



Hydropower Sustainability Assessment Protocol

Official Assessment

Statkraft

Jostedal

Norway

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Final



10/05/2013

Client: Statkraft

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Assessment Date: 27/08/2012 to 31/08/2012

Project stage: Operation

Project size: 288 MW

Project type: Storage

Cover page photo: Fossøygelet, location of a fish passage.

Acronyms

Acronym	Full Text
EMPS	EFI's Multi-area Power Market Simulator, a well-established market-analysis tool / power-production model
DN	Direktoratet for Naturforvaltning (Norwegian Directorate for Nature Management)
HBV model	Hydrologiska Byråns Vattenbalansavdelnings modell (Water-balance model of the Hydrological Bureau)
KPI	Key Performance Indicator
LFI	Laboratorium for Ferskvannøkologie og Inlandsfiske, Uni Miljø (Institute of Freshwater Ecology and Inland Fisheries, University of Bergen)
NINA	Norsk Institutt for Naturforskning (Norwegian Institute for Nature Research)
NVE	Norsk Vassdrags och Energidirektorat (Norwegian Rivers and Energy Directorate).
NOK	Norwegian Krone
PGM	Power Generation, Midt Norge (Central Norway) Region
R&D	Research and Development
RCM	Reliability Centred Maintenance
SAP	Software in which Statkraft's internal management system is built (Statkraft personnel refer to this system as the SAP system).
VMO	A matrix developed to measure and compare performance of powerplants in the absence of a profit target
WFD	Water Framework Directive

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Executive Summary

This report presents the findings of an assessment of the Jostedal Project using the Operation Stage tool of the Hydropower Sustainability Assessment Protocol. Jostedal is a 288 MW hydroelectric power plant, fully owned by Statkraft, located in western Norway. This assessment was carried out over the period July to October 2012, with an on-site assessment encompassing a visit to the project site and interviews with stakeholders conducted in the week beginning 27th August 2012. Following a review of the report carried out in March 2013, this assessment meets the requirements of an Official assessment, as set out in the Terms and Conditions for the Use of the Protocol.

Jostedal was licensed in 1984, and commissioned in 1989. It has low adverse environmental and social impacts, but there are specific issues of concern to local stakeholders. These include: fish passage and spawning in the Jostedøla River; decreasing water levels in a small pond, Vivatjønni, near to the main reservoir, Styggevatn; reduced flows in tributary streams downstream of intakes; timing of the opening (from snow and ice) of access roads to the Styggevatn area; the potential danger at the quarry site adjacent to Styggevatn; and sedimentation affecting localised flood risk.

The project provides significant social and economic benefits to the locality, especially flood protection and the generation of revenues that are used to provide benefits to the local population.

These issues are reflected in the findings of this assessment, and in a range of high scores that summarise the findings. **Jostedal meets Proven Best Practice on eleven out of seventeen topics** assessed using the Protocol: Governance; Hydrological Resource; Asset Reliability and Efficiency; Infrastructure Safety; Financial Viability; Project Benefits; Project-Affected Communities and Livelihoods; Labour and Working Conditions; Cultural Heritage; Public Health; and Water Quality.

Jostedal meets or exceeds Basic Good Practice on all six remaining topics.

On four of these, basic good practice is exceeded, owing to only one significant gap against proven best practice. On the topic of Biodiversity and Invasive Species, Jostedal is found to make a positive contribution to the recolonisation of the Jostedøla River by sea trout, but Statkraft do not follow a process to identify risks or opportunities for biodiversity other than salmonid fish (a gap under the Protocol criteria of both 'Assessment' and 'Management').

On the topic of Erosion and Sedimentation, the natural geomorphological conditions of the river will present ongoing problems of localised flooding that are associated with Jostedal, presenting a gap against the Protocol criterion of 'Outcomes'.

On the topic of Reservoir Management, the Jostedal project has not yet resolved the potential public danger at the quarry site adjacent to Styggevatn, which is a significant gap against the 'Management' criterion. Also, on the topic of Downstream Flow Regimes, against the 'Management' criterion, Jostedal has not provided a management response yet to the decreasing water levels in the Vivatjønni pond.

The above gaps reflect (and may result from) the significant gaps against the two remaining topics. Jostedal exactly meets basic good practice on these two topics. On the topic of Communications and Consultation, there are two gaps against proven best practice: stakeholder mapping does not identify issues of specific interest to stakeholder groups, and communication needs and approaches specific to these groups (on the 'Assessment' criterion); and stakeholder engagement does not actively ensure the inclusion of stakeholders who may find it difficult to engage (the 'Stakeholder Engagement' criterion). These gaps create risks that Jostedal will fail to identify the range of stakeholders' interests and concerns or communicate the project's approach to addressing these interests and concerns.

On the topic of Environmental and Social Issues Management, there are two significant gaps against proven best practice. First, although Jostedal has numerous processes for environmental and social issues management, these processes do not systematically prompt the consideration of broader risks and

opportunities, for example on opportunities for biodiversity enhancement (other than salmonid fish) or opportunities to enhance the tourism value of the reservoir (against the 'Assessment' criterion). Second, there has been an absence of thorough and timely feedback provided to stakeholders on environmental and social issues (on the 'Stakeholder Engagement' criterion).

Two topics, Resettlement and Indigenous Peoples, are Not Relevant to Jostedal. The scores for all topics are summarised in the following Sustainability Profile and Table of Significant Gaps.

Sustainability Profile

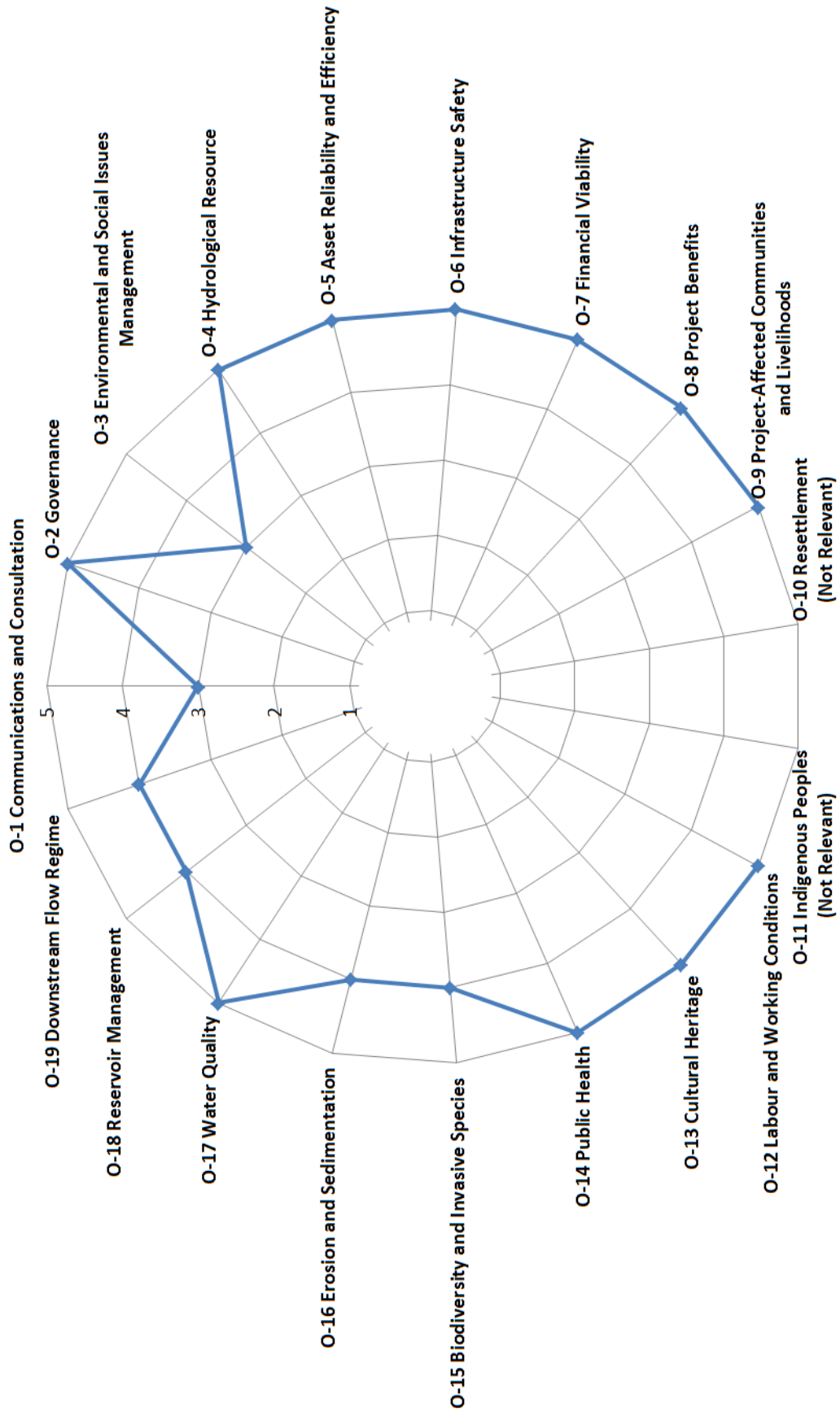


Table of Significant Gaps

	Level 3: Significant Gaps against Basic Good Practice	Level 5: Significant Gaps against Proven Best Practice
Assessment	No significant gaps	<p>O1: The lack of stakeholder mapping that identifies issues of specific interest to stakeholder groups, and communication needs and approaches specific to these groups.</p> <p>O3: Application of a systematic process to identify broader environmental and social considerations, risks and opportunities.</p>
Management	No significant gaps	<p>O15: The absence of a process to identify, anticipate or respond to risks and opportunities for biodiversity.</p> <p>O18: The lack of resolution of the security issue surrounding the access to the cabin on Styggevatn's east side, close to the dam.</p> <p>O19: The absence of further management measures to prevent the impact of lowered water levels in Vivatjønni.</p>
Stakeholder Engagement	No significant gaps	<p>O1: The lack of inclusive stakeholder engagement with all directly-affected stakeholders.</p> <p>O3: The absence of thorough and timely feedback on environmental and social issues to stakeholders.</p>
Conformance/ Compliance	No significant gaps	No significant gaps.
Outcomes	No significant gaps	O16: The on-going impact on the residents of the valley from flooding because of sedimentation.

Introduction

This report presents the findings of an assessment of the Jostedal project using the Hydropower Sustainability Assessment Protocol. Jostedal is a 288 MW hydroelectric power plant, fully owned by Statkraft, located in western Norway.

The Hydropower Sustainability Assessment Protocol

The Hydropower Sustainability Assessment Protocol ('the Protocol') is a framework to assess the performance of hydropower projects according to a defined set of sustainability topics, encompassing environmental, social, technical, and financial issues.

Developed by the International Hydropower Association (IHA) in partnership with a range of government, civil society and private sector stakeholders, the Protocol is a product of intensive and transparent dialogue concerning the selection of sustainability topics and the definition of good and best practice in each of these topics. Important reference documents that informed the development of the Protocol include the World Bank safeguards policies, the Performance Standards of the International Finance Corporation, and the report of the World Commission on Dams. To reflect the different stages of hydropower development, the Protocol includes four assessment tools that are designed to be used separately, corresponding to the Early Stage, and Preparation, Implementation and Operation stages of a project.

Applying the Protocol delivers an evidence-based assessment of performance in each topic, with a set of scores providing an indication of performance in relation to basic good practice and proven best practice. The scoring system is as follows:

- 5 Meets Proven Best Practice;
- 4 One significant gap against Proven Best Practice;
- 3 Basic Good Practice / More than one significant gap against Proven Best Practice;
- 2 One significant gap against Basic Good Practice;
- 1 More than one significant gap against Basic Good Practice.

This means that if there is one or more gap(s) at the level of basic good practice, the topic cannot score higher than a 2 or a 1, respectively. Only if all criteria at the level of basic good practice are satisfied will the assessor move on to the criteria for the level of proven best practice.

Assessments rely on objective evidence to support a score for each topic that is factual, reproducible, objective and verifiable. Key attributes of the Protocol are: (i) global applicability, i.e. it can be used on all types and sizes of hydropower projects, anywhere in the world; and (ii) consistency, i.e. the consistency of its application is carefully governed by a system of quality control encompassing accredited assessors, terms and conditions for use, and the Protocol Council.¹

Scoring is an essential feature of the Protocol, providing an easily communicated and replicable assessment of the project's strengths, weaknesses and opportunities. The scoring system has been devised to ensure that a Protocol Assessment cannot provide an overall 'pass' or 'fail' mark for a project, nor can it be used to 'certify' a project as sustainable. The Protocol provides an effective mechanism to continuously improve sustainability performance because results identify gaps that can be addressed, and the findings provide a consistent basis for dialogue with stakeholders.

Assessment Objectives

Statkraft identified five objectives for the assessment:

¹ Full details of the Protocol and its governance, are available on www.hydrosustainability.org.

1. To build capacity in using the Protocol within Statkraft and assist in decision-making on how to embed the Protocol within the organisation;
2. Operation Tool with IHA, which will feed into subsequent revisions of the Protocol;
3. To evaluate the sustainability of operations of the Jostedal Power Station using a structured and internationally-consistent assessment methodology;
4. To identify areas for improvement and raise awareness on sustainability issues in Statkraft; and
5. To assess the compatibility of the Operation tool in the Protocol with the Norwegian concession system.

Project Description

The Jostedal project utilizes the run-off from a catchment area of 144 square kilometres, at an elevation of 1200 metres, on the west side of the Jostedalen valley, located in the western part of Norway. The Jostedøla river runs through the valley, meeting the Sognefjord at the settlement of Gaupne.

The main reservoir is Styggevatn, at the north end of Jostedalen. This is fed by an additional reservoir further upstream, the Kupvatn. From Styggevatn, an underground penstock carries water down the east side of the valley to the power plant, taking in water from streams at 22 intakes. Kupvatn and Styggevatn and streams on the western side of the valley are fed by Jostdalsbreen, the largest glacier on the European mainland.

The power station is located 1200 m inside the mountain on the eastern side of the valley, 40 km from Styggevatn and 15 km from Gaupne. The project head is 1186 m, one of the highest of any hydro scheme in Europe. The power station is equipped with a single 288 MW Pelton turbine.

A second power station, Leirdøla, is located in the south-west of the valley, and discharges to Jostedal power plant's discharge tunnel, prior to both discharging, at a depth of 46 m, to the Sognefjord. Leirdøla is not included in this assessment.

Jostedal was licensed in 1984, and commissioned in 1989. It produces 874 GWh per year. Approximately 90% of production is generated between November and May, with little generation in summer as the reservoir is replenished by rainfall and snowmelt. It is a multipurpose project, built to manage damaging summer floods resulting from snowmelt, partly in response to a damaging flood in the valley in 1979.

Statkraft's Sogn Power Plant Group manages Jostedal, with Statkraft's midt Norge (Central Norway) regional division which has total production of 10 TWh per year. Midt Norge's Regional Director reports directly to Statkraft's CEO. The region consists of Administration, Communications, Technical, and Production teams and four power plant groups (3 hydro, 1 wind).

In this report, 'Jostedal' or 'the Jostedal project' are used to refer to the full set infrastructure that comprises the Jostedal project (reservoirs, dams, intakes, penstock, and power plant). 'The Jostedal power plant' refers only to the power station. 'Jostedøla' refers to the Jostedøla River, and 'Jostedalen' refers to the Jostedalen valley.

A map of the Jostedal project in relation to its context is shown in the figure below.

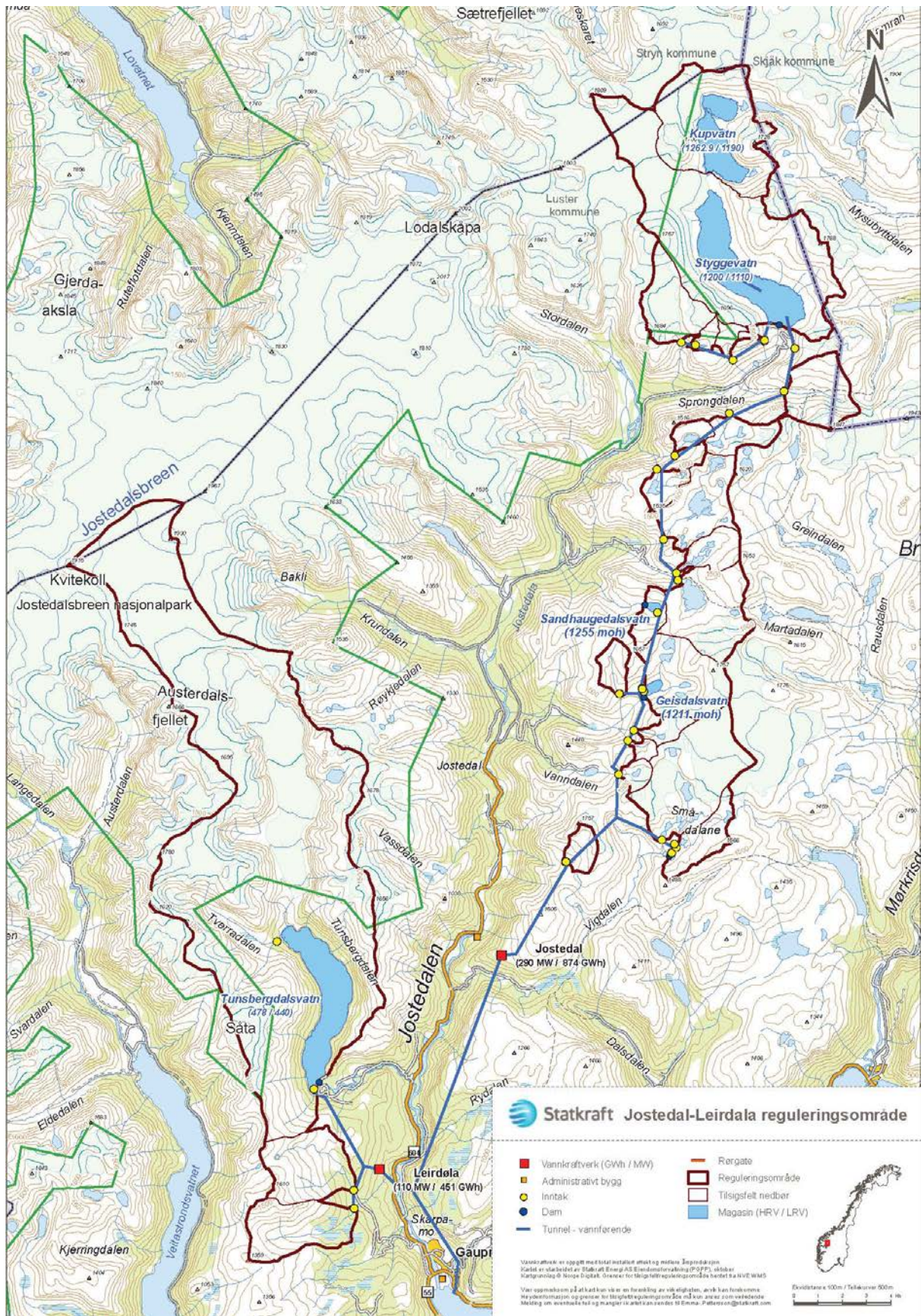


Figure 1. Jostedal-Leirdala Regulatory Area (provided by Statkraft)

Assessment Process

The assessment has been conducted using the Protocol's Operation tool, which contains 19 individual topics, addressing governance, technical, financial, social and environmental issues. This tool assesses the operational phase of a project. The tool assesses performance in relation to ongoing operations and issues, and does not assess sustainability of the original preparation or implementation of a project, except in specific cases where commitments were made at the time of the project's development.

