,0	0,7	1,3	0,0	0,7	1,3	1,0
Option 2	Option 2a	1,0	0,0	1,3	0,7	0,3	1,0	0,7	1,0	0,7	0,7	1,3	0,7	0,7	0,7	1,0
	Option 2b	1,0	0,0	1,3	0,7	0,3	1,0	0,7	1,7	0,7	1,3	1,7	0,7	0,7	0,7	1,0
Option 3	Option 3a	1,0	1,0	0,7	0,7	0,3	1,0	0,7	1,0	0,3	0,7	1,3	0,7	0,7	0,7	1,0
	Option 3b	1,0	1,0	0,7	0,7	0,3	1,0	0,7	1,0	0,3	0,7	1,3	0,7	0,7	0,7	1,0
	Option 3c	1,3	1,0	0,7	0,7	0,3	1,0	0,7	1,0	0,3	1,0	1,3	0,7	0,7	1,0	1,0
	Option 3d	1,0	0,7	0,7	1,3	0,3	1,0	0,7	1,0	0,0	0,7	1,3	0,0	1,0	1,7	1,0
Option 4	Option 4	1,7	1,0	1,3	1,0	0,3	1,0	1,0	1,3	0,7	0,7	1,7	1,0	0,7	1,3	1,0

Table 49: Detailed feasibility analysis for group 2 countries

Options	Sub-options	Technical feasibility criteria							Political feasibility criteria						Cost recovery feasibility criteria	
		Addressing specific at MS level?	Addressing general gaps at EU level?	In accordance with OSD?	Removable technical barriers?	Sufficient technical or staff support from other Cas?	Carrying capacity to identify their critical resource needs?	Safeguarding of technical know ledge?	Available administrative / infrastructural capacity?	Removable political barriers?	Cooperative mechanism in place?	Political commitment?	High level of consistency across MS?	Regulative system and law available?	Sufficient funds?	Cost recovery pow er in place?
Option 1	Option 1a	1,7	0,0	0,7	0,7	0,3	1,0	1,0	1,3	0,7	0,3	1,3	0,0	0,7	1,3	1,0
	Option 1b	0,7	0,0	0,7	0,7	0,3	1,0	1,0	1,3	0,7	0,3	1,3	0,0	0,7	1,3	1,0
	Option 1c	1,7	1,0	1,0	1,0	0,3	1,0	1,0	1,0	1,0	1,0	1,7	1,3	0,7	1,7	1,0
	Option 1d	1,7	1,0	0,7	0,7	0,3	1,0	0,7	1,0	1,0	0,7	1,3	0,0	0,7	1,3	1,0
Option 2	Option 2a	1,0	0,0	1,3	0,7	0,3	1,0	0,7	1,0	0,7	0,7	1,3	0,7	0,7	0,7	1,0
	Option 2b	1,0	0,0	1,3	0,7	0,3	1,0	0,7	1,7	0,7	1,3	1,7	0,7	0,7	0,7	1,0
Option 3	Option 3a	1,0	1,0	0,7	0,7	0,3	1,0	0,7	1,0	0,3	0,7	1,3	0,7	0,7	0,7	1,0
	Option 3b	1,0	1,0	0,7	0,7	0,3	1,0	0,7	1,0	0,3	0,7	1,3	0,7	0,7	0,7	1,0
	Option 3c	1,3	1,0	0,7	0,7	0,3	1,0	0,7	1,0	0,3	1,0	1,3	0,7	0,7	1,0	1,0
	Option 3d	1,0	0,7	0,7	1,3	0,3	1,0	0,7	1,0	0,0	0,7	1,3	0,0	1,0	1,7	1,0
Option 4	Option 4	1,7	1,0	1,3	1,0	0,3	1,0	1,0	1,3	0,7	0,7	1,7	1,0	0,7	1,3	1,0

Table 50: Detailed feasibility analysis for group 3 countries

Options	Sub-options	Technical feasibility criteria							Political feasibility criteria						Cost recovery feasibility criteria	
		Addressing specific at MS level?	Addressing general gaps at EU level?	In accordance with OSD?	Removable technical barriers?	Sufficient technical or staff support from other Cas?	Carrying capacity to identify their critical resource needs?	Safeguarding of technical know ledge?	Available administrative / infrastructural capacity?	Removable political barriers?	Cooperative mechanism in place?	Political commitment?	High level of consistency across MS?	Regulative system and law available?	Sufficient funds?	Cost recovery pow er in place?
Option 1	Option 1a	2,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
	Option 1b	2,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
	Option 1c	1,0	1,0	1,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
	Option 1d	1,0	1,0	1,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
Option 2	Option 2a	1,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
	Option 2b	1,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
Option 3	Option 3a	1,0	1,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
	Option 3b	1,0	1,0	1,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
	Option 3c	1,0	1,0	1,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
	Option 3d	1,0	1,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0
Option 4	Option 4	1,0	1,0	1,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0

Table 51: Synthesis table for group 1 countries

Options	Sub-options	Technical feasibility criteria	Political feasibility criteria	Financial feasibility criteria	Sum
Option 1	Option 1a	9	6	2	17
	Option 1b	8	6	2	16
	Option 1c	10	7	3	20
	Option 1d	10	6	3	19
Option 2	Option 2a	8	5	2	15
	Option 2b	8	6	2	16
Option 3	Option 3a	9	6	2	16
	Option 3b	8	5	2	15
	Option 3c	8	5	2	15
	Option 3d	6	3	3	11
Option 4	Option 4	11	7	3	20

Table 52: Synthesis table for group 2 countries

Options	Sub-options	Technical feasibility criteria	Political feasibility criteria	Financial feasibility criteria	Sum
Option 1	Option 1a	5	4	2	12
	Option 1b	4	4	2	11
	Option 1c	7	7	3	16
	Option 1d	6	5	2	13
Option 2	Option 2a	5	5	2	12
	Option 2b	5	7	2	13
Option 3	Option 3a	5	5	2	12
	Option 3b	5	5	2	12
	Option 3c	6	5	2	13
	Option 3d	6	4	3	12
Option 4	Option 4	7	6	2	16

Table 53: Synthesis table for group 3 countries

Options	Sub-options	Technical feasibility criteria	Political feasibility criteria	Financial feasibility criteria	Sum
Option 1	Option 1a	2	2	0	4
	Option 1b	2	2	0	4
	Option 1c	3	2	0	5
	Option 1d	3	2	0	5
Option 2	Option 2a	1	2	0	3
	Option 2b	1	2	0	3
Option 3	Option 3a	2	2	0	4
	Option 3b	3	2	0	5
	Option 3c	3	2	0	5
	Option 3d	2	2	0	4
Option 4	Option 4	3	2	0	5