This assessment was carried out as part of the IHA – Statkraft Sustainability Partnership. IHA provided a team of assessors to conduct the assessment over the period July to October 2012. Interviews in Jostedal with external stakeholders and Statkraft regional staff, interviews with staff at Statkraft's Lilleaker office, and site inspections to the project were carried out during the week beginning 27th August 2012. As many as 30 interviews were conducted and 135 documents reviewed. A draft report was delivered to Statkraft by 5th October 2012 and amended in response to comments received from Statkraft by 9th November 2012.

The November 2012 report did not meet the requirements of an Official Protocol assessment, as the assessors were not accredited by IHA at the time of the on-site assessment in August 2012. The assessment team members have since been accredited, and the Protocol's Government Committee has given approval for this assessment to be made an Official assessment, following a desk review by the now-accredited Lead Assessor. The second requirement of an Official assessment, that the written support of the Project Sponsor has been provided, is met, and this written support from Statkraft is included in Appendix A. Please note that Cameron Ironside (IHA Programme Director) was an additional assessment team member but is yet to be accredited.

The Lead Assessor's desk review did not result in any substantive changes to the findings or scoring in the November 2012 report. A number of additional comments from Statkraft were considered. The changes made were largely editorial or bring factual statements up-to-date. The Assessment Team has not revisited the project, conducted any additional interviews, or reviewed any additional documentary evidence.

Statkraft's Åse Roen (Senior Environmental Advisor, CR&HSE) was the single point of contact, supported by Trine Elgersma (Environmental Coordinator, Power Generation Central Norway). An additional team provided assistance with arranging interviews, gathering documents and translation and interpretation (Norman Kjærvik, Communication Manager PGM; Anette Moritz, Senior Environmental Advisor PGPE; Marilyn Marskar, Senior Environmental Advisor PGPE; Morten Stickler, Senior Environmental Advisor CR&HSE; and Tormod Schei, Senior Environmental Advisor CR&HSE). This team also observed the conduct of a number of interviews for capacity-building purposes.

Assessment Experience

Arrangements for the site visit and interviews were managed effectively, despite the difficulty of making arrangements over the summer holiday period in Norway. It was not possible to arrange only one requested interview, with NVE's regional office, however it was possible to hold a video conference with NVE Oslo.

The majority of documentary evidence provided was in Norwegian. Where translations were provided, they were completed by Statkraft personnel. Other Norwegian documents were reviewed by the assessment team (with one exception who was able to read Norwegian) using on-line automated translation services for some topics.

Interviews were held mainly in English. Some were held in Norwegian, and some in Norwegian with interpretation for the English-speaking team members. Statkraft staff provided interpretation during the latter.

IHA would like to thank all Statkraft staff involved, and all Statkraft interviewees and external interviewees for arranging the assessment process and providing their time to gather and provide a wealth of evidence.

Layout of this Report

This report consists of nineteen sections numbered in direct correspondence with the nineteen topics of the Protocol's Operation tool. Four appendices are provided, including the written letter of support of the project operator (required for an official Protocol assessment), and detailing the items of visual, verbal and documentary evidence referred to under each topic.

For each topic, findings are provided according to the criteria used in the Protocol's methodology: Assessment, Management, Stakeholder Engagement, Stakeholder Support, Conformance / Compliance, and Outcomes. Findings are presented against a statement of 'basic good practice' and a statement of 'proven best practice' for each, with a 'Yes/No' indication of whether the scoring statement is met. A summary of the significant gaps against the scoring statement, the topic score and a brief summary are presented at the close of each topic section.

1 Communications and Consultation (O-1)

This topic addresses ongoing engagement with project stakeholders, both within the company as well as between the company and external stakeholders (e.g. affected communities, governments, key institutions, partners, contractors, catchment residents, etc). The intent is that stakeholders are identified and engaged in the issues of interest to them, and communication and consultation processes maintain good stakeholder relations throughout the project life.

1.1 Background Information

This topic addresses on-going engagement with all project stakeholders on issues of interest to them, and the management of consultation and communication. Findings on stakeholder engagement under other topics focus on the issues related to those topics only. Stakeholder engagement on the issue of Labour and Working Conditions is addressed under O-12. Corporate level engagement with directly affected stakeholders is assessed under O-2 Governance.

Jostedal project external stakeholders include: Jostedal permanent residents and summerhouse owners, the Local Regional Society, the National Park Visitors Centre, Tourist Businesses (e.g. Icetroll, glacier guides), Landowner Associations (e.g. Jostedalen, Gaupne and Røneid associations), Hunting and Fishing Associations, Luster Municipality and Sogn og Fjordane County Council, the Norwegian Directorate for Nature Management (DN), the Norwegian Water Resources and Energy Directorate (NVE), the Environmental Department of the County Governor, the Labour Union, the Norwegian Ministry of Petroleum and Energy, and the Ministry of Culture and Science.

Jostedal project stakeholders within Statkraft include Region Midt Norge employees based in Gaupne; Jostedal employees and contractors; and PG and corporate level employees based in Oslo. Responsibilities for Jostedal stakeholder communications and engagement, and media communications lie with the regional communications manager. Media cases are dealt with locally, with support from the corporate level if necessary. In the case of critical incidents, communication will be handled according to an Emergency Response Plan.

On-going issues of concern amongst stakeholders include: sea trout migration and availability in the Jostedal river; clearance of the access road to Styggevatn reservoir, for which Statkraft is responsible for maintenance; activities that may affect the re-introduction of reindeer in local protected areas e.g. access road clearance; safety issues near the old quarry wall located on the south-east bank of Styggevatn reservoir; accumulation of sediments at Alsmo, which may cause flooding of the local road; and water levels and fishing conditions in the Vivatjønne pond.

1.2 Detailed Topic Evaluation

1.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging issues relating to hydropower facility communications and consultation have been identified; requirements and approaches are determined through a periodically updated assessment process involving stakeholder mapping; and effectiveness is monitored.*

On-going issues relating to Jostedal communications and consultation have been identified through on-going communications with Luster Municipality and queries raised by the local community.

Emerging stakeholder relations issues associated with potential large refurbishment or maintenance works would be identified in the “environmental programme for projects” (Statkraft template H-10/150).

Requirements and approaches to on-going or emerging communications and consultations issues in relation to Jostedal are determined through weekly meetings between all department/group leaders in the Midt Norge Region. Approaches to communications and consultations may include meetings with stakeholders, articles in the local newspaper (Sogn Avis), and letters or phone calls depending on the scale of the issue. For example, the sediments accumulation issue at Alsmo was discussed in a minuted meeting in March 2012 between Luster municipality, the landowner and Statkraft; and an article was published in the Sogn Avis in April 2004 to respond to community concerns on fishing conditions and sea trout migration in the Jostedal river.

Evidence was provided of the identification of relevant stakeholder groups and general communication and consultation requirements and approaches. However, specific requirements for each stakeholder group have not been identified through a periodically updated assessment process involving stakeholder mapping. The absence of communication and consultation requirements and approaches for each group is not considered a significant gap; it has not led to significant communication issues and there is evidence of close relationships with local communities and on-going communications with Luster Municipality, NVE and the Environmental Department of the County Governor.

The effectiveness of communications is monitored through the responses in the local media and if further communications are required that is discussed at the leader group meetings.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the stakeholder mapping takes broad considerations into account.*

The stakeholder mapping provided by Statkraft includes relevant stakeholder groups at local, regional and national level, but it does not take broad considerations into account. The stakeholder mapping does not include a stakeholder analysis outlining the relationship amongst stakeholder groups, and the level of consideration of rights, or identifying issues of specific interest to them, and proactive communication that addresses these issues, risks and responsibilities. The lack of a stakeholder mapping that identifies issues of specific interest to stakeholder groups, and communication needs is a **significant gap** against proven best practice. The lack of specific communication needs and approaches could generate communication uncertainties with various stakeholder groups; an example would be the communication requirements concerning the planned date for clearance of the road in spring, and how far in advance to communicate this date, which affects local tourism businesses and the re-introduction of the reindeer in the region.

Criteria met: No

1.2.2 Management

Analysis against basic good practice

Scoring statement: *Communications and consultation plans and processes, including an appropriate grievance mechanism, are in place to manage communications and engagement with stakeholders; these outline communication and consultation needs and approaches for various stakeholder groups and topics.*

Communications processes in place within Statkraft’s management system to manage external and internal communications and engagement with stakeholders include:

- A process to secure and perform proactive communication;
- A process to secure and perform reactive communication;
- A process to secure contingency for communications in crisis situations;
- A environmental programme for projects (template H-10/150); and

- On-going internal communication processes.

An appropriate grievance mechanism is in place. All external stakeholders interviewed would contact Statkraft to raise issues through a phone call and/or talking directly with the plant manager or the region communications manager.

The reactive communication process is applied in most cases to prompt project communications. This process outlines a grievance mechanism or how to deal with external routine queries or queries that require formal consideration. If Statkraft receive an external inquiry, the process should follow this sequence of actions: an assessment on how the matter should be handled, the inquiry log, assess and secure approval from a superior, assess nature and timing of response, respond to matter, and assess if the matter has been closed.

The proactive communication process will be applied for construction projects or to improve business reputation (e.g. to respond to negative web blogs). The proactive communication process was implemented for the creeks tributaries proposal in the west side of the valley following the concession requirements established by Norwegian regulations.

Emerging issues associated with potential large refurbishment or maintenance works will require a risk analysis to assess whether the preparation of an “environmental programme for projects” (Statkraft template H-10/150) is required. This template contains a section on stakeholder relations. However, maintenance works undertaken since the start of the operation of the plant to date have not required the preparation of such plan. To date only small-scale maintenance works have taken place and any stakeholder communication requirements are identified through the leader group meetings or in relevant permitting conditions (e.g. intake inspections with activity inside the borders of the National Park require a 24 hour notification to the Environmental Department of the County Governor).

On-going internal communication processes include leader group meetings, weekly reports from the regional director to the corporate power generation director, and regular emails to all internal staff.

In addition to the management system and internal communication processes, the regional communications department monitors the regional press, media articles and web blogs that refer to Jostedal. The local newspaper (Sogn Avis) seldom mentions Jostedal. Jostedal has featured (positively) 10 times in Sogn Avis since 2000; the last article dates from 2011 in relation to the tourist outreach program at the Jostedal power plant visitors centre.

Statkraft’s communications and consultation plans include:

- Regional Communications Plan (2011), which identified communication needs in relation to the now withdrawn creeks tributaries project in the west side of the valley and the proposed Vigdøla power plant, including a public meeting with NVE in April-May 2011; and
- Regional Media Plan (2012), which lists key media activities planned for 2012 in the region.

The plans and processes described above do not outline communication and consultation needs and approaches for various stakeholder groups and topics. This is not a significant gap against basic good practice for the reasons set out under Assessment above. Although SN Power/Statkraft’s public affairs toolkit has not been implemented for Jostedal, communications plans and processes in place have resulted in well-managed communications as described above

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, communication and consultation plans and processes show a high level of sensitivity to communication and consultation needs and approaches for various stakeholder groups and topics; and processes are in place to anticipate and respond to emerging risks and opportunities.*

Communication and consultation plans and processes do not show a high level of sensitivity to communication and consultation needs. As described in the assessment findings section, the lack of a stakeholder mapping that identifies issues of specific interest to stakeholder groups, and communication needs is a **significant gap** against proven best practice; this gap is the same as that described in the Assessment findings.

Processes are in place to respond to risks and opportunities and include:

- On-going communications with NVE, Luster Municipality and Sogn og Fjordane County Governor's Environmental Department;
- Preparation of a risk analysis for emerging issues associated with potential large refurbishment or maintenance works; and
- On-going internal communications e.g. leader group meetings.

Criteria met: No

1.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *The operation stage involves appropriately timed and scoped, and often two-way, engagement with directly affected stakeholders; engagement is undertaken in good faith; ongoing processes are in place for stakeholders to raise issues and get feedback.*

Directly-affected stakeholders (those with substantial rights, risks and responsibilities) include Jostedal permanent residents and summerhouse owners, the Local Regional Society, the Glacier Visitors Centre, Tourist Businesses (e.g. Icetroll, glacier guides), Landowner Associations (Jostedalen, Gaupne and Røneid associations), Hunting and Fishing Associations, DN, NVE, Luster Municipality and Sogn og Fjordane County Governor's Environmental Department.

The Jostedal operation stage involves appropriately timed and scoped, and often two-way, engagement with directly-affected stakeholders and engagement is undertaken in good faith.

Stakeholder engagement activities with directly-affected stakeholders are both proactive and reactive and include:

- Stakeholder engagement with local communities and businesses through a reactive process of communication following an external query;
- Proactive engagement activities at the plant visitors centre (e.g. tourist outreach program and school tours);
- Consultation /public events undertaken in relation to the creeks tributaries project in West side of the valley (now withdrawn);
- Meetings with Luster municipality, Sogn og Fjordane County Council, DN and NVE; and
- Participation of fishing associations in the fish-stocking program.

The tourist outreach program aims to engage with tourism business in the region. Every year since 2011, tourism businesses are invited for a day to the Jostedal power plant visitors centre. The Jostedal power plant visitors centre also hosts and guides groups from local schools and it is open for everyone to visit over the summer season; the centre receives about 400-500 visitors a year. The centre also offers guided tours over the winter season if booked in advance.

Most of the directly-affected stakeholders interviewed felt that engagement was undertaken two-way and in good faith. Examples of how engagement on scoped issues has been undertaken at the appropriate time include:

- The last minuted meeting involving Statkraft, a landowner and Luster municipality dates from March 2012 in relation to the removal of sediments at Alsmo.

- Minuted meetings with Luster municipality in February 2008 and November 2010. Issues discussed in the last meeting include stream flows, floods in Jostedal tributaries, construction roads and other local interventions, and technical plans for the construction of the Vigdøla power plant.
- On-going relations with the Sogn og Fjordane County Council as established through their monitoring responsibilities prior to the approval of permits and the revision of the license conditions, and on the EU Water Framework Directive;
- Ongoing relations with the County Governor on the requirements for nature management;
- Fishing associations experienced in fish-stocking in Luster participated in a fish-stocking program to improve the availability of the sea trout and fishing conditions as required by the license requirements.

On-going processes are in place for stakeholders to raise issues and get feedback. All directly-affected stakeholders interviewed knew how to approach Statkraft if they had any queries of concern. Most of them would contact the Jostedal plant manager or the regional communications manager through a phone call. Feedback on issues raised is usually provided by telephone or letters.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, engagement is inclusive and participatory; negotiations are undertaken in good faith; and feedback on how issues raised have been taken into consideration has been thorough and timely.*

Engagement is carried out directly, through regular working contact, with of a range of directly-affected stakeholders, such as Luster Municipality, NVE and the County Governor, the Fishing Association and selected tourism businesses. Some engagement is an open participatory process (for example, consultation on the western tributaries proposal, and a general feeling amongst members of the community that it is easy to contact Jostedal managers). However, engagement is not necessarily inclusive: it is not carried out to enable a wider range of stakeholders to get involved. There is no ongoing regular process for discussing concerns and inviting the views of the public who may not be inclined to contact Statkraft directly or are not able to, such as an annual meeting or newsletter. This is a **significant gap** against proven best practice.

Interviewed stakeholders indicated that negotiations were undertaken in good faith, e.g. compensation negotiations with affected landowners.

Feedback on how issues raised have been taken into consideration has not been thorough or timely for some environmental and social issues (see O-3 Stakeholder Engagement findings for further details) .

Criteria met: No

1.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to communications and consultation have been and are on track to be met with no major non-compliances or non-conformances, and communications related commitments have been or are on track to be met.*

The processes relating to Jostedal communications and consultation are listed and described in the management findings section above are on track. Objectives relating to communications and consultation are presented in the Statkraft Group policy for communication and brands (2011) and Statkraft Group policy for social responsibility (2011).

The Statkraft Group's policy for communication and brands principles include: "to provide information to and communicate with all its stakeholders in an open, accurate and timely manner" and "to respond rapidly to external inquiries with fact-based, accessible information". The Statkraft Group's policy for social responsibility principles include "collaboration with interest groups using inclusive, predictable and verifiable processes and

communicate the consequences our activities have for society openly in compliance with requirements and on a timely basis". Some of the external stakeholders interviewed felt that feedback was not provided in a timely manner. This is a significant gap under topic O-3, and Statkraft are aware of the need to improve the timeliness of feedback to stakeholders.

No evidence of major non-compliances relating to Jostedal communications and consultations was found. The licence to operate Jostedal (Clause 15) requires that results of hydrological observations to safeguard public interest shall be made available to the general public. This requirement has been met; interviews with NVE and Sogn og Fjordane County Council indicate that results are publicly available at the NVE website.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances.

Criteria met: Yes

1.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

The lack of stakeholder mapping that identifies issues of specific interest to stakeholder groups, and communication needs and approaches specific to these groups.

The lack of inclusive stakeholder engagement with all directly-affected stakeholders.

2 or more significant gaps

1.3 Scoring Summary

Statkraft have engaged with directly-affected stakeholders through appropriately timed and scoped engagement activities through the operation of the Jostedal plant. Engagement was often two-way and undertaken in good faith, and processes are in place for stakeholders to raise issues and get feedback.

Statkraft's plans and processes and grievance mechanisms are in place to manage internal and external communications and to assess on-going or emerging communication issues. A stakeholder map identifying relevant groups is in place; however, it does not take into account broad considerations or identify communications approaches that are tailored to each stakeholder group. Engagement is participatory (open to all) but there are no efforts made to ensure that it is inclusive of all directly affected stakeholders. Interviews with stakeholders indicate that negotiations were undertaken in good faith, but feedback on how issues raised has not been thorough or timely in some cases.

No evidence of non-compliances in relation to the licence commitments has been identified, and there are no non-conformances. The Jostedal project has achieved basic good practice for communications and consultations with two significant gaps against proven best practice, resulting in a score of 3.

Topic Score: 3

1.4 Relevant Evidence

Interview:	1, 2, 5, 7, 8, 9, 10, 12, 13, 14, 15, 16, 18, 20, 21, 22, 27, 29, 30, 31, 32
Document:	7, 9, 10, 11, 13, 14, 42, 53, 66, 70, 72, 73, 77, 97, 100, 101, 108, 117, 122, 125, 126, 127, 129, 136, 137
Photo:	2, 6

2 Governance (O-2)

This topic addresses corporate and external governance considerations for the operating hydropower facility. The intent is that the owner/operator has sound corporate business structures, policies and practices; addresses transparency, integrity and accountability issues; can manage external governance issues (e.g. institutional capacity shortfalls, political risks including transboundary issues, public sector corruption risks); and can ensure compliance.

2.1 Background Information

Jostedal is owned by Statkraft Energi AS, which owns all Statkraft hydropower operations in Norway as well as an energy trading arm and a number of other interests not relevant to this assessment. Statkraft Energi AS is 100% owned by Statkraft AS, both limited liability companies. Statkraft AS is in turn owned by Statkraft SF, an arm of the Norwegian government under the control of the Ministry of Trade and Industry.

Statkraft Energi AS is governed by a Board of Directors, serving a formal governance function (for example, signing off on the company Annual Financial Statements), and meeting annually. In practice however, the assets owned by Statkraft Energi form part of a corporate structure managed by the Board of Directors of Statkraft AS (the 'Group'), through a corporate management team.

Under this management structure Jostedal is in the Power Generation Department (PG) within EVP (Generation and Industrial Ownership). It is under this structure that actual governance takes place: Group governance is guided by a vertical structure of five levels: at level 1, Statkraft AS Articles of Association, level 2 the Statkraft Vision and Values, level 3 the Statkraft Strategy, level 4 Group Procedures and finally level 5 Processes. Processes at level 5 contain the process requirements for the PG group, and are compliant with Group policies but adapted for PG requirements. The link between 1 to 4 and 5 is found in the "Group Procedure for Formulation and Adoption of the Governance Document" paper. The group is ISO 14001 and 9001 certified.

PG itself operates under a matrix structure, in which centralised HR, Process and IT, Technology and Maintenance, Production and Concession, and Administration and Controlling services are provided to four regional powerplant groups, as well a development arm and external companies. Jostedal is in the Region Midt Norge (Central Norway), and in a Sogn powerplant group. Each of the regions has capacity mirroring that of the management structure to provide these services at a regional level, with Sogn powerplant group powerplant group manager in charge of Jostedal maintenance group (sub-powerplant group).

2.2 Detailed Topic Evaluation

2.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging political and public sector governance issues, and corporate governance requirements and issues have been identified, and monitoring is being undertaken to assess if corporate governance measures are effective.*

Statkraft operates in a stable, highly regulated and well understood political environment, and there is clear evidence that both public sector and corporate governance issues are identified and monitored on a ongoing basis. This is demonstrated throughout the management structure from group level to Jostedal specific areas.

At Group level, these issues are assessed internationally, regionally and nationally. This is done through staff and company participation in Associations, working groups and processes that highlight issues, including

governance issues across these areas. Evidence was provided of regional-level challenges being identified (for example the Water Framework Directive within the EU), as well as national-level challenges (upcoming concession negotiations, and the impacts of internal and external attitudes to hydropower, and use of water), and of comprehensive monitoring of both emerging issues and their impacts on the Group.

By way of further example, each Vice President within the corporate management structure is responsible for monitoring an item on a 'Top 7' list of 'public affairs questions that require specific focus'.

Reporting both through the line, and into the Emendo system, identifies corporate governance issues (along with other related issues) at project and powerplant levels.

The evaluation of both external and internal issues is reflected in comments on risk in the annual finance statement, and was supported by evidence of an understanding of how the highlighted risks are being assessed and monitored.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no significant opportunities for improvement in the assessment of political and public sector governance issues and corporate governance requirements and issues.*

Statkraft places great emphasis on evaluating political and public sector risk, not only within Norway, but regionally (especially in the EU) and internationally. Furthermore, assessment of corporate governance requirements is thorough and reflected in Group Policies. There are processes to address corporate governance issues as they relate to hydropower operations in Norway, for example issues of the changing perceptions of hydropower and how that may affect concession terms. .

There are no significant opportunities for improvement of the assessment of governance issues.

Criteria met: Yes

2.2.2 Management

Analysis against basic good practice

Scoring statement: *Processes are in place to manage corporate, political and public sector risks, compliance, social and environmental responsibility, procurement of goods and services, grievance mechanisms, ethical business practices, and transparency; policies and processes are communicated internally and externally as appropriate; in case of capacity shortfalls, appropriate external expertise is contracted for additional support.*

Statkraft Energi, through Group procedures, has a broad range of tools to manage its governance risks and responsibilities, as well as its relationship with external stakeholders. Political risks are managed through involvement in processes referenced earlier (see Assessment, basic good practice) , and through for example, staff representation in Brussels at EU headquarters in a position to inform decision-making. Statkraft employees are active in Eurelectric, with a number of representatives active in working groups. Corporate staff are also engaged in public affairs work nationally, and Statkraft has representation in Energy Norway (a non-profit industry organization representing about 270 companies involved in the production, distribution and trading of electricity in Norway). Issues that have been identified through this engagement are being actively managed within the company. Evidence was provided of proactive steps to manage the impact of the EU WFD, and also the review of concessions internally in Norway, for example.

Compliance requirements are clearly defined, with compliance mapped at project level, with appropriate use of templates and registers. Compliance responsibility is furthermore set out in corporate policy.

Risks related to procurement are managed through use of externally recognised vetting systems (Sellihca, an EU approved tool), along with clearly defined and communicated internal procedures and structures.

Grievance mechanisms are in place both internally and for external parties to engage with the company. Internal mechanisms include unions at all levels of the Group, clear ability to communicate with line management, and reporting via the Emendo system. Similarly, external grievances are addressed through the SAP and Emendo systems, and line functions have focussed responsibility to engage with for example, project affected communities (for example, interviews confirmed that the Jostedal plant manager identified this as a specific responsibility).

Ethical business practices are set out in the Group procedures, and were demonstrated, for example through the Code of Conduct that applies throughout the Group. Policies and processes are available internally through the company internet, and there are defined line responsibilities around communications. Policies and high level vision and policies are clearly communicated externally through the internet and quarterly and annual financial reporting. Interviewees demonstrated significant use of external expertise in areas relating to governance (including strategic recruitment) to address perceived shortfalls. Examples include recruiting international expertise on resettlement, and participation in international NGO working groups focussing on issues relevant to the Group.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, contractors are required to meet or have consistent policies as the developer; procurement processes include anti-corruption measures as well as sustainability and anti-corruption criteria specified in pre-qualification screening; and processes are in place to anticipate and respond to emerging risks and opportunities.*

The 'Supplier Code of Conduct', applicable to contractors, mirrors the Statkraft internal Code of Conduct. Major procurement is handled at group level, and generally all contracts are pre-qualified through the EU Sellihca Qualification, guided by the UN Global Compact.

The Supplier Code of Conduct clearly spells out supplier duties in respect of corruption, sustainability, the environment, labour rights and related issues.

Interviewees demonstrated that both risks and opportunities formed part of all contract negotiations, with risk allocation considerations and benefit sharing opportunities identified. Continuous improvement in procurement processes at the corporate level was evident, for example, through Transparency International comments on the content of the corporate anti-corruption handbook.

Criteria met: Yes

2.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *The business interacts with a range of directly affected stakeholders to understand issues of interest to them; and the business makes significant project reports publicly available, and publicly reports on project performance, in some sustainability areas.*

This scoring statement differs from that under Stakeholder Engagement under O-1 as it considers the broader, business-level engagement from a governance perspective.

Statkraft engages with a broad group of stakeholders, internationally, regionally and nationally, as highlighted above, makes reports publically available around CSR responsibilities (for example, group sustainability reporting), and interacts at a local level with project affected communities, including local government. The business provides a Stakeholder Engagement booklet, as part of Public Affairs toolkit, for project-level stakeholder engagement and interviewees defined processes governing engagement whenever projects are under consideration (refer to O-1 for details of the use of this guidance on Jostedal).

Evidence was provided of meetings with local governments around specific hydropower projects held as frequently as required to ensure that such officials are kept abreast of developments at plant level, and channels of communication remain open.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the business makes significant project reports publicly available and publicly reports on project performance in sustainability areas of high interest to its stakeholders.*

Significant reports are published on the company website, mainly through quarterly and annual reporting, along with sustainability reporting. There is evidence that project performance is reported when issues that affect stakeholders are identified. An example of such interaction was provided, where a reporting process was put in place to address issues related to non-compliance with downstream flows on a company project.

There is no evidence of systematic provision of powerplant level reports to the public, however evidence of engagement with local government, in anticipation of local issues, was provided, as was evidence of Statkraft engagement with local press to address issues with Jostedal as they arise.

Criteria met: Yes

2.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *The project has no significant non-compliances.*

The project does not have any significant non-compliances.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *The project has no non-compliances.*

A non-compliance was reported (both to assessors, and internally on the Emendo system – demonstrated to assessors) in respect of a minor building erected close to the Jostedal project, without reporting to the appropriate agency. The non-compliance arose because both the company and another agency were not aware of the requirement to report to this agency. This was rectified, and there are no non-compliances at the Jostedal level.

Criteria met: Yes

2.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *There are no significant unresolved corporate and external governance issues identified.*

There are a number of external governance issues that continue to be of relevance (for example, the application of the EU WFD in Norway), but there are no unresolved issues. The Statkraft group engages around governance at the highest level, and there is clear evidence of proactive management of potential outcomes.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no unresolved corporate and external governance issues identified.*

There are no unresolved corporate or external governance issues.

Statkraft operates within a robust and comprehensive corporate governance structure with significant engagement with best practice internationally. There are no unresolved issues identified.

Criteria met: Yes

2.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

There are no significant gaps against proven best practice.

0 significant gaps

2.3 Scoring Summary

While internal governance structures appear complicated, these structures are understood and respected internally, and communication of corporate governance through the website is carried out in a clear and open manner. Externally, Statkraft is engaging at the highest level, including as a member of the UN Global Compact.

Topic Score: 5

2.4 Relevant Evidence

Interview:	1, 2, 4, (4a), 5, (6,7,8), 22, 23, 24, 25, 26
Document:	1, 2, 3, 15, 16, 17, 37, 38, 41, 42, 44, 46, 47, 48, 54, 61, 62, 64, 70, 72, 73, 76, 77, 78, 81, 94, 95, 98, 109, 110, 111, 138, 139
Photo:	None

3 Environmental and Social Issues Management

(O-3)

This topic addresses the plans and processes for environmental and social issues management. The intent is that negative environmental and social impacts associated with the hydropower facility are managed; avoidance, minimisation, mitigation, compensation and enhancement measures are implemented; and environmental and social commitments are fulfilled.

3.1 Background Information

Some of the most significant environmental and social issues and benefits associated with the Jostedal project concern: the economic and social benefits of the revenues generated by the project; fish passage and spawning; sedimentation; flood management; and flows in the watercourses downstream of the reservoir and intakes. These are covered in detail under other topics, specifically O-8, O-15, O-16 and O-19. Topic O-9 addresses the impact of the project on livelihoods and living standards. O-3 concerns all environmental and social issues, and in particular how these are managed.

Ongoing and emerging environmental issues are: day-to-day waste and pollution control; fish passage and spawning; decreasing water levels in the Vivatjønni; and impacts of the intake at Vigdal (because of absence of waterflow as a natural fence for grazing animals); the timing of opening access roads (either opening the Styggevatn road early for access, and keeping it closed later for reindeer migration); the potential public danger at the quarry site adjacent to Styggevatn; and sedimentation affecting localised flood risk.

3.2 Detailed Topic Evaluation

3.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Systematic processes are in place to identify any ongoing or emerging environmental and social issues associated with the operating hydropower facility, utilising appropriate expertise; and monitoring programs are in place for identified issues.*

Systematic processes are in place at the level of the project, Sogn group and above to identify ongoing or emerging issues, and include: an annual mapping of environmental aspects for the Sogn group; occasional audits by NVE of compliance with license conditions; annual dam safety inspections which include environmental issues; a monthly report which includes environmental issues and corresponds to the Handlingsplan (action plan) for the Sogn group and reports against KPIs that include serious environmental incidents and less serious environmental incidents; regional-level leader group meetings (which are minuted) every Monday; regional weekly operating meetings resulting in a Friday memo from the Regional Director to the Statkraft CEO; regional annual reports and sustainability reports; occasional inspections of installations in the catchment area such as thresholds, affected riverbeds, and affected stone deposits; and the 'Emendo' incident reporting system.

Evidence of the application of these processes to Jostedal was provided: including an HSE assessment of the construction of helicopter pads at Jostedal intakes, and items recorded in the Emendo and SAP systems.

Appropriate expertise is used for certain issues, for example the use of LFI, Bergen (University of Bergen) for sea trout investigations and mapping of invasive species on the spoil heaps in Vanndalen and Fagredalen.

Maintenance staff undertake internal courses for planning, implementation and reporting on environmental inspections, and additional training is planned in the coming winter.

Monitoring programs are in place for fish issues (see O-15). Monitoring of water levels in Vivatjønni was in place until recently (but see O-16). Otherwise the reporting described above and the Emendo system would provide sufficient monitoring of issues after they had been identified.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes to identify ongoing and emerging environmental and social issues take broad considerations into account, and both risks and opportunities.*

Broader considerations, risks and opportunities in this context might include opportunities to contribute further to the amenity and tourism value of the reservoir (see O-18), opportunities to contribute to biodiversity other than salmonid fish (see O-15), or broader reputational risks amongst the local community. The above processes are largely focused on specific ongoing issues (fish, Vivatjønni) and do not look beyond the immediate or most obvious impacts or license conditions of the project. For example, the mapping of environmental aspects refers to the issues of Vivatjønni, the fish passage at Langøyhjelet, and maintenance of a weir at Vigdøla, but no other issues are identified. Informal processes, such as meetings with the municipality and with community organisations, do not encompass broader issues, risks or opportunities systematically. No evidence has been provided that would show how broader considerations at Jostedal are identified. The absence of a systematic process (ie. one that is scheduled regularly, follows a pre-determined procedure, and is likely to be documented) to identify and manage broader considerations is a **significant gap** against proven best practice.

Criteria met: No

3.2.2 Management

Analysis against basic good practice

Scoring statement: *An environmental and social management system is in place to manage measures to address identified environmental and social issues, and is implemented utilising appropriate expertise (internal and external).*

An environmental management system covering all Statkraft operations was established in 2009, and applies to PG, the Sogn group and Jostedal.

The system includes a series of procedures and governing documents, which were seen stored in PG's 360 document management system. These include the following documents: template for an environmental program in projects; instructions for mapping environmental aspects; specification of contractor's HSE requirements; waste management at the power plant group Sogn; HSE competence requirements; checklist of environmental impacts; emergency response plans; chemical management; risk assessment methodology; action plan for abnormal events in regional centres; etc. Statkraft provided an example of how these procedures are applied to Jostedal, an assessment of HSE risk of the recent construction of helipads.

Specifically, project managers in the regional technical team (who oversee construction work) must meet environmental management requirements, and an HSE coordinator is appointed on every construction project. An emergency response plan is in place for the central Norway region.

A register of documents on HSE for the Jostedal project, using procedure H-01/130 is kept. Most of the documents that are electronically linked to this document concern safety, but some concern environment (waste disposal, and the register of environmental aspects for example). A larger number of other documents are assigned to specific individuals as their responsibility or are referred to as in the archive. These include:

audits for weirs, annual reports, permits related to fish, and registration of thresholds and bridges. Evidence was provided of an inspection of weirs.

The 'Emendo' system is an improvement and non-conformity system: it is used to register observations; incidents; improvement proposals; and deviation permits. A hard copy equivalent can also be used.

For 'appropriate expertise' refer to Assessment, above.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities; and plans and processes are embedded within an internationally recognised environmental management system which is third party verified, such as ISO 14001.*

The processes described under Assessment (basic good practice) are used to anticipate and respond to some risks and opportunities as they emerge during operation. The management system described under Assessment above does not include social issues, which may be justified as there are no significant social impacts of operation (see O-9).

These processes do not identify, anticipate or respond to broader considerations, risks and opportunities; this gap is described under Assessment above.

Plans and processes are embedded in an ISO 14001-certified system.

Criteria met: Yes

3.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *Ongoing processes are in place for stakeholders to raise issues and get feedback.*

Our findings here are focused on Stakeholder Engagement concerning environmental and social issues only. O-1 addresses stakeholder engagement on all issues.

Processes in place for stakeholders to raise issues and get feedback are: direct contact with the plant group manager or regional-level staff, by phone, email, and letters (and with feedback by phone, email and letters); periodic meetings with Luster municipality; regular meetings and correspondence with NVE and DN regarding compliance with license conditions; and statutory requirements for public consultation regarding construction with potential significant impacts such as the proposed western intakes.

Issues raised by these stakeholders can be logged as incidents in the Emendo system, prompting feedback by a deadline, but the thoroughness of the response depends on what exactly is logged in the system. The 360 document management system is used to store all incoming and outgoing documents, including correspondence from external stakeholders.

Members of the public interviewed agreed that it was easy to get in contact with Statkraft. However some complained of a lack of response to concerns (but see 'proven best practice' below). Interviewees agreed that the process of consultation on the proposal to tap the western tributaries was open and anyone who wished to could get involved. Engagement is not inclusive and participatory, but this gap is addressed under O-1 above.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, feedback on how issues raised have been taken into consideration has been thorough and timely.*

Feedback on how issues raised has not been thorough or timely. A number of stakeholders have complained of poor timeliness in Statkraft's responses to their issues, and a lack of feedback. For example, one community group has written to Statkraft complaining of ineffective mitigation and a lack of progress at Vivatjønni, and another local stakeholder mentioned in interviews that the Vigdalen problem was raised as early as the court settlements. Resolution of the issue of the quarry cliff at Styggevatn has also been slow. Most external stakeholders interviewed believed that Statkraft could be quicker in its response and feedback. These issues are discussed in detail under other topics, but all point to a gap in the thoroughness and timeliness of feedback on how issues raised have been considered. This is a **significant gap** against proven best practice. It applies on O-3 as the issues for which feedback is not thorough and timely are environmental or social (rather than general, which is addressed under O-1).

Criteria met: No

3.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in environmental and social management plans have been and are on track to be met with no major non-compliances or non-conformances, and environmental and social commitments have been or are on track to be met.*

The commitments set out in the environmental aspects register are met (Langøyane fish ladder) or on track (maintenance of Vigdøla weir, measures to protect Vivatjønni).

An environmental group policy and environmental group procedures are in place at the level of the Statkraft group, as well as a group policy for social responsibility, code of conduct and supplier code of conduct. The Jostedal project generally conforms with these commitments, though it is notable that two particular commitments could be better applied at Jostedal: the environmental policy's requirement that Statkraft operates a company-wide EMS, and the group environmental procedures' requirement that relevant communications from external interested parties shall be recorded in the non-conformity system.

Discussions with NVE and DN confirm that Jostedal is fully compliant with its licence and regulatory commitments, despite a minor deviation recently recorded (now corrected) concerning sedimentation at Alsmo. NVE in Oslo describe how their relationship has been good and orderly, and it is easy to meet with Statkraft.

In addition, note that commitments to landowners affected on the construction of the project continue to be honoured.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances

Criteria met: Yes

3.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *Negative environmental and social impacts associated with hydropower facility operations are avoided, minimised and mitigated with no significant gaps; and land disturbance associated with development of the hydropower project is rehabilitated or mitigated.*

Site-specific environmental impacts are avoided, due to good plant management and construction management. Land disturbance from the development of the intakes has been rehabilitated (but see O-15 concerning the use of non-native plants). Impacts that are not yet avoided or mitigated are the decreasing water levels in the Vivatjønni and reduced flows downstream of the intake at Vigdal (removing a spawning area for fish), but action will be taken in the near future at Vivatjønni and the impact at Vigdal is not significant. The other issues listed in the background section above are not impacts of Jostedal but are opportunities to make a broader contribution.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, negative environmental and social impacts associated with hydropower facility operations are avoided, minimised, mitigated and compensated with no identified gaps.*

The remaining issue of flows in Vigdal is compensated by numerous measures to support to the migration of fish.

Criteria met: Yes

3.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

There are two significant gaps against proven best practice: application of a systematic process to identify broader environmental and social considerations, risks and opportunities; and the absence of thorough and timely feedback on environmental and social issues to stakeholders.

2 or more significant gaps

3.3 Scoring Summary

Negative environmental and social impacts are assessed and managed through a detailed management system including a range of procedures, and Jostedal brings wider social benefits (discussed under O-8). However there is no systematic process for identifying and managing broader risks and opportunities, with some issues remaining outstanding or unresolved, and feedback has not been timely. This has given rise to a perception amongst some community stakeholders that Statkraft are unwilling to carry out additional measures primarily because of cost implications. The absence of any systematic process for broader issues, and slow feedback on ongoing issues are significant gaps against proven best practice, resulting in a score of 3.

Topic Score: 3

3.4 Relevant Evidence

Interview:	1, 5, 6, 7, 11, 12, 13, 14, 15, 20, 21, 31, 32
Document:	1, 2b, 3, 5, 8, 10, 15, 16, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28, 37, 38, 39, 40, 41, 42, 43, 44, 45, 53, 54, 81, 94, 98, 102, 107, 108, 112, 120, 124, 130, 131, 135, 136, 137
Photo:	3, 5, 7, 8

4 Hydrological Resource (O-4)

This topic addresses the level of understanding of the hydrological resource availability and reliability to the operating hydropower facility. The intent is that power generation planning and operations take into account a good understanding of the hydrological resource availability and reliability in the short- and long-term, taking into account other needs, issues or requirements for the inflows and outflows as well as likely future trends (including climate change) that could affect the facility.

4.1 Background Information

Jostedal is a straight-forward system from a hydrological point of view. Inflow is provided by three main components: rainfall, snowmelt and glacial melting. The two main reservoirs can store 1.5 years (Styggevatn) and 3 years (Kupvatn) of average inflow for their respective catchments. There are 22 small creek intakes at a level around 1200 m.a.s.l., augmenting the inflow to Kupvatn/Styggevatn.

The Jostedøla valley's catchment is 804 km² and located at high altitude. Approximately 70% is located above 800 m.a.s.l., and 29% is covered by glaciers. As a glacially controlled river, the runoff is concentrated to a few months in the summer when melting and rainfall occurs. During the rest of the year precipitation is stored as snow and runoff is reduced to a low baseflow level. Average runoff is around 37 m³/s, the specific runoff is approximately 46 l/s/km² (~1450 mm) and just over 60% of the annual runoff occurs in the June-August period.

The Leirdøla power plant was already in place when Jostedal was planned. Several different schemes for utilising the power potential of the Jostedøla river were proposed, and the one eventually implemented was the smallest. This has left the western side of the valley unutilised (with the exception of the already harnessed Leirdøla subcatchment), which means that around 70% of the original runoff still flows along its natural course.

Flood protection is a very important concern in the valley, which has been hit by two devastating floods, in 1899 and, the worst on record, in 1979. Therefore the license requires that Jostedal shall not make any flood worse than it would have been without the plant. There is also a requirement to utilise 1 metre of regulation amplitude as extra flood protection in the main reservoir, Styggevatn, during the period up to the 1st of September each year.

The issue of downstream flows and the relationship between plant operation and in-stream water is dealt with under topic O-19.

4.2 Detailed Topic Evaluation

4.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Monitoring is being undertaken of hydrological resource availability and reliability, and ongoing or emerging issues have been identified; inputs include field measurements, appropriate statistical indicators, issues which may impact on water availability or reliability, and a hydrological model.*

The project hydrology in the Jostedøla river is based on approximately 80 years of field measurements, from 1930 to 2010. In addition to this data, valid for the main river, there are shorter time series for some smaller tributaries, in particular for Nigardsbreen due to a license requirement set by NVE for hydrological, sedimentological and glaciological (mass balance) measurements of the Nigardsbreen glacier. Statkraft also operates several hydrological gauges in the Jostedøla catchment, also as a part of the license requirements.

Water levels in the two large reservoirs, Styggevatn and Kupvatn, are continuously registered, and the levels are transmitted to the control room where they are monitored.

Statkraft's hydrological staff carry out snow and glacial mass-balance measurements around the catchment during the late winter in order to predict water availability for the coming year. The gauging stations are located at a variety of altitudes and with different aspects in order to provide good data.

All issues which may affect water availability and reliability are well-known and any emerging issues will be captured by the monitoring efforts described above.

The storage of the reservoirs and historical data series are used in a hydrological model (HBV) to simulate a range of water-availability scenarios. There is a separate flood-prediction model.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, issues that may impact on water availability or reliability have been comprehensively identified; and scenarios, uncertainties and risks are routinely and extensively evaluated over the short- and long-term.*

The key issues that may affect water availability are changes in precipitation (amount and seasonality) and glacial mass balance. Climate variability is comprehensively factored into Jostedal's hydrological analysis, which is of the highest quality, including continuous evaluation of scenarios over the short- and long- term. In the short term the state-of-the-art modelling yields a range of possible scenarios for water availability. Traditional hydrological trend analysis is applied and a scaling factor is used to correct for the increase in runoff that has been statistically proven over the last decade.

As part of the routine medium to long-term planning, several different departments within Statkraft use climate change scenarios in addition to the standard trend-analysis tools. Climate change is identified by the company's CEO as the single most important business driver for Statkraft. A central function has been set up to co-ordinate all climate change work across the various parts of Statkraft's operations and across all the countries in which it operates.

Criteria met: Yes

4.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to guide generation operations that are based on analysis of the hydrological resource availability, a range of technical considerations, an understanding of power system opportunities and constraints, and social, environmental and economic considerations.*

Access to the hydrological resource is strictly governed by the license conditions. Technical considerations include what intakes were permitted at the time of development, and what water is available to Jostedal power station. The license also takes social, environmental and economic considerations into account. An example is that it stipulates flood-control measures which limit operations during certain periods of the year.

In addition, generation is based on power-system opportunities and constraints by using a power-system production model called EMPS, a well-established market-analysis tool. This is run in two steps. The first step is for the whole Nordic system, including its interconnectors to central Europe. The second step is run for the more detailed level, with higher resolution (over time). The first run gives the price of electricity and the second run gives water values. The water value for the coming week is set in a weekly meeting. This is done with results from the model runs with the assistance of expert input. There is also a daily meeting where changes to the value can be made in response to unexpected and rapid changes in price or availability.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, generation operations planning has a long-term perspective; fully optimises and maximises efficiency of water use; and has the flexibility to adapt to anticipate and adapt to future changes.*

Trend analyses, continuously updated hydrological statistics and attention to climate change scenarios provide for a long-term perspective of the water resource and its utilisation. These, including the EMPS model ensure that planning has the flexibility to adapt to future changes.

Generation operations are optimised by operating during the 3000 hours (average) every year that yield the highest income. In case the models show inflow that will fill the reservoir, the management response is to generate at full capacity until the risk for spilling is removed, and only spill if it is unavoidable.

Runoff forecasting, serving the dual purpose of flood control and avoidance of spill, has been very efficient. At only two instances in the 1990-2011 period has the 1199 m.a.s.l. limitation been broken before 1st of September, and then only on 29th and 30th of August respectively. Spill (water level above 1200 m.a.s.l.) only occurred once, in late September of 1992, peaking at 1201.2 m.a.s.l. Generation is highly efficient and has great flexibility to adapt to variable conditions.

Criteria met: Yes

4.2.3 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

There are no significant gaps against proven best practice.

0 significant gaps

4.3 Scoring Summary

The hydrological resource is monitored comprehensively, with measurements of river flow, reservoir levels and inter-seasonal storage in the form of snow and ice.

Management of generation operations is aided by sophisticated models, one for hydrological forecasting and one for water-value determination. There is also a flood-prediction model and a modern sophisticated control system with on-site access to the entire Nordic operations of Statkraft. The future availability of water in the medium to long-term is studied by both traditional trend analyses as well as with climate change studies.

There are no significant gaps against proven best practice, resulting in a score of 5.

Topic Score: 5

4.4 Relevant Evidence

Interview:	10, 16, 28
Document:	1, 2, 1-2a, 1-2b, 4, 24, 25, 38, 50, 51, 53, 54, 55, 56, 57, 58, 59, 60, 89, 104, 135
Photo:	10

5 Asset Reliability and Efficiency (O-5)

This topic addresses the reliability and efficiency of the hydropower facility and associated network assets. The intent is that assets are maintained to deliver optimal performance in the short- and long-term in accordance with the overall electricity generation and supply strategy of the owner/operator.

5.1 Background Information

The Jostedal project commenced operation in 1989, and is equipped with one 288 MW Pelton turbine. With very high head and relatively inconsequential downstream flow issues as the water is released directly into Gaupnefjord, the project is operated as a peaking station within the larger Statkraft portfolio. Management of the project forms part of the much broader management plans within the Power Generation group, and is dealt with as one of three powerplants within the Sogn maintenance group. Furthermore, as part of a powerplant group, maintenance is scheduled based on defined criteria, including security, production protection, health and safety, risk etc. Generally, maintenance is dealt with either through the maintenance group linked to the powerplant group, or as a project, which is within the technical group for Midt Norge. The decision on whether a job falls to maintenance or the technical group is based on cost.

5.2 Detailed Topic Evaluation

5.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Routine monitoring of asset condition, availability and reliability is being undertaken to identify risks and assess the effectiveness of management measures; and ongoing or emerging asset maintenance and management issues have been identified.*

Detailed systems at Group and PG level guide processes for maintenance, including projects, refurbishment and new plants. The RCM (Reliability Centred Maintenance) planning system and the associated database provide the central tool through which monitoring is undertaken. The RCM methodology is based on the IEC 60300-3-11 standard and supports a risk-based approach to maintenance. It is used to identify risks in the plant, and define the scope of maintenance measures and resource and spare parts requirements, with the aim of preventing failures of critical systems/equipment and ensuring optimal maintenance.

This monitoring is complemented by structured inspections and reporting, both through powerplant staff and matrix responsibilities, and use of the company SAP system to record issues on reliability. This is complemented by monthly 'fault analysis meetings' where all issues, including those captured in the SAP system, are analysed.

Systematic monitoring of asset condition takes place across the group in accordance with clearly defined and detailed policies and procedures, with processes in place to identify risks, assess management measures and identify ongoing maintenance and management issues.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging asset maintenance and management issues takes into account both risks and opportunities.*

Long-term planning for the powerplants takes into account issues such as R&D developments, regulators' frameworks, market conditions, possible changes to licenses, with the premise of optimising the operation of

individual plants within in the Statkraft system (which is guided by the bigger market into which Statkraft sells its electricity).

The processes and procedures for decision-making are clearly defined, with analysis of long-term powerplant strategies. There is also ongoing analysis of individual maintenance components and evaluation of risks and opportunities as these are identified, for example, the Market Division highlighting an opportunity to provide frequency regulation services to the grid, regulators highlighting issues with individual components, or line staff identifying opportunities for improvement.

Evidence of systematic analysis of risks was also provided, where unavailability and failure analysis on individual plants lead to general research to prevent recurrences elsewhere in the group.

Criteria met: Yes

5.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to address routine monitoring and maintenance requirements of the operating facility in accordance with the overall electricity generation and supply strategy of the owner/operator.*

Routine maintenance is factored into production planning three years in advance, based on the optimal time to conduct the maintenance, generally scheduled for two to three week windows (which is in turn driven by a powerplant maintenance plan). At the end of the preceding year, a more detailed plan is developed based on current knowledge of planned maintenance for the period, and substantial planning is undertaken between the maintenance or project teams and production team, when routine monitoring and maintenance is scheduled to optimise plant operation within the system.

Monitoring and maintenance of Jostedal are thoroughly planned to ensure that such plans fit within overall production planning, which is turn is driven by models optimising water values. It is clear that such requirements are designed within the overall generation and supply strategy of the Group.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities; and asset maintenance management plans include a long-term program for efficiency improvements and asset upgrades.*

The assessment process outlined earlier in this topic (above, under Assessment) details the processes to respond to risks and opportunities.

Quarterly meetings are scheduled between maintenance and production staff and support staff from Group, where long-term issues around the powerplants are considered, and options to improve productivity are tabled. These planning meetings evaluate all options around maintenance and refurbishment, including opportunities and risks. By design, these opportunities and risks cover a wide spectrum across production, technical and financial issues, as well as maintenance. This is reflected in the breadth of competencies involved in the meetings.

A long-term plan exists for Jostedal as part of the powerplant subgroup, including efficiency improvement and upgrade options, in line with the overall production and generation strategy of the Group, and this is monitored and evaluated on a continuous basis.

Criteria met: Yes

5.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to asset maintenance and management have been and are on track to be met with no major non-compliances or non-conformances, and any asset related commitments have been or are on track to be met.*

Processes are on track with no major non-compliances, with processes and objectives around asset maintenance and management met.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances. Interviewees confirmed that due to planned rehabilitation work at another plant in the group, a backlog of issues was created at Jostedal, however these were not material and have been rectified. Furthermore, key performance indicators for the group had indicated a backlog during the last reporting period. However this was confirmed as resulting from a switchover in reporting tools, and rectified. It was noted that there will never in practice be a zero backlog of maintenance, and evidence confirms this is the case at Jostedal. This backlog is planned and is not a non-conformance with objectives and processes.

Criteria met: Yes

5.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Asset reliability and efficiency performance is in line with the objectives of the owner/operator and any asset performance guarantees with only minor gaps.*

Interviewees confirmed that Jostedal is operated largely in line with the Group's objectives. Jostedal's reliability and efficiency is measured against availability when required by the system. Generally, demonstrated scorecards indicate that performance is in line with the Group's objectives.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *Asset reliability and efficiency performance is fully in line with the objectives of the owner/operator and any asset performance guarantees.*

Planning staff confirmed that there were occasions where Jostedal was not available when, according to the production schedule, it should have been running. Their evidence was that this was not a serious issue, related to a software problem due to be fixed in 2013.

While there may have been an occasion where the plant was not available, this is not considered a significant gap and is planned to be addressed in 2013. Reliability and efficiency is fully in line with Group objectives.

Criteria met: Yes

5.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

[Click here to enter text.](#)

0 significant gaps

Analysis of significant gaps against proven best practice

[Click here to enter text.](#)

0 significant gaps

5.3 Scoring Summary

Statkraft demonstrates considerable focus on ensuring that assets are operating optimally, with a focus on ensuring that each project operates to the benefit of the system as a whole, and to meet Group planning requirements. This is especially the case for long-term risk and opportunity evaluation, and the considerable interaction between maintenance and production planning. Jostedal is clearly included in this focus.

Topic Score: 5

5.4 Relevant Evidence

Interview:	1, 3, (4a), 10, 16, 18, 22, 23
Document:	49, 50, 51, 52, 63, 68, 78, 79, 140
Photo:	None

6 Infrastructure Safety (O-6)

This topic addresses management of dam and other infrastructure safety. The intent is that life, property and the environment are protected from the consequences of dam failure and other infrastructure safety risks.

6.1 Background Information

Operational safety of the infrastructure related to the Jostedal project mainly concerns the safety of the main dam at Styggevatn, but also includes day-to-day safety of operations of reservoirs, waterways, intakes and project roads. NVE is the Norwegian government regulator of dam safety. The dam is a rock-fill dam with filters and an asphalt core. It is 51 metres high and 890 metres long at the crest. An issue of third-party safety concerning a vertical cliff at the reservoir rim is dealt with under O-18.

6.2 Detailed Topic Evaluation

6.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Routine monitoring of dam and infrastructure safety is being undertaken to identify risks and assess the effectiveness of management measures; and ongoing or emerging dam and other infrastructure safety issues have been identified.*

The risks relating to infrastructure are mainly dam break, road safety, and tunnel and dam leakages.

NVE has the audit responsibility for dam-safety inspections. This is delegated to accredited dam-safety auditors, with a specified person assigned for each dam. In the case of Jostedal the responsible auditor is Roar Lund, Statkraft Midt Norge. Routine audits according to the NVE protocol are implemented every 15 years, and in-between there are inspections at 1 and 5 year intervals, carried out as self-assessments.

Leakage through the dam is monitored at two sites, utilising triangular weirs and a gauge which is connected to the control room, allowing real-time information on leakage. Actual leakage has been reduced over time, indicating a certain armouring effect at work.

Dam settlement is monitored in horizontal (annually) and vertical (every 5 years) directions. Tunnels are assessed according to an approved Statkraft system.

Every employee is required to report all noted risks. This is part of day-to-day requirements but during annual inspections it is also systematised as an item-by-item exercise.

This range of routine monitoring shows that there are currently no ongoing or emerging infrastructure safety issues.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging safety issues takes into account consideration of a broad range of scenarios and both risks and opportunities.*

A broad range of scenarios and risks are assessed through: flood scenarios and climate change impacts on flood risk; a detailed dam-break study with potential impacts; and the Corporate Emergency Response Plan, the Emergency Response Plan for region Midt Norge and the Action Plan for the Sogn power group.

Flood scenarios and climate change impacts on flood risk are continuously re-assessed. Concerns over climate change have caused dam-safety to be revisited and NVE regulates possible necessary adaptation. Most climate

models predict considerable increases in precipitation in the Scandinavian mountain chain over the medium-term future (20-100 years).

The Corporate Emergency Response Plan, the Emergency Response Plan for region Midt Norge and the Action Plan for the Sogn power group include detailed listings of potentially emerging issues, and prescribe actions to be taken.

Opportunities are assessed through the participation of several engineers, including the Dam Safety Engineer, in a network which holds regular seminars and discussions. There is also co-operation with the hydraulics laboratory at Trondheim Technical University, for dam-break studies.

Criteria met: Yes

6.2.2 Management

Analysis against basic good practice

Scoring statement: *Dam and other infrastructure safety management plans and processes have been developed in conjunction with relevant regulatory and local authorities with no significant gaps, and provide for communication of public safety measures; emergency response plans and processes include awareness and training programs and emergency response simulations.*

NVE, the regulator, issues the operating license, which includes dam safety requirements, and monitors the quality and implementation of all safety-related work. The municipality and the county administrations also have some responsibilities and oversight functions.

Safety signage addressing the public is posted in relevant locations. The mode and responsibility for communication with the public, regarding emergencies as well as emerging risks and hazards, are clearly governed by the response and action plans.

Whenever changes are made to safety-related issues (e.g. new flood calculations related to dam safety) a public meeting is held and police and other authorities are informed.

There is a well-developed Emergency Response Plan for which with the Director of the Midt Norge region is responsible. This plan is tested every year and training is regularly scheduled and implemented.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities; and public safety measures are widely communicated in a timely and accessible manner.*

On-going processes for anticipating emerging risks and opportunities give detailed guidance on how to respond and who to contact (including internal and external stakeholders) in response to different levels and types of incidents and emerging risks: these include dam safety audits, the Corporate Emergency Response Plan, The Emergency Plan for region Midt Norge and the 'Action Plan for Abnormal Conditions in Water Infrastructure'.

These plans and the close relationship with local stakeholders indicate that public safety measures would be communicated in a timely and accessible manner, but as yet there have not been any emergencies requiring this in practice.

Criteria met: Yes

6.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to safety have been and are on track to be met with no major non-compliances or non-conformances, and safety related commitments have been or are on track to be met.*

Dam safety and other monitoring show good conformance and compliance.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

Regular dam safety inspections in accordance with NVE regulations are undertaken. Only regular maintenance issues have been identified during these, and projects have been formulated in response, in order to address the identified needs. These do not constitute non-compliances nor non-conformances as they are part of the regular maintenance processes.

Criteria met: Yes

6.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Safety risks have been avoided, minimised and mitigated with no significant gaps.*

All identified safety risks are managed well and monitored continuously with no significant gaps.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, safety risks have been avoided, minimised and mitigated with no identified gaps; and safety issues have been addressed beyond those risks caused by the operating facility itself.*

All identified safety risks are managed well and monitored continuously with no identified gaps.

Examples of addressing safety risks beyond those caused by the facility are risks from glacier calving, and a third-party safety project. The risk of wave-creation from icebergs calving from the Austdalsbreen glacier into the Styggevatn reservoir has been investigated by academic researchers with the conclusion that there is no major risk. Signs alerting people to the issue remain posted in the area that is easily accessible to tourists. A third-party safety project, a corporation-wide effort, has been implemented. Identified issues for Jostedal included protective railings along the roads in the valley and a vertical cliff wall below a mountain hut on the side of Styggevatn reservoir. The latter issue is dealt with under O-18.

Criteria met: Yes

6.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

There are no significant gaps against proven best practice.

6.3 Scoring Summary

Infrastructure safety, especially dam safety, is a strongly-regulated issue in Norway. NVE requires that any dam owner monitors and manages safety concerns at the highest possible standards and responds to emerging issues in a prompt and comprehensive manner. Safety inspections and emergency response planning, training and testing follow detailed plans and are comprehensive in nature. There are no identified non-conformances or non-compliances. There is little room for independent initiatives, as all activities beyond the regulated specifications and requirements are considered non-compliances by the regulator.

There are no significant gaps against proven best practice, resulting in a score of 5.

Topic Score: 5

6.4 Relevant Evidence

Interview:	5, 18
Document:	1, 2, 1-2a, 1-2b, 43, 44, 54, 74, 85, 86, 90, 91, 92 and 93
Photo:	4, 11, 12, 13, 14, 15, 16, 17, 18, 19.

7 Financial Viability (O-7)

This topic addresses financial management of the operating hydropower facility, including funding of measures aimed at ensuring project sustainability, and the ability of the project to generate the required financial returns to meet funding requirements as well as to optimise its financial opportunities. The intent is that the operations of the hydropower facility are proceeding on a sound financial basis that covers all funding requirements including social and environmental measures and commitments, and that it is aware of and responding to market trends which may influence its long-term viability.

7.1 Background Information

Jostedal operates as part of an integrated operating system of power stations within Norway, which in turn supply into a complex Nordic (and European) market, which makes it difficult to assess its financial performance separately. In fact there is no individual costing for Jostedal, rather it forms part of the Sogn powerplant group, which adds to the challenge of assessing the individual project.

The overall financial model for Statkraft treats the PG (Power Generation) group in which Jostedal is included as a cost centre, with Markets, operating at Group level, accountable for income and profitability. The system is run using complex and detailed models, with close cooperation between Markets, production planning and power generation. Jostedal has a wide optimum operating range, and serves an important function as a peaking plant within the Statkraft portfolio. Annual financial reporting for Statkraft Energi AS (which owns Jostedal) is publicly available.

7.2 Detailed Topic Evaluation

7.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Routine monitoring of the operating hydropower facility's finances is being undertaken to identify risks and assess the effectiveness of management measures; and ongoing or emerging financial management issues have been identified.*

Markets benchmarks on a regular basis, against KPI's and the average compared to the Norwegian market. Each week, production and price modelling is carried out for the next five years, including a substantial process for backtesting outcomes.

Powerplants' individual performance is measured according to cost per VMO (a matrix developed to measure and compare performance of powerplants in the absence of a profit target). The allocation of budgets to the cost centre is dictated by an iterative process between corporate level 'ambition statements', Power Group management and the powerplant groups, with decisions driven by technical considerations, rather than financial, after annual budgets are allocated. This process, which takes place annually, is based on outputs from the RCM planning system, where funds allocated to the powerplant Group are allocated between projects and maintenance, according to technical requirements. More directly, management is driven against defined financial KPIs, such as cost per VMO.

It is clear that cost monitoring is routinely carried out at a powerplant level (against budget, and through analysis of cost/ VMO), while income levels are monitored at group level (with assessments against the markets and internal KPI's). In both instances ongoing or emerging issues are identified within these processes.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging financial management issues takes into account both risks and opportunities including factors and trends that might influence future demand for electricity, water and ancillary services.*

All cost-side considerations are driven by questions on how to optimise the amount of water going into the plant, and increase the amount of electricity out of this water. Opportunities and risks are identified through a variety of channels, including the Long-term Planning system, the RCM risk assessment process and work on R&D. These issues are evaluated across functions and provide a comprehensive opportunity to evaluate emerging issues.

In addition to weekly modelling runs over a five year horizon, bi-weekly meetings assess these models to test for fit. In addition, there is an annual cycle of Long-term Forecasting, a 'deep dive' cross-functional approach to provide long-term forecasts to 2020, 2025 and 2030 that results in a substantive report to the Board. This identification of issues includes both risks and opportunities that might influence further demand.

Criteria met: Yes

7.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place for financial management of the operating hydropower facility.*

Management of the assessment processes is comprehensive, with benchmarking and backtesting of reality against predictions, and processes in place to correct on the basis of this analysis. This is an inclusive process across multiple disciplines to correct weaknesses and exploit opportunities, and furthermore it operates across both short term operations (for example, constant management and adjusting of water values) and long-term planning.

In addition, detailed processes link maintenance and project planning to financial planning and decision making, which happens at PG level. There was clear evidence of planning across departments aimed at maximising plant availability and productivity (focussing on optimal plan operation through maintenance). For example, weekly and quarterly meetings are cross-disciplinary and involve HQ production staff, with complete analysis of financial merits of any decisions included.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities; and financial contingency measures can be implemented for environmental and social management plans if required.*

Processes are in place to respond to emerging risks and opportunities, and planning is comprehensively structured to identify such risks and opportunities early enough to incorporate these into models. An adaptive process with multidisciplinary teams encourages this approach. For example, the meetings referred to under basic good practice above included an evaluation of risks and opportunities implicit in any decision. Opportunities include options to replace powerplants, and include feedback from R&D processes and external bodies. An example was given of information provided by regulators of risks around a particular runner type, and identification of opportunities to optimise performance from replacements.

Social and environmental issues are resolved as they happen, with the focus on reporting the issue and addressing causes (see O-3). Financial costs are absorbed and explained in non-compliances around budgets.

Criteria met: Yes

7.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to financial management have been and are on track to be met with no major non-compliances or non-conformances, and funding commitments have been or are on track to be met.*

Objectives and processes have been met, as measured against KPI's and models. Statkraft exceeds Norwegian averages and achieved a 2% higher price than competitors over recent measurement periods, going up to 5% higher at times. Interviewees attribute this to systems and the culture of self-assessment and evaluation.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

Jostedal is tracking against its VMO, and there are no significant non-conformances.

On the market side, the Dynamic Asset Modelling Price has returned negative numbers, with hedging having lost money compared to the amount that would have returned on the spot market. Evidence suggests that processes are now in place to address this perceived weakness. As this topic calls for assessment of the operating facility, the assessors do not consider this as a gap. If the intent statement was aimed at Statkraft itself, it may have scored differently.

Criteria met: Yes

7.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *The operating hydropower facility or the corporate entity to which it belongs can manage financial issues under a range of scenarios, can service its debt, and can pay for all plans and commitments including social and environmental.*

The Group, or corporate entity, can operate under a range of scenarios. It is clear that modelling incorporates and adjusts to changes in scenarios on an ongoing basis. It is also clear that Statkraft can manage financially under a wide range of scenarios, and can pay for all commitments, including environmental and social.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the operating hydropower facility or the corporate entity to which it belongs can manage financial issues under a range of scenarios, and has optimised or is on track to optimise its market position with respect to supply and demand for electricity, water and ancillary services.*

Optimisation to meet electricity, water and ancillary services, including incorporation of learning was demonstrated in interviews. For example, scenario analysis picked up modelling weaknesses resulting from the impacts of climate change, and models were adapted to account for these impacts after significant internal review. Further, scenario analysis brings in a range of stakeholders, including the Norwegian Ministry of Energy. Statkraft is continuously optimising its modelling and maintenance/ projects, to ensure that it continues to meet demand for electricity, water and ancillary services.

Criteria met: Yes

7.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

There are no significant gaps against proven best practice.

0 significant gaps

7.3 Scoring Summary

Jostedal is managed financially as part of the Group, and it is clear that its value as a peaking plant with a wide operating range is recognised in financial planning. As a result the project is optimised for revenue purposes, and operations are managed to ensure its availability to deliver. Operations proceed on a sound financial basis that provides (at PG and corporate levels) for environmental and social measures and commitments. There is also very clear awareness, and response to, market trends that will influence the way Jostedal is run. The facility fits within a complex and detailed corporate financial operating model.

Topic Score: 5

7.4 Relevant Evidence

Interview:	3, 4, 10, 16, 18, 22, 23, 26
Document:	46, 47, 48, 51, 63, 64, 68, 78, 79, 138, 139
Photo:	None

8 Project Benefits (O-8)

This topic addresses the benefits that were committed to alongside development of the hydropower facility, in cases where these commitments are well-documented against a pre-project baseline. The intent is that commitments to additional benefits and benefit sharing strategies made during development of the hydropower facility are fulfilled, and that communities affected by the hydropower development have benefitted. In the case of older projects where there is an absence of well-documented commitments to project benefits made at the time of project approval or an absence of data on the pre-project baseline against which to compare post-project, this topic is not relevant; in this case, issues in relation to project benefits should be taken into consideration under topic O-3 Environmental & Social Issues Management.

8.1 Background Information

There are well-documented commitments to additional benefits and benefit-sharing strategies made during the development of Jostedal, and therefore this topic is relevant. Commitments are set out in the operational licence (1984) to share the benefits of the project with affected-communities beyond one-time compensation payments, and benefit-sharing strategies are established by the Norwegian tax system for the energy sector.

Benefit-sharing commitments included in the licence include: to pay into a business development fund to be provided to Luster municipality to promote industry and commerce in the municipality; to keep roads, bridges and quays available for general public use; to maintain the access roads from Fåberg to Styggevatn and other access roads; to contribute 2 million NOK to the Ministry of Culture and Science for scientific research in Luster; to provide 10 million NOK for flood control; and pay a yearly fee of 50,000 NOK to Luster municipality to improve fishing conditions, and in some cases wildlife in the municipality.

An NVE decree on access roads commits Statkraft to the maintenance of the access roads from Fåberg to Fagredalen, and maintenance responsibilities for the access road from Bjørk to Vanndalen/Geisdalen are described under a separate agreement (2002) between Statkraft and the landowners. Statkraft are required to pay 20,000 NOK annually to landowners to maintain this access road, and keep access roads open to the general public.

Companies that are engaged in energy generation in Norway are subject to special rules for taxation. Tax regulations in Norway require the payment of the following taxes: i) license concession fee, ii) concession linked to sales of power (the municipality may use or sell up to 10% of production, and the County may use or sell the remainder from this 10%), iii) natural resource tax, and iv) property tax.

In addition to the commitments made in the license, Statkraft employee housing during construction was turned over to the community at low prices, as part of an official agreement with Luster municipality.

8.2 Detailed Topic Evaluation

8.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Monitoring is being undertaken to assess if commitments to project benefits have been delivered and if management measures are effective; and ongoing or emerging issues relating to delivery of project benefits have been identified.*

Statkraft monitors internal payment records to ensure that fees are paid to landowners as set out in the agreement with landowners on access roads maintenance.

Statkraft cannot undertake any monitoring to assess if taxes paid to the municipality have been used to deliver project benefits to affected-communities, as the choice of the municipality's expenditure is a matter for the municipality and their electorate. Information on the municipality's income and expenditure is publicly available however.

NVE is responsible for monitoring compliance with the commitments set out in the license, and visual evidence and interviews with local communities show that commitments have been delivered. The Luster Municipality annual report (2011) provides a synopsis of the business development fund expenditure.

On-going or emerging issues relating to delivery of commitments are identified through on-going communications with Luster Municipality, and NVE and queries raised by the local community.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging issues relating to project benefits takes into account both risks and opportunities.*

The identification of emerging issues relating to project benefits takes into account both risks and opportunities. An example of a risk taken into account is the risk to one of the best spawning areas in the Jostedal river created by the potential removal of sediments at Alsmo, which required to meet flood control commitments. Statkraft is currently liaising with the authorities to address this issue (see topic O-16).

The Statkraft's regional communications department identifies opportunities to promote and get feedback on project benefits through the local media (e.g. articles in the local newspaper Sogn Avis) and guided tours for tourism businesses and schools at the visitors centre. Monitoring of Statkraft's sponsorships programme (see 'Management') by the regional communications department is an additional means of identifying emerging issues and opportunities..

Criteria met: Yes

8.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to deliver commitments to project benefits, and to manage any identified issues relating to these commitments; and commitments to project benefits are publicly disclosed.*

Measures are in place to deliver commitments and manage any identified issues. Measures to deliver these commitments include:

- Statkraft Power Generation group processes to ensure the fees set out in the licence (e.g. business development fund, fees for flood control and improving fishing conditions) and taxes are paid to Luster Municipality following the "statute for licensing and authorising the business fund". The state also transfers revenues between municipalities (except in the case of the property tax). Luster municipality have the responsibility to invest tax revenues in projects of interest for the local communities as a benefit sharing strategy, and have their own decision-making processes. Jostedal contributes about 20-30 million NOK out of a total budget of 450 million NOK. An interview with Luster municipality representatives indicated that commitments to pay taxes and other additional fees related to project benefits have been delivered as stated in the licence;
- Statkraft's Regional maintenance department processes/measures to ensure that the road is cleared and maintained. Decisions to clear the road are taken internally around June-early July;
- Statkraft Power Generation group processes to ensure the fees set out in the licence for scientific research are paid to the Ministry of Culture and Science; and access roads maintenance fees are paid to landowners; and.

- Meetings with relevant stakeholders to discuss specific issues (e.g. a minuted-meeting took place in March 2012 to discuss the sedimentation issues at Alsmo between Statkraft, the landowner and Luster Municipality).

Commitments to project benefits are publicly disclosed. The licence to operate Jostedal is publicly available on the NVE website. Most external stakeholders interviewed indicated that they were aware of the license commitments.

Interviews with Luster Municipality representatives indicated that all projects funded with the revenues from Jostedal are approved by the councillors and all cases are public. Inclusion of a synopsis on the business development fund in Luster Municipality's annual report is another means of disclosure.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to risks and opportunities.*

Processes in place at PG level take into account potential financial control risks as set out in the Investment Strategy 2012.

On-going discussions with Luster municipality and NVE provide a process to anticipate and respond to risks and opportunities in relation with the delivery of project benefits. Commitments made in the licence are revised periodically and new conditions will be subject to a separate agreement. The business development fund can be used to address any emerging risks and opportunities.

In addition, Statkraft's regional sponsorships programme, monitored by the regional communications manager, can be used to anticipate and respond to opportunities to deliver further benefits to the local community. The plan was prepared through regional leader group discussions, and sponsored activities have been disclosed in Sogn Avis.

Criteria met: Yes

8.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage project benefits have been and are on track to be met with no significant non-compliances or non-conformances, and commitments have been or are on track to be met.*

Processes in place to manage project benefits are listed in the management section above. There is no evidence of significant non-compliances or non-conformances in relation to their implementation and commitments are on track to be met.

Objectives in place to manage project benefits are set out in the following documents:

- The license to operate Jostedal (1984);
- Norwegian tax regulations;
- The regional communications plan (2011);
- The regional sponsorship plan (2012); and
- Statkraft's group policy for communication and brands (2011).

Objectives are on track to be met with no evidence of significant non-compliances or non-conformances.

Statkraft have the responsibility to meet the objectives set out in the licence to manage project benefits and pay the taxes as required by the regulations. Luster Municipality is responsible for investing the revenue funds in local community projects. Interviews with Luster Municipality and NVE representatives indicated that Statkraft have met all objectives under their responsibility.

The Regional Communications plan (2011) states that “sponsorship and financial support should always follow the group's sponsorship strategy and achieve adequate geographical coverage”. This objective has been met. The annual regional sponsorship plan (2012) outlines the sponsorships planned and budget allocated for each municipality in the region, including Luster.

Statkraft's group policy for communication and brands (2011) indicates that “sponsorship is used to promote visibility, establish and cultivate relations and build positive associations with the Statkraft brand”. This objective has been met (see Outcomes concerning sponsorship of the local sports club).

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There is no evidence of any non-compliances or non-conformances in relation to the processes and objectives in place to manage project benefits.

Criteria met: Yes

8.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Communities directly affected by the development of the hydropower facility and any other identified beneficiary of the facility have received or are on track to receive benefits.*

Directly-affected communities and beneficiaries of the development of the Jostedal plant are: Jostedal permanent residents and summerhouse owners; the Local Regional Society; tourist businesses (e.g. Icetroll, glacier guides); landowner associations (e.g. Jostedalen, Gaupne and Røneid associations); hunting and fishing associations; Luster Municipality and Sogn og Fjordane County Council.

Directly-affected communities' representatives interviewed indicated that the development of the plant has delivered the following benefits:

- Additional expenditure of the local authorities on public services, for example the municipality has built a community centre as part of an agreement made during the licensing process;
- Support to businesses and employment through the business development fund (Næringsfond) to grant loans for commercial investments such as buildings, machinery, equipment and new enterprises.;
- Flood control (major flood events have not occurred since 1979, and all interviewees considered flood control as a significant benefit); and
- Benefits to tourist businesses and fishing and hunting organisations from improved accesses to areas with good conditions for fishing, hunting, and leisure activities.

This is not to say that issues do not arise with the delivery of these benefits. Some of the stakeholders interviewed were critical of Statkraft's effectiveness at benefit-sharing with the local community and sponsorships; for example some stakeholders interviewed indicated that smaller sums of money addressing local initiatives would be more effective to address local community concerns in all areas in the valley, and the municipality; and that the sponsored sports centre is located far away in the valley, and it is not enough for the community. In addition, tourism businesses would like to see the access road to Styggevatnet cleared according to a fixed date, and there have been delays to resolving the sedimentation and flooding issue at Alsmo. These issues are addressed under other topics.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, benefits are significant and sustained for communities affected by the project.*

The benefits delivered to date will remain in place for affected communities. Most of the affected communities’ representatives interviewed consider the benefits to have a significant value, in particular flood control. Tax revenues and investments in local community projects will also be a continuous benefit.

Some interviewees, including Luster Municipality representatives, indicated that these benefits attract people to live in the area. However others in the community call for more localised, small-scale distribution of benefits.

A competition run by the Norwegian newspaper “Dagens Næringsliv” in 2009 to evaluate “the best place to live in Norway” concluded that Luster municipality was the best place to live in Norway. This competition ranked 29 Norwegian municipalities following three main criteria of the standard of living, the social conditions, and services provision. Some of the interviewees felt that this was only possible with the revenues of the hydropower plants in the region, including Jostedal.

In addition, Statkraft’s regional sponsorship program has committed to funding to the local sports club (Idrettslaget Bjørn) for the next 3 years (2012-2014; 150,000 NOK in 2011-2012). Feedback from Luster municipality, and most of the local community representatives, on sponsorships carried out in the region to date is positive. Local communities would like to see an increase in the sponsorships budget in the region.

Criteria met: Yes

8.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

8.3 Scoring Summary

There are well-documented commitments to additional benefits and benefit sharing strategies made during the development of Jostedal as set out in the operational licence (1984) and benefit-sharing strategies established by the Norwegian tax system. As a result of those commitments, the project has provided: improved and maintained access roads, flood control, payment of a business development fund to Luster Municipality, and payment of fees to Luster Municipality to improve the fishing conditions and scientific research in Luster. In addition, Luster municipality invests tax revenues in projects of interest for the local communities as a benefit sharing strategy. Jostedal contributes about 20-30m NOK out of a total budget of 450m NOK. Statkraft also runs a regional sponsorship program, which contributes to fund the local sports club in Luster. Commitments to project benefits have been publicly disclosed on the NVE website and in the local press.

Topic Score: 5

8.4 Relevant Evidence

Interview:	1, 2, 7, 9, 10, 12, 13, 14, 15, 31
Document:	1, 2, 10, 11, 53, 65, 67, 96, 97, 99, 105 106, 118, 119, 126, 127, 128, 132, 133
Photo:	20, 21, 22, 23, 24, 25

9 Project-Affected Communities and Livelihoods

(O-9)

This topic addresses how impacts of development of the hydropower facility on project affected communities have been addressed, in cases where these commitments are well-documented against a pre-project baseline. The intent is that livelihoods and living standards impacted by the project have been improved relative to pre-project conditions for project affected communities with the aim of self-sufficiency in the long-term, and that commitments to project affected communities have been fully fulfilled. In the case of older projects where there is an absence of well-documented commitments to project-affected communities made at the time of project approval or an absence of data on the pre-project baseline against which to compare post-project, this topic is not relevant; in this case, issues in relation to project affected communities should be taken into consideration under topic O-3 Environmental & Social Issues Management.

9.1 Background Information

This topic focuses on community groups adversely affected by the project's development and operation. There are well-documented commitments to project-affected communities made during development of Jostedal, and therefore this topic is relevant.

Communities adversely affected by the Jostedal project are difficult to identify; adverse effects are minor and only the following groups have been affected during the development and operation of the plant: landowners, hunters, fishermen and tourism businesses.

Commitments to project-affected communities made at the time of the approval are documented in the license to operate Jostedal (1984) and in Court of Appeal Provisions, concerning fishing conditions, and compensation for the loss of water rights, waterfall rights, land use and damage to land (hereafter referred to as 'loss of rights and damages'). The Court of Appeal required that a number of landowners should be compensated with a one-off payment and 55 landowners will be compensated on an annual basis; this topic addresses commitments made by the court of appeal on economic compensation of affected landowners.

Commitments made to improve fishing conditions in the Jostedal river are addressed in topic O-15 Biodiversity & Invasive Species. Commitments made to improve and maintain access roads are considered project benefits to hunters and tourism business; those commitments and issues are addressed in topic O-8 Project Benefits. Other on-going social issues not related to documented commitments have been addressed in topic O-3 Environmental and Social Issues Management.

The main economic activities in the Jostedal valley comprise farming, hunting, fishing, tourism and outdoor activities (e.g. winter sports, kayaking and glacier tours). Findings on whether the livelihoods and living standards impacted by the project have been improved are mainly based on oral evidence provided by project-affected communities representatives interviewed.

9.2 Detailed Topic Evaluation

9.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Monitoring is being undertaken to assess if commitments to project affected communities have been delivered and if management measures are effective; and ongoing or emerging issues that affect project affected communities have been identified.*

Statkraft monitors internal payment records to ensure that fees paid to landowners as set out in the court of appeal.

There are no on-going issues associated with the delivery of commitments set out in the court of appeal. On-going or emerging issues in relation to the commitments made to project-affected communities are identified through a reactive process of communication (i.e. affected-communities contact Statkraft to communicate issues of concern).

Criteria met: Yes

Analysis against proven best practice

Scoring statement: In addition, identification of ongoing or emerging issues for project affected communities takes into consideration both risks and opportunities, and interrelationships amongst issues.

Since there are no on-going or emerging issues in relation to compensation of landowners for the loss of rights and damages, this scoring statement is not relevant.

Criteria met: Yes

9.2.2 Management

Analysis against basic good practice

Scoring statement: Measures are in place to deliver commitments to project affected communities, and to manage any identified issues relating to these commitments; and if there are any formal agreements with project affected communities these are publicly disclosed.

Measures in place to deliver compensation fees to landowners affected by the loss of rights and damages are driven by the Statkraft Power Generation group processes to ensure the payment of agreed annual fees.

Potential issues will be managed through the reactive communication process and grievance mechanism described in the management findings in topics O-1 Communications and Consultations.

Commitments to affected landowners are publicly disclosed. The court of appeal is available at the Lovdata website. Most external stakeholders interviewed indicated that they were aware of the license commitments and compensations provided to landowners affected by the loss of rights and damages.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: In addition, processes are in place to anticipate and respond to risks and opportunities.

Processes in place at PG level take into account potential financial control risks as set out in the Investment Strategy 2012. Other processes to respond to potential emerging risks and opportunities include:

- Meetings and on-going communications with Luster municipality and NVE.
- The Business Development Fund and Sponsorships could be used to address any emerging opportunities.

Criteria met: Yes

9.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: Ongoing processes are in place for project affected communities to raise issues and get feedback.

On-going processes are in place for project-affected communities to raise issues and get feedback. All project-affected communities representatives interviewed knew how to approach Statkraft if they had any queries of

concern. Most of them would contact the Jostedal plant manager or the regional communications manager through a phone call. Feedback on issues raised is usually provided by telephone or letters.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, feedback on how issues raised are taken into consideration is thorough and timely, and project affected communities have been involved in decision-making around relevant issues and options.*

There is no evidence of issues raised in relation to landowners' compensation for the loss of rights and damages.

Consultation events undertaken for western creeks proposal involved potentially affected landowners as part of the decision-making and licensing negotiation process. Most of the project-affected communities interviewed felt that feedback on issues specifically related to the western creeks proposal was provided in a thorough and timely manner.

There are concerns with the timeliness of feedback on some issues. This is addressed under O-3.

Criteria met: Yes

9.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage delivery of commitments to project affected communities have been and are on track to be met with no significant non-compliances or non-conformances, and commitments have been or are on track to be met.*

Processes in place to manage delivery of commitments to project-affected communities are described in the management section above.

The objective of those processes is to provide annual compensation fees to affected landowners as set out in the Court of Appeal (1986).

There is no evidence of significant non-compliances or non-conformances and objectives have been met. Interviews with landowners and NVE representatives indicated that Statkraft have met all commitments.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There is no evidence of no non-compliances or non-conformances in relation to the processes and objectives in place to deliver compensation fees to affected landowners.

Criteria met: Yes

9.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *Livelihoods and living standards impacted by the project have been or are on track to be improved; and economic displacement has been fairly compensated, preferably through provision of comparable goods, property or services.*

Livelihoods affected by the the loss of rights and damages to land have been fairly compensated through one-off compensation or the payment of annual compensation as indicated in the Court of Appeal decisions (one

example from 1986 was seen as evidence). In 2011, a total sum over 400,000 NOK was paid in compensation fees to affected landowners.

All interviewees indicated that livelihoods and living standards of affected landowners have improved.

In addition, the business development fund and revenue funds raised by Luster municipality provide additional benefits that are available for affected-landowners (e.g. community centre) and contribute to improve their living standards (see O-8).

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, the measures put in place to improve livelihoods and living standards are on track to become self-sustaining in the long-term.*

The measures put in place to compensate landowners on an annual basis for the loss of rights and damages will remain in place. Livelihoods and living standards of affected landowners are self-sustaining in the long-term.

Some of the interviewed project-affected communities indicated that those landowners receiving on-going compensation have better improved their livelihoods compared to those who received one-off payment compensation. This difference in livelihoods improvement is not a significant gap; both types of compensation together with additional project benefits contribute to self-sustaining improved livelihoods in the long-term.

Project benefits such as flood control and tax revenues invested in community projects will also contribute to improve livelihoods and living standards in the long-term (see topic O-8 Project Benefits).

Criteria met: Yes

9.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

9.3 Scoring Summary

Economic compensation commitments to project-affected communities made at the time of the approval are documented in the Court of Appeal Provisions to compensate affected landowners. Through the provisions of the appeal a number of landowners were compensated with a one-off payment and 55 landowners are compensated on an annual basis. The compensation fees paid on a one-off payment and on an annual basis have satisfactorily compensated landowners. There are no on-going issues in relation to economic displacement compensation; and the commitments are publicly available on the NVE website.

Compensation payments and project benefits have improved livelihoods and living standards of affected landowners, and this will continue in the long-term. The Jostedal project has achieved proven best practice for project-affected communities with no significant gaps, resulting in a score of 5.

Topic Score: 5

9.4 Relevant Evidence

Interview:	1, 2, 7, 8, 9, 10, 12, 13, 14, 15, 16, 31, 32
Document:	1, 2, 53, 65, 67, 71, 127
Photo:	9, 23, 25, 31, 35, 36, 37

10 Resettlement (O-10)

This topic addresses how physical displacement arising from development of the hydropower facility has been addressed, in cases where resettlement occurred and commitments are well-documented against a pre-project baseline. The intent is that the dignity and human rights of those physically displaced have been respected; that these matters have been dealt with in a fair and equitable manner; that livelihoods and standards of living for resettles and host communities have been improved; and that commitments made to resettles and host communities have been fully fulfilled. In the case of older projects where there is an absence of well-documented commitments in relation to resettlement made at the time of project approval or an absence of data on the pre-project baseline against which to compare post-project, this topic is not relevant; in this case, issues in relation to resettlement should be taken into consideration under topic O-3 Environmental & Social Issues Management.

This topic is Not Relevant to Jostedal. The development of Jostedal did not require physical displacement.

11 Indigenous Peoples (O-11)

This topic addresses the rights, risks and opportunities of indigenous peoples with respect to the hydropower facility, recognising that as social groups with identities distinct from dominant groups in national societies, they are often the most marginalized and vulnerable segments of the population. The intent is that the operating facility respects the dignity, human rights, aspirations, culture, lands, knowledge, practices and natural resource-based livelihoods of indigenous peoples in an ongoing manner throughout the project life.

This topic is Not Relevant to Jostedal. There are no community groups in the project area that meet the definition of Indigenous Peoples.

12 Labour and Working Conditions (O-12)

This topic addresses labour and working conditions, including employee and contractor opportunity, equity, diversity, health and safety. The intent is that workers are treated fairly and protected.

12.1 Background Information

Stakraft operates within a complex regulatory environment with a strong focus on labour issues and working conditions.

12.2 Detailed Topic Evaluation

12.2.1 Assessment

Analysis against basic good practice

Scoring statement: *A periodically updated assessment has been undertaken of human resource and labour management requirements for the operating facility, including occupational health and safety (OH&S) issues, risks, and management measures, with no significant gaps; monitoring is being undertaken to assess if management measures are effective; and ongoing or emerging labour management issues have been identified.*

Labour management at Jostedal falls under the guidance of Group level policy, with a matrix system including regional level support to functional groups. Human resource and labour management requirements are assessed and monitored according to the management structure and performance reviews at the project level. There is also an annual employee survey at group level, where all employees are surveyed, for issues to be raised, and this is analysed at the facility level.

Regular meetings between employee representatives and Statkraft take place across the management levels (from group level broad issues to meetings within AMU at a regional level).

Occupational Health and Safety (OH&S) risks throughout the group are assessed through the SAP system, and inputs into Emendo, which captures incidents at all sites including Jostedal, as well as meetings between labour representatives, safety officers and management.

The system is comprehensive and, and identifies labour management issues in a systematic manner.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging labour management issues takes broad considerations into account, and both risks and opportunities.*

Broad issues are identified at a corporate level. Statkraft is a signatory to the UN Global Compact, and there is demonstrated focus at Corporate HR level on involvement in human and labour rights issues at an international level, to the extent that Statkraft is represented in a working group within Norway to consider these issues and their application. A further example of broad considerations includes reference to gender representation, both in employee numbers and at board level.

Corporate-level negotiations with labour unions address issues at this level, and they are fed down through the organisational power group HR representatives, and so into the operational matrix system.

Criteria met: Yes

12.2.2 Management

Analysis against basic good practice

Scoring statement: *Human resource and labour management policies, plans and processes are in place to address all labour management planning components, including those of contractors, subcontractors, and intermediaries, with no significant gaps.*

Internal policies address all labour management planning components, from collective bargaining with Unions at the corporate level, through to representation at powerplant level to address individual and directly relevant issues within the powerplants themselves, with regular scheduled meetings between labour representatives and management. Union representation extends through three levels within the Group, with broader issues and collective bargaining at Group level.

Processes and procedures are provided on the intranet, with specific HR resources also available. These procedures are comprehensive and include induction processes, guidelines for employees and new leaders, salaries, employee manuals and general HR and labour management policy and procedures. Each staff member uses a competency web, which manages individual evaluation processes, training needs and individual competencies.

The annual employee survey extends beyond information provision to a management system for identifying manager / employee level issues on an annual basis, as well as the ability to add new issues to the survey for the following year.

Contractors (including subcontractors and intermediaries) are bound by the Suppliers' Code of Conduct with specific reference to labour rights and standards, and health, safety and security. Management processes (including pre-qualification through Selhica) are in place to ensure that contractors are in compliance with national regulations.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The processes referred to under the Assessment criteria apply to this criteria. Management processes at corporate level, both through participation at this level in leading international fora and working groups, and through engagement with unions, anticipate and respond to emerging risks and opportunities. Examples of responses to risks and opportunities include engaging Transparency International to vet policy documents and engaging in regional and national forums and workshops that include broad stakeholder groups (including international NGO groups) to understand emerging issues. Interviewees spoke of the incorporation of these discussions into internal policy discussions.

Criteria met: Yes

12.2.3 Stakeholder Engagement

Analysis against basic good practice

Scoring statement: *Ongoing processes are in place for employees and contractors to raise human resources and labour management issues and get feedback.*

Stakeholder engagement is comprehensive throughout the group. Unions provide representation across all levels, including regionally (through AMU, an employer / employee forum) and at the powerplant group level. The annual survey is a proactive tool with evidence of management reaction to outcomes, which are measured down to powerplant group level. Emendo captures issues of concern, in particular around HSE, but also other

issues relevant to working conditions, such as ethical behaviour (and other issues addressed under other topics). Individual employees engage through the competence web on an individual level.

Contractor relationships, including with subcontractors and labour, receive significant attention within Statkraft, with evidence of intervention at sub-contractor level through the presence of Statkraft staff at sites. Contractor relationships are also managed on an ongoing basis through two-way discussions on specific issues relating to individual jobs. With regard to Jostedal in particular, it is also clear that contractors are all based in Norway and subject both to the same regulations as Statkraft, and the Supplier Code of Conduct.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, feedback on how issues raised have been taken into consideration has been thorough and timely.*

Interviews amongst staff, union representatives and management i confirmed that issues raised are addressed in a thorough and timely manner.

Criteria met: Yes

12.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives relating to human resource and labour management have been and are on track to be met with no major non-compliances or non-conformances, and any labour related commitments have been or are on track to be met.*

Statkraft operates within a sophisticated and internationally-engaged legal regime. Internal policies mirror this, and there was clear evidence given that these issues are well managed, with commitments on track to be met, or having been met. There was no evidence of non-compliance with any regulations from interviewees that included employees, unions and management.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-conformances or non-compliances.

Criteria met: Yes

12.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *There are no identified inconsistencies of labour management policies, plans and practices with internationally recognised labour rights.*

Plans, policies and practises reflect and are consistent with internationally-recognised labour rights. Statkraft is a signatory to the UN Global Compact, and interviews highlight Statkraft's role in engaging with stakeholders within Norway to ensure compliance with international standards for labour rights. There were no identified inconsistencies.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: In addition, labour management policies, plans and practices are demonstrated to be consistent with internationally recognised labour rights.

Management plans were demonstrated to be consistent with internationally recognised labour rights. This is reflected in Statkraft participation as a member in the UN Global Compact working group within Norway, compliance with internationally-recognised anti-bribery legislation, and inclusion of internationally-accepted Worker Rights provisions in the Code of Conduct, as examples provided in interviews. In addition, this project is fully legally compliant in a jurisdiction that has put into force relevant international conventions.²

Criteria met: Yes

12.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

There are no significant gaps against proven best practice.

0 significant gaps

12.3 Scoring Summary

Statkraft operates within a stringent regulatory environment on labour and workforce management issues. It has also demonstrated that it is proactive in its exploration of world leading standards and principles when dealing with these aspects of its management, including in relation to its contractors.

Topic Score: 5

12.4 Relevant Evidence

Interview:	1, 2, 4, 5, 17, 23, 24, 26, 27, 29
Document:	1,2,16,17,41,67,81
Photo:	None

² Norway has put into force all of the ILO ‘fundamental’ conventions and UN conventions referred to in the IFC Performance Standard on Working Conditions, with the exception of the UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families.

13 Cultural Heritage (O-13)

This topic addresses cultural heritage, with specific reference to physical cultural resources, associated with the hydropower facility. The intent is that physical cultural resources are identified, their importance is understood, and measures are in place to address those identified to be of high importance.

13.1 Background Information

Jostedal is located in an area that has been populated over centuries and had a strong link to the mountains, fishing and hunting, mountain summer farms and transport routes between eastern and western Norway. It is located within important cultural landscape features (e.g. Breheimen National Park, Jostedalsbreen National Park, Nigardsbreen Nature reserve and Vigdalen landscape area).

Breheimen National Park in particular was a habitable area for people living by hunting from 7,000 BC and therefore traces of old wild reindeer hunting and trapping systems are of cultural heritage interest. Sites dating from prior to AD 1537 must be protected as cultural heritage by the Norwegian law. There are two reindeer traps within the project area.

There are also many mountain summer farms and buildings in the region that form part of special cultural landscapes representing the old traditional farming systems and seasonal grazing migration patterns from low to high altitudes. Some of the old farm buildings within the project area are still in use and others are now used as summer cabins.

The Fåbergstølsgrandane is the largest remaining active sandur in Norway and Europe mainland. Fåbergstølsgrandane together with the glaciers are an important areas from a scientific perspective to understand how the landscape features were formed at the end of the last Ice Age 10,000 years ago.

There are no impacts on cultural heritage caused by the operation of the Jostedal project.

13.2 Detailed Topic Evaluation

13.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging cultural heritage issues with respect to physical cultural resources have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.*

There are no on-going or emerging cultural heritage issues with respect to physical cultural resources. Interviews with NVE, the Country Governor, and local community representatives indicated that there are no on-going or emerging issues with respect to physical cultural heritage resources.

An assessment of existing cultural heritage resources was undertaken prior to construction, and existing resources identified should be considered prior carrying out maintenance works to meet the requirements of the licence to operate.

Statkraft have no responsibilities to manage identified cultural heritage features. Sogn og Fjordane County Council would notify Statkraft if there are any issues of concern identified during routine inspections of cultural heritage features (e.g. ancient reindeer traps). The Council also undertakes inspections prior to granting /renewing permits associated with maintenance works (e.g. the permit for accessing the intakes via helicopter was renewed in 2010).

Existing physical cultural resources identified prior to construction are described in (i) a report produced by the University of Bergen (1985) to present the results of archaeological investigations; and (ii) a resolution of Sogn og Fjordane County Council (1985) which concludes that the development will have minor impacts on cultural heritage and therefore they have no reason to oppose to the development plans.

Measures established at the time of construction to avoid impacts on identified features were effective. Visual evidence shows the status of those resources.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging cultural heritage issues takes broad considerations into account, and both risks and opportunities.*

This scoring statement is not relevant because there are no on-going or emerging issues in relation to cultural heritage.

Criteria met: Yes

13.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to manage identified cultural heritage issues.*

There are no identified cultural heritage issues that require ongoing management and therefore this scoring statement is not relevant. Processes to manage emerging risks are discussed under Proven Best Practice below.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

Interviews with the regional environmental coordinator indicated that future maintenance works should follow the processes listed below to ensure that cultural heritage requirements set out in the licence to operate are met. These processes will be used to anticipate and respond to emerging risks associated with future maintenance works:

- For small-scale works a risk analysis will be undertaken;
- For large-scale works the risk analysis will be followed by the preparation of an environmental programme for projects using the management system document template H-10/150;
- If works are undertaken outside the area where archaeological investigations were undertaken, further investigations will be carried out prior commencement of works;
- Agreements with contractors undertaking the works will require that works should be halted if unknown features are encountered and relevant authorities shall be notified.

There is no evidence of processes to anticipate and respond to emerging opportunities. This is not considered a significant gap against proven best practice, since Statkraft is not responsible for the maintenance or monitoring of existing cultural heritage features. (The lack of processes to anticipate and respond to opportunities has been addressed further in topic O-3).

Criteria met: Yes

13.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage cultural heritage issues have been and are on track to be met with no significant non-compliances or non-conformances, and cultural heritage related commitments have been or are on track to be met.*

Objectives and commitments set out in the licence with regard to cultural heritage (clause 13) are met and are on track to be met through process in place to anticipate and respond to risks. Interviews with NVE representatives indicated that there are no non-conformances or non-compliances with respect to the commitments set out in the license.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

No evidence of non-conformances or non-compliances has been found.

Criteria met: Yes

13.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Negative cultural heritage impacts arising from activities of the operating hydropower facility are avoided, minimised, mitigated and compensated with no significant gaps.*

There are no negative cultural heritage impacts arising from the operation of Jostedal. If processes listed in the management findings section above are in place during future maintenance works, potential impacts will be avoided, minimised, mitigated and compensated.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, where opportunities have been identified, measures to address cultural heritage issues beyond those impacts caused by the facility have been or are on track to be achieved.*

Although there are no impacts caused by the operation of the Jostedal plant, there are some measures that address cultural heritage issues beyond any potential impacts:

- (i) the book *Glacial Streams Hydropower Jostedalen* (Faugli et al, 1998) published by NVE, Statkraft and the University of Bergen, promotes the importance of the cultural landscape in Jostedal.
- (ii) Income from power production is used by Luster municipality to stimulate better care of historical / cultural sites; for example restoring an old farmhouse and supporting the historical association to register buildings of historical interest.

Criteria met: Yes

13.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

13.3 Scoring Summary

There are no issues or impacts on cultural heritage caused by the operation of the Jostedal project. An assessment of existing physical cultural heritage resources was undertaken prior to construction, and those resources should be considered prior to carrying out any future maintenance works. Processes exist to anticipate emerging risks during maintenance works that could affect sites of interest, for example reindeer traps. Licence requirements with regard to cultural heritage have been met and there are non-conformances or non-compliances. The project also contributed to some measures to enhance cultural heritage in the Jostedal valley. The Jostedal project has achieved proven best practice for cultural heritage with no significant gaps, resulting in a score of 5.

Topic Score: 5

13.4 Relevant Evidence

Interview:	6, 16, 26, 29, 31
Document:	1, 2, 53, 82, 83
Photo:	29, 30, 31, 32, 33

14 Public Health (O-14)

This topic addresses public health issues associated with the operating hydropower facility. The intent is that the operating facility has not created or exacerbated any public health issues; that ongoing or emerging public health issues associated with the facility are identified and addressed as required; and commitments to implement measures to address public health are fulfilled.

14.1 Background Information

There are no issues of public health associated with the waters utilised by the Jostedal project or its operations, and the capacity of the public health system in the area is high.

14.2 Detailed Topic Evaluation

14.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging public health issues associated with the operating hydropower facility have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.*

There are no significant issues of public health associated with the Jostedal plant, and no ongoing or emerging public health issues associated with Jostedal's operation have been identified. The local municipality's health department monitors drinking water quality parameters.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging public health issues takes into account public health system capacities, access to health services, and health needs, risks and opportunities for different community groups.*

The Protocol scoring statement requirements for this criterion (local public health system capacities and the specific requirements of different community groups) are not relevant in this context, where there are no significant public health concerns and the public health system capacity is high.

Criteria met: Yes

14.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to manage identified public health issues.*

No issues have been identified and no management measures specific to public health are required. The public health system is in place to respond to any issues identified by the municipality health department's monitoring and by the doctor employed by the county administration.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The public health system and Statkraft’s environmental management system are in place to respond to emerging risks for public health. Note that public safety and the issues of the quarry are dealt with in O-3 and O-18.

Criteria met: Yes

14.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: Processes and objectives in place to manage public health issues have been and are on track to be met with no significant non-compliances or non-conformances, and public health related commitments have been or are on track to be met.

No specific commitments are required, and there are no non-compliances with regulatory requirements.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: In addition, there are no non-compliances or non-conformances.

There are no non-compliances or non-conformances.

Criteria met: Yes

14.2.4 Outcomes

Analysis against basic good practice

Scoring statement: Negative public health impacts arising from activities of the operating hydropower facility are avoided, minimised and mitigated with no significant gaps.

There are no negative public health impacts arising from the project’s operations. Interviewees reported that the drinking water in Jostedal has been found to be the third best in quality in Norway.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: In addition, where opportunities have been identified, measures to address public health issues beyond those impacts caused by the operating hydropower facility have been or are on track to be achieved.

Although not identified as an opportunity for public health, the project contributes to a positive benefit for public health through its support to the community centre in Jostedal which provides a heated swimming pool, sports facilities and a children’s playground. The centre is financed by the municipality’s revolving fund (see O-8). In addition, the Jostedal project’s role in the prevention of damaging floods has a direct positive benefit for public safety and well-being.

Criteria met: Yes

14.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

Basic good practice criteria are fully met with no significant gaps.

0 significant gaps

Analysis of significant gaps against proven best practice

Proven best practice criteria are fully met with no significant gaps.

0 significant gaps

14.3 Scoring Summary

This topic is not of high relevance to the Jostedal plant, which operates in waters with no public health issues, and in an area where the public health system capacity is high. The plant's overall management of environmental hazards avoids any impact on public health, and the plant makes a positive contribution to public health through flood prevention and through support to the leisure and fitness facilities at the community centre.

Topic Score: 5

14.4 Relevant Evidence

Interview:	5, 12, 13, 14, 15, 20, 21, 32
Document:	None
Photo:	None

15 Biodiversity and Invasive Species (O-15)

This topic addresses ecosystem values, habitat and specific issues such as threatened species and fish passage in the catchment, reservoir and downstream areas, as well as potential impacts arising from pest and invasive species associated with the operating hydropower facility. The intent is that there are healthy, functional and viable aquatic and terrestrial ecosystems in the area that are sustainable over the long-term; that biodiversity impacts arising from the operating hydropower facility are managed responsibly; that ongoing or emerging biodiversity issues are identified and addressed as required; and that commitments to implement biodiversity and invasive species measures are fulfilled.

15.1 Background Information

Jostedalen lies in an area of high natural beauty and scientific interest, but there are no threatened species or critical habitats that are affected by the operation of the Jostedal project. Invasive species are not a significant issue in Jostedalen, and the development of Jostedal has had no or limited effects on their distribution.

The main biodiversity issue concerns fish species of interest to recreational fishermen, particularly the sea trout and the brown trout, which are respectively sea-migrating and lacustrine forms of the same species *Salmo trutta*, and also Salmon. The river has long been managed to enhance fishing (for example a waterfall at Langøyane was altered to allow upward migration in 1957).

Prior to the construction of the Jostedal project, discharges from the Leirdøla plant to the Jostedøla River limited migration of sea trout, due to the cold temperatures of the water originating from the nearby Jostedalsbreen glacier. This impact has been avoided since a tunnel was built from the Leirdøla plant to Jostedal's tunnel, at the time of the construction of the Jostedal project. This allowed migration in Jostedøla to resume.

Ninety-two bird species and four hundred and thirty species of vascular plants can be found in the area, in addition to a range of mammals including moose ((*Alces alces*), bears, and reindeer. There is high habitat diversity due to glacial retreat, varying altitude and the tree-line. These include deciduous woodland (mainly grey alder, birch and aspen), grasslands, heaths, bogs, and areas exposed by the retreating glaciers. A number of national parks and reserves have been established for the recreational and scientific interest of these areas. These are: Jostdalsbreen National Park, Nigardsbreen Nature Reserve, Breheimen National Park, and the Vigdalen Landscape Area. The Fåbergstølsgrandane sandur lies downstream of Styggevatn and is the largest sandur in mainland Europe.

Environmental Impact Assessment studies during the preparation of the Jostedal project found 5 non-biting midge (chironomid) species that were new to science in the Vivatjønni pond near to Styggevatn (the genus was named *Vivacricotopus* after the pond).

15.2 Detailed Topic Evaluation

15.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging biodiversity issues have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.*

There is no process in place to identify ongoing or emerging issues for biodiversity, but issues related to fish have been identified through Statkraft's ongoing discussions with local fishing associations and with the Directorate of Nature. These issues are: the passage, growth and survival of sea trout, brown trout and salmon;

the potential impact of the proposed tapping of western tributaries on fish populations; and brown trout populations in Vivatjønni.

A specific issue that emerged following the construction of the project was Statkraft's use of non-native plant species for the restoration of a spoil area.

No other issues have emerged or been raised by stakeholders or the Directorate of Nature concerning any other aspects of biodiversity. The blocking of reindeer migration routes by the Styggevatn reservoir has not emerged as an issue as was feared at the time of the project's development. Stakeholders have raised concerns with the absence of flows below the intake in Vigdalen, but this has been raised because of the absence of a 'natural fence' for managing sheep movements rather than as a concern for biodiversity in the Vigdalen Landscape Area.

Statkraft, with the involvement of the local fishing association in some cases, have commissioned NINA and LFI Bergen to carry out extensive assessment and monitoring of sea trout migration and spawning, and juvenile growth and density measurements.

The impacts of the construction of Jostedal were subject to detailed academic research, specifically on changes in temperature and hydrology, as a requirement of the NVE license. This concluded that temperature changes in the river system resulting from Jostedal's operation have not resulted in deteriorating conditions for fish, the river is very cold even in its natural state, and the closure of stream intakes in July and August to supply warmer water for migration / spawning is not required.

Monitoring has been carried out as follows over 2000 to 2010: electro-fishing surveys at 10 locations in the main river, three times annually; monitoring of the survival of translocated eggs; counting of spawning fish through visual surveys by snorkel; and collection of fish scales. This has been carried out by the Laboratory of Freshwater Ecology and Inland Fisheries of the University of Bergen. Monitoring of adults and juvenile populations was carried out by the Norwegian Institute for Nature Research over 1986-92.

It is not clear whether or how the potential impact on fish of the proposal to construct western intakes was assessed. Informants interviewed during this assessment argued tapping the western tributaries would be catastrophic for fish populations, so we assume that this was an issue brought forward by stakeholders during the hearing on this proposal.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging biodiversity issues takes into account both risks and opportunities.*

Identification of ongoing or emerging issues is focused entirely on fish, and then mainly on sea trout. Risks and opportunities for other elements of biodiversity are not assessed. Examples might include: risks to biodiversity in Vivatjønni that may be affected by lowering water levels; and the risk that wild reindeer repopulating the northern area of the valley (as a result of concerted effort from the County Council) will be deterred if the roads are opened earlier than the end of May. The absence of an assessment that identifies issues, risks and opportunities for biodiversity other than salmonid fish is a significant gap against proven best practice (the same gap as for 'Management').

Criteria met: Yes

15.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to manage identified biodiversity issues.*

Measures are in place to address the issues identified, listed under 'Assessment' above.

Detailed measures are in place to address the passage, growth and survival of trout and salmon. These include: the construction and maintenance of fish passages in three locations (Langøyhjelet, Haukåsgjelet and Fossøygjelet); the creation and maintenance of spawning areas, including the creation of a spawning creek; and the planting of fertilised fish eggs.

There is considerable debate amongst stakeholders, including fishermen, farmers, fish experts and the authorities on the measures required, their effectiveness, and the effectiveness of maintenance (for example, some stakeholders argue that fish passages were not constructed properly and are not maintained, and that it is the length of the season of their effectiveness that is the concern). It is acknowledged amongst these stakeholders that putting in place effective measures to support sea trout populations, and maintaining them, is difficult, and it is accepted that more investigations will be required before further work. In addition, maintaining spawning areas is in conflict with the need to remove sedimentation to reduce flooding at Alsmo (see O-16). The fishermen's priorities are to: increase juvenile survival in creeks by avoiding the drying out of creeks; the effectiveness of the spawning creek; and the issues with sedimentation at Alsmo and Myklamyr.

Measures in place to preserve the brown trout population in Vivatjønni are the two thresholds built at the time of the tapping of the creek above Vivatjønni to prevent the lowering of the pond. As described under O-19, there are steps being considered to prevent the further lowering of the water in this pond, although progress is slow and some stakeholders have lodged formal complaints on the delay in these measures. This is a gap, but is not considered significant for biodiversity at this stage.

A specific issue that emerged following construction of the tributary intakes was Statkraft's use of non-native plant species for the restoration of spoil areas. This was widely practised when the revegetation work was carried out, and the species used are not seen as a big risk by DN, but it is not a recommended method today.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

There are no processes in place to anticipate and respond to emerging risks and opportunities for biodiversity, other than salmonid fish. The absence of a process to identify, anticipate or respond to risks and opportunities for biodiversity is a **significant gap** against proven best practice (the same gap as under 'Assessment').

Criteria met: No

15.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage biodiversity issues have been and are on track to be met with no significant non-compliances or non-conformances, and biodiversity related commitments have been or are on track to be met.*

The license to operate (1984) sets out requirements on wildlife and fishing in general terms, delegating authority to the Directorate of Nature. Statkraft signed an agreement with DN initially in January 2000, and subsequently extended the agreement, regarding measures on fish recovery in the Jostedøla and monitoring. The agreement sets out very basic requirements concerning fish passages, monitoring of fish entering the river from the fjord, and to translocate spawning fish above fish ladders (it also includes reference to a plan made by NVE dated 18.02.1997). Discussions with DN and with the national office of NVE show a strong relationship between Statkraft in Gaupne and these regulators, and no non-compliances can be identified. Biodiversity-related commitments are being met.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

Discussions with NVE and DN indicate there are no non-compliances, and there are no non-conformances with Statkraft objectives.

Criteria met: Yes

15.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Negative biodiversity impacts arising from activities of the operating facility are avoided, minimised, mitigated, and compensated with no significant gaps.*

There are no significant negative impacts on biodiversity arising from the operation of Jostedal project. The findings of LFI analysis of sea trout monitoring data shows that the measures supported by the project are having a positive effect on sea trout recolonisation above Langøyhjelet and that brown trout spawn in the tributaries (although water temperatures will continue to limit salmon colonisation). The negative impact of the loss of water in the tributaries downstream of intakes is compensated by extensive activities to support fish passage and spawning. Although there are risks of biodiversity impacts at Vivatjønni, there is no evidence of any impacts or that they are significant.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are healthy, functional and viable aquatic and terrestrial ecosystems in the area affected by the hydropower facility that are sustained over the long-term; or the facility has contributed or is on track to contribute to addressing biodiversity issues beyond those impacts caused by the operating hydropower facility.*

The Jostedal project has contributed to biodiversity issues beyond the impacts caused by its operation through its activities on fish passage and spawning. The project's operation does not have a negative impact on sea trout through the lowering of water temperatures (as confirmed by detailed studies) but has a minor negative impact due to the loss of flows immediately downstream of the tributary intakes. The project's support to fish passage, spawning, monitoring and studies can therefore be seen as a contribution to addressing a biodiversity issue beyond its own impacts, as it allows recolonisation of the river following the construction of the discharge tunnel to prevent Leirdøla discharging to the river.

Criteria met: Yes

15.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

The absence of a process to identify, anticipate or respond to risks and opportunities for biodiversity.

1 significant gap

15.3 Scoring Summary

Issues concerning sea trout have been identified through the license requirements and Statkraft’s ongoing discussions with local fishing associations and with the Directorate of Nature. Detailed measures are in place to address the passage, growth and survival of sea trout. These measures address biodiversity beyond the impacts of Jostedal as they encourage recolonisation of the river. However, the identification of ongoing or emerging issues is focused entirely on salmonid species, and risks and opportunities for other elements of biodiversity are not assessed. This is a significant gap against proven best practice, resulting in a score of 4.

Topic Score: 4

15.4 Relevant Evidence

Interview:	5, 6, 7, 20, 21, 31, 32
Document:	1, 2a, 2b, 3, 5, 25, 26, 27, 28, 29, 30, 31, 32, 33, 36, 53, 54
Photo:	7, 8, 34, 35, 36, 37, 38

16 Erosion and Sedimentation (O-16)

This topic addresses the management of erosion and sedimentation issues associated with the operating hydropower facility. The intent is that erosion and sedimentation caused by the operating hydropower facility is managed responsibly and does not present problems with respect to other social, environmental and economic objectives; that external erosion or sedimentation occurrences which may have impacts on the operating hydropower facility are recognised and managed; and that commitments to implement measures to address erosion and sedimentation are fulfilled.

16.1 Background Information

Jostedøla is a glacial river, which means it carries high loads of both suspended and bed-transported material. Estimates made at the time of construction gave a total annual sediment load of between 70,000 and 150,000 tonnes.

The license conditions for the Jostedal project sets out requirements in relation to flood mitigation, sedimentation and erosion. As the project is partly constructed in response to flood-control priorities, the construction of the power plant and its associated infrastructure was accompanied by a number of other catchment interventions aimed at lowering local thresholds (to augment the passage of flood waters) and the removal of accumulated sediments in some areas.

It is part of the license requirement that Statkraft, as the owner of Jostedal project, is responsible to address problems related to sediment transport in the Jostedøla river, irrespective of whether the problem is directly related to the operations of the plant or not. Statkraft will be asked to take such measures that NVE deems necessary to avoid problems, primarily flooding.

16.2 Detailed Topic Evaluation

16.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging erosion and sedimentation issues have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.*

As part of the license and requirements in the Water Resources Act, Statkraft has to specifically monitor both suspended load and bed load at Nigardsbreen (a valley glacier on the west side of the valley) and Fåbergstølen (the largest active sandur in mainland Europe). The requirement to measure suspended load at Fåbergstølen expired 5 years after commissioning. Suspended load also had to be monitored for the first 5 years of operation at Haukåsgjelet and at the power plant itself. Beyond these specific requirements, internal processes are in place to identify additional emerging issues.

Through this monitoring, ongoing and emerging issues have been identified. By far the most important issue identified is the intermediate deposition of sediments occurring along the more level stretches of Jostedøla in the valley. This has led to flooding of several properties and also the main road up through the valley (at least once a year lately). This is also one of the main community concerns in relation to the Jostedal project.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging erosion and sedimentation issues takes into account both risks and opportunities.*

Monitoring has taken risks and opportunities into account. For example, several solutions for how to dispose of the 80,000 m³ of sediments have been discussed, but a decision is not yet made. One opportunity has been suggested by the land owners who have offered that the material can be deposited on their land. They have water-logged areas which are presently poor for farming purposes, and the idea is to remove the topsoil, deposit the sediments removed from the river, and cover with topsoil, thereby (in theory) creating less water-logged soil more suitable for farming purposes.

Criteria met: Yes

16.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to manage identified erosion and sedimentation issues.*

The management system of Statkraft for the Sogn group of power plants has routines and measures in place to deal with any identified issues, and a “job” has been defined in the system for the specific issue of the Alsmo sediment removal.

NVE has determined that the correct management response at Alsmo is to remove 80,000 m³ of sediments. The number is the result of detailed measurements comparing the present situation with the pre-project situation.

The delay in implementing the determined intervention has been caused by a conflicting issue: the banks of material causing the flooding are also excellent spawning areas for sea trout. There has therefore, been some uncertainties regarding which priority was stronger, and the latter issue is also the responsibility of a different government department, DN. A decision has now been made by the regulator that the sediment removal should go ahead. This is, however, not yet communicated to the community and compulsory consultations might still change the outcome.

All other relevant aspects are, e.g. spoil dumps, are monitored as part of regular management.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The management system has processes that can anticipate and respond to emerging risks and opportunities in relation to the Jostedal project, such as weekly reports etc. However, it is important to note that it is mainly NVE that reserves the right to handle such identification, and also to prescribe the necessary management responses. The County Council also plays a role in anticipating emerging risks and opportunities.

Criteria met: Yes

16.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage erosion and sedimentation issues have been and are on track to be met with no significant non-compliances or non-conformances, and erosion and sedimentation related commitments have been or are on track to be met.*

All the original requirements for monitoring of sediment transport as part of the license have either been finalised or are on-going to the satisfaction of the regulator.

The sediment removal at Alsmo is on track to be dealt with. There are no significant non-compliances or non-conformances.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances.

Criteria met: Yes

16.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Erosion and sedimentation issues are avoided, minimised and mitigated with no significant gaps.*

The issue at Alsmo is on track to be mitigated. Other issues, such as minor roadside erosion, are dealt with in a satisfactory manner.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, erosion and sedimentation associated with operating facility do not present ongoing problems for environmental, social and economic objectives of the facility or the project affected areas.*

The problem with sediment transport and associated intermediate sedimentation in Jostedøla causing problems with flooding is an on-going issue that is unlikely to be resolved. It is an inherent part of the geomorphology of a glacial valley such as Jostedal that deposition of river-transported material will create new issues in locations of low river gradient. However, as part of the license granted to Statkraft by NVE, Statkraft can be mandated by NVE to address any emerging issues in the valley. By mandating Statkraft to respond to the Alsmo issue, NVE has made it a project concern.

The fact that this issue presents an on-going problem for the residents in the valley is a **significant gap** against best proven practice, albeit one that the owner/operator of the plant cannot resolve. The only possible management response is to address new issues raised by the regulator and the community on a case-by-case basis.

Criteria met: No

16.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

The ongoing impact on the residents of the valley from flooding because of sedimentation is a significant gap. This is the responsibility of Statkraft as a result of licensing conditions, even if it is not causally associated with the hydropower project and unavoidable on a geological time scale.

1 significant gap

16.3 Scoring Summary

This is a strongly regulated topic and NVE sets license requirements for monitoring and management. The license also puts the responsibility for managing erosion and sedimentation issues in Jostedal on Statkraft for the duration of the power plant's operations.

The main identified issue is sedimentation at Alsmo along the lower reaches of the river, which has caused frequent flooding of the main road in the valley, as well as some properties at the site. Conflicting priorities delayed a resolution, but now planning is on-going for the removal of 80,000 m³ of sediments.

Natural geomorphological conditions makes it impossible for the plant owner to avoid the ongoing sedimentation problems in the valley that is Statkraft's responsibility due to licensing conditions. This is a significant gap against proven best practice, resulting in a score of 4.

Topic Score: 4

16.4 Relevant Evidence

Interview:	4, 5, 8, 9, 12, 13, 14, 15, 21, 30
Document:	1, 2, 1-2a, 1-2b, 3, 4, 18, 19, 20, 21, 22, 23, 24, 53 and 54
Photo:	38, 39

17 Water Quality (O-17)

This topic addresses the management of water quality issues associated with the operating hydropower facility. The intent is that water quality in the vicinity of the operating hydropower facility is not adversely impacted by activities of the operator; that ongoing or emerging water quality issues are identified and addressed as required; and commitments to implement measures to address water quality are fulfilled.

17.1 Background Information

The original license conditions for the Jostedal project included several monitoring programmes related to water quality. These were to be run for limited periods (with the exception of three aspects of sediment-transport measurements dealt with under Topic 16). This was implemented by consultants from the regulator NVE (separate departments) with satisfactory results. Due to this the regulator has not seen the need to demand continued water quality monitoring in the river, beyond the data collected as part of the fish monitoring conducted in the lower Jostedøla.

The layout of the Jostedal hydropower scheme, with intake at 1200 m.a.s.l. and a tailrace releasing into the fjord at 35 metres depth, means that even in the unlikely event of accidents which might contaminate the water passing through the plant's waterway, the impact would likely be greatly diluted by the fjord waters and not affect any sources of drinking water.

17.2 Detailed Topic Evaluation

17.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging water quality issues have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.*

No ongoing or emerging issues have arisen. Following commissioning, NVE's license conditions required the project owner to monitor several water-quality parameters, among them temperature (important for fish migration success as well as maturation of smolt – see O-15) and sediment content. Following the stipulated period there has been no need to continuously monitor water quality in the river, as it remains of very high quality.

The municipality health department monitors the quality of local drinking water sources. The municipality uses water from an alluvial aquifer for domestic water supply, and regular monitoring of this would capture some issues related to the Jostedal project. The water in Gaupne, the population centre close to the power plant, has been cited as among the best in the country by DN.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging water quality issues takes into account both risks and opportunities.*

There are no significant risks or opportunities. The regular environmental management system and community relations are in place to identify emerging issues, risks and opportunities for water quality, some of which would also be captured by the on-going studies of fish (notably sea trout) in the lower reaches of the river.

Criteria met: Yes

17.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to manage identified water quality issues.*

Statkraft's environmental management system provides procedures to ensure a management response to any identified issues.

Fylke-level (County Council) staff consider the European Water Framework Directive an excellent tool for future management of water-quality issues. The directive is being implemented in Norway, which is a signatory to the EEA agreement and subjected to implementation of the directive.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The regular environmental management system and community relations are sufficient to anticipate and respond to emerging risks and opportunities for water quality.

Criteria met: Yes

17.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place to manage water quality issues have been and are on track to be met with no significant non-compliances or non-conformances, and water quality related commitments have been or are on track to be met.*

There are no significant non-compliances or non-conformances, and there are no outstanding water-quality-related commitments to be met. The commitments made as part of license requirement at the construction of the plant have expired and were fulfilled without non-compliances or non-conformances.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances.

Criteria met: Yes

17.2.4 Outcomes

Analysis against basic good practice

Scoring statement: *Negative water quality impacts arising from activities of the operating hydropower facility are avoided, minimised and mitigated with no significant gaps.*

Water quality is demonstrated to be of a sustainably high quality.

With the possible exception of water temperature, there are no impacts of the operating facility on water quality. Evidence relating to water temperature and its effect on sea-trout migration and smolt maturation is discussed under O-15. This evidence shows that temperature in fact slightly increased following the development of Jostedal.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, water quality in the area affected by the operating hydropower facility is of a high quality; or the facility has contributed or is on track to contribute to addressing water quality issues beyond those impacts caused by the operating hydropower facility.*

The water in the river is a very high quality, and after passing through the river alluvium to the domestic water supply of Gaupne it is rated as some of Norway's best drinking water, a remarkable fact in a country blessed with ample resources of clean water.

Criteria met: Yes

17.2.5 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

There are no significant gaps against proven best practice.

0 significant gaps

17.3 Scoring Summary

NVE's license conditions for commissioning required the project owner to monitor several water-quality parameters, among them temperature and sediment content. Following the stipulated period there has been no need to continuously monitor water quality in the river, and it remains of very high quality. The water is of high quality and the only significant issue is the risk of cooling of the water in the river. This is discussed under O-15. The domestic water supply in Gaupne, using Jostedøla water which has been filtered through river alluvium, is of the best possible quality. There are no significant gaps against proven best practice, resulting in a score of 5.

Topic Score: 5

17.4 Relevant Evidence

Interview:	5, 12, 13, 14, 15, 21, 30
Document:	1, 2, 8, 29, 30, 31, 32, 33, 34, 35, 53, 54, 55, 56, 57, 59, 60, 141
Photo:	None

18 Reservoir Management (O-18)

This topic addresses management of environmental, social and economic issues within the reservoir area during hydropower facility operation. The intent is that the reservoir is well managed taking into account power generation operations, environmental and social management requirements, and multi-purpose uses where relevant.

18.1 Background Information

Reservoir management is strongly regulated in Norway. The Jostedal project is a multi-purpose development with a strong focus on flood protection, motivated by the frequent floods in the past and highlighted by the biggest flood on record in 1979.

This flood protection focus means that there is large regulation capacity in the two main reservoirs, Styggevatn (which can store up to 1.5 years of average inflow) and Kupvatn (3 years). Styggevatn is made up of two original lakes – Styggevatn and Austdalsvatnet – which through the regulation have been joined into one reservoir. Together with the provision of enough water to make the power plant economically viable, flood protection is also a reason for the 22 small diversions of stream on the east side of the Jostedøla valley at the level of 1200 m.a.s.l., the high-water level of the Styggevatn reservoir.

The volume of Kupvatn is $146 \times 10^6 \text{ m}^3$ and the regulation amplitude is just under 73 metres. The volume of Styggevatn (together with Austdalsvatnet) is around $350\text{-}360 \times 10^6 \text{ m}^3$ and the regulation amplitude is 90 metres (down to 1110 m.a.s.l.), except for the Austdalsvatnet part which can only be lowered to 1130 m.a.s.l., for a 70 metre regulation amplitude. The variation in storage volume relates to the movement of the glacier front of Austdalsbreen.

The Styggevatn reservoir is also an important resource for a local tourist operation which runs kayaking trips across the reservoir to the Austdalsbreen glacier.

18.2 Detailed Topic Evaluation

18.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging reservoir management issues have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.*

Ongoing and emerging issues are: the license requirement to maintain a 1 m draw-down for flood protection purposes until 1st September each year; and public safety related to the quarry wall near the tourist cabin at the shore of Styggevatn.

The Styggevatn reservoir is regulated with an amplitude of 90 metres, between the low-water level of 1110 m.a.s.l. and a high-water level of 1200 m.a.s.l. The last metre, from 1199 to 1200, has to be reserved as flood-protection, and only after 1st September each year can the entire regulation amplitude may be utilised in filling the reservoir in preparation for draw-down operations during the winter period. Therefore comprehensive monitoring of water levels is carried out, with direct automatic feed to the control centre in Gaupne for the Styggevatn, and manual readings for the upper reservoir, Kupvatn.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, identification of ongoing or emerging reservoir management issues takes into account both risks and opportunities.*

Emerging risks and opportunities for reservoir regulation planning (the risk of understorage and opportunities to optimise levels) are carried out through assessment of snow and glacial storage in late spring each year. This informs reservoir regulation planning for the coming summer filling season.

In addition, continuous dialogue with tourism operators is used as one means to identify opportunities for better management of the reservoir for multipurpose uses.

Criteria met: Yes

18.2.2 Management

Analysis against basic good practice

Scoring statement: *Measures are in place to manage identified issues.*

The comprehensive management system of Statkraft as applied to Jostedal power station, exemplified by the monitoring of reservoir levels, flood forecasting etc., has no significant gaps at this level.

There have been no major floods since the construction of the plant, which is an indicator that the flood protection aspect of the dam is working, at least since operation of Jostedal (but which is a short time in statistical terms). Flooding issues lower in the valley are not an issue of reservoir management and are addressed under O-16.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities.*

The comprehensive monitoring of issues surrounding reservoir management cover the needs for anticipation and response to most emerging risks.

However, the risk related to the quarry has not been responded to. The issue of the vertical cliff wall of the quarry has been caused by an unfortunate location of the quarry during construction, leaving this vertical wall exposed above the reservoir surface. Local stakeholders are concerned about the risk of falling into the reservoir (or onto its ice in winter) from a height of about 20-25 metres when hiking/skiing to and from a nearby cabin, especially in conditions of bad visibility. Discussions are still on-going regarding the best possible solution, with options being the relocation of the cabin (not a priority for local stakeholders) or extensive filling in of the old quarry, with significant reduction of reservoir capacity as a result (which is not a priority for Statkraft). The lack of a resolution of this issue is a **significant gap** at this level, as it is a stated strong concern of parts of the local community..

In addition, there are some opportunities that could be pursued. For example, improved access to the reservoir for the tourism operator – in particular the advantage of a fixed date for the late-spring opening of the road up to Styggevatn – would provide the tour operator significantly improved planning opportunities in terms of advance bookings. This issue is dealt with under O-1 and O-3.

Criteria met: No

18.2.3 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *Processes and objectives in place for reservoir management have been and are on track to be met with no significant non-compliances or non-conformances, and reservoir management related commitments have been or are on track to be met.*

There are no significant non-compliances or non-conformances.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, there are no non-compliances or non-conformances.*

There have been no non-compliances or non-conformances during the last 10 years, and prior to that only two very minor exceedances of the 1199 m.a.s.l. limit for Styggevatn before 1st September both by about 0.2 metres during the last days of August, in 1990 and 1992. However the exceedances were caused by flood, so the limit demonstrated its aim to protect against floods, and therefore these exceedances should not be regarded as non-compliances.

Criteria met: Yes

18.2.4 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

The lack of a resolution of the security issue surrounding the access to the cabin on Styggevatn's east side, close to the dam, is a significant gap. The vertical cliff wall created by the quarry has been on the community's agenda for a long time, and is quoted as one of very few strongly held community concerns in relation to the operation of the Jostedal project.

1 significant gap

18.3 Scoring Summary

The reservoir is managed for both flood protection and power generation. Flood protection concerns are included in the regulatory requirements. The flood protection function has been successful with no major flood occurring since the construction of the plant.

The reservoir is managed for both flood protection and power generation. Flood protection concerns are included in the regulatory requirements. The flood protection function has been successful with no major flood occurring since the construction of the plant.

The power generation function of reservoir management is a straight-forward summer filling operation with winter draw-down for power generation during the period with the highest power price.

There is one significant gap against proven best practice – the lack of resolution of the considerable community concern over secure passage to and from the cabin east of the Styggevatn dam – resulting in a score of 4.

Topic Score: 4

18.4 Relevant Evidence

Interview:	5, 8, 9, 11
Document:	1, 2, 4, 53, 54, 104
Photo:	11

19 Downstream Flow Regime (O-19)

This topic addresses the flow regimes downstream of the operating hydropower facility infrastructure in relation to environmental, social and economic objectives. The intent is that issues with respect to the operating hydropower facility's downstream flow regimes are identified and addressed, and commitments with respect to downstream flow regimes are fulfilled.

19.1 Background Information

Downstream flows from the Jostedal project concern flows from a number of structures, which can be grouped as follows: rare spilling events from the main storage dam, Styggevatn; flows downstream of intakes on 22 tributaries to the Jostedøla River (which are mainly on the eastern side of the valley, but also on the very north end of the valley just below Styggevatn); and flows from the power station which combine with flows from the Leirdøla power plant before discharge to the Sognefjord.

The regulation of the watercourses in Jostedal is licensed by a Royal decree in 1984, which includes rules of operation.

The catchment is subject to occasional significant flood events resulting from snowmelt in the upper catchment in the summer months. In 1979, prior to the construction of the Jostedal project, a major (1 in 200 year) flood caused significant damage to housing, infrastructure and farmland.

The Jostedal project captures an estimated 30% or less of run-off in the catchment. The intakes on the tributaries contribute approximately 50% of the water used for power production by the project.

19.2 Detailed Topic Evaluation

19.2.1 Assessment

Analysis against basic good practice

Scoring statement: *Ongoing or emerging issues relating to the operating hydropower facility's downstream flow regimes have been identified, and if management measures are required then monitoring is being undertaken to assess if management measures are effective.*

Issues related to downstream flow regimes have been identified through Statkraft's ongoing discussions with local stakeholders and with NVE, and environmental inspections downstream of the dam and the intakes, prompted by the SAP system, and where necessary have been subject to specific studies. License provisions give NVE the opportunity to set new requirements, and Statkraft can bring new suggestions, taking into account other stakeholder's opinions.

The issues are: lowering levels of a pond, Vivatjønni; the absence of flows downstream of the tributary intakes; the possible impact of lowered water temperatures on the ability of sea trout to migrate upstream and smolt to survive; and the ongoing issue of sedimentation. In addition, a further issue is the use of a greater proportion of the catchment's resource, combined with the further reduction in flooding risk, by the construction of additional intakes on the western side of the valley. This proposal was subject to taken to public consultation by Statkraft and recently rejected.

Vivatjønni lies immediately below the Styggevatn, though is not fed by flows from Styggevatn. The pond is valued for recreational purposes and brown trout fishing. Lower levels of the pond are due to the addition in 2001 of the diversion of a tributary to the Styggevatn. This issue has not been identified through an assessment of emerging issues, but through discussions with stakeholders.

The absence of flows downstream of tributary intakes appeared to occur over very short distances during the assessment team's site visit, because flows are replenished from un-tapped tributaries. However this was at a time of higher rainfall, and it is conceivable that the extent of lowered flows would be greater during drier periods. Some stakeholders complain that this has removed 'natural fences' between farmers' fields, and reduces habitat availability for fish spawning. It is thought to be a particular problem in one tributary, in Vigdalen. This issue also has not been identified through an assessment of emerging issues, but simply through discussions with stakeholders.

The impact of water temperature on fish migration and survival has been assessed through detailed studies. These are discussed in further depth under O- 15.

Sedimentation may have an impact on fish spawning areas, and some stakeholders reported that it is a problem for farmers who have fixed boundaries to their land and can lose their fishing rights as fish habitats move with the changing river morphology. Sedimentation issues have been assessed by Statkraft and NVE and are discussed under O-16.

Note that downstream flows from the power plant into the fjord at Gaupne have not created any ongoing or emerging issues (and the community at Gaupne report the positive effect of discharge, reducing 'ice fog' over the fjord in winter).

Monitoring is carried out on issues requiring a management response: please refer to O-15 and O-16 for details on fish and sedimentation respectively; the levels of Vivatjønni are not systematically monitored by Statkraft.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, issues identification takes into account both risks and opportunities. In the case of a need to address downstream flow regimes, an assessment has been undertaken that includes identification of the flow ranges and variability to achieve different environmental, social and economic objectives based on field studies as well as relevant scientific and other information.*

Discussions with NVE and stakeholders as described above allows for the identification of risks and opportunities. There has been no requirement to alter downstream flow regimes, and there are limited options for varying downstream flows, other than closing some of the tributary intakes.

Criteria met: Yes

19.2.2 Management

Analysis against basic good practice

Scoring statement: *In the case of a need to address downstream flow regimes, measures are in place to address identified downstream flow issues; and where formal commitments have been made, these are publicly disclosed.*

The only opportunity to alter downstream regimes is by closing tributary intakes. The Styggevatn dam includes a gate which allows for spilling when the reservoir is reaching the highest regulated level of 1200 m, and it has been built to meet the requirements of flood control (drawn down to 1199 m until the end of August) set out in the 1984 license as well as power production.

Measures are in place to address identified issues but they concern only the mitigation of impacts of downstream flows: for example in 1990 a decree was made for a series of weirs to be built in for the management of sediments, and the measures discussed under O-15 and O-16 concern mitigation of effects on fish and sedimentation. At Vivatjønni, Statkraft installed two thresholds to mitigate the effects of the construction of the above intake at the time of construction.

Formal commitments related to licence conditions are publicly disclosed. It is not clear that the specific issues and commitments at Vivatjønni are publicly disclosed, but these issues have been discussed in letters with members of the public and issues are discussed by telephone. Further issues of public consultation are discussed under O-1.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In addition, processes are in place to anticipate and respond to emerging risks and opportunities. In the case of a need to address downstream flow regimes, in addition commitments are made in relation to downstream flow regimes that include the flow objectives; the magnitude, range and variability of the flow regimes; the locations at which flows will be verified; and ongoing monitoring.*

Discussions with NVE and stakeholders as described above allows for the identification of risks and opportunities. However, the risks associated with Vivatjønni have not yet been responded to. Recent investigations have shown that the thresholds built at Vivatjønni are not effective, and the levels in Vivatjønni may be lower due to reduced snowmelt. Statkraft has been considering alternative measures, but these have not yet been carried out, giving rise to concerns amongst some members of the community (see O-1, O-3). The absence of a management response to address the issues at Vivatjønni is a **significant gap**.

Criteria met: No

19.2.3 Stakeholder Engagement

Analysis against basic good practice

Stakeholder engagement is not assessed at level 3.

Analysis against proven best practice

Scoring statement: *In the case of a need to address downstream flow regimes, in addition the assessment and management process for downstream flow regimes has involved appropriately timed and two-way engagement with directly affected stakeholders, and ongoing processes are in place for stakeholders to raise issues with downstream flow regimes and get feedback.*

Mitigation of lowered flows has involved stakeholder engagement, which in some cases has been appropriately-timed and two-way, but in other cases it has not.

Statkraft's proposal to construct additional intakes on the western side of the valley was taken to public consultation. In addition, there have been discussions by letter and phone on the Vivatjønni issue. Some of the downstream flows issues – Vivatjønni and Vigdalen – were identified through active engagement with stakeholders.

However, a number of stakeholders have complained of poor timeliness in Statkraft's responses to their issues, and a lack of feedback. Most external stakeholders interviewed believed that Statkraft could be quicker in its response and feedback. This is discussed under O-3 and is identified as a significant gap under that topic.

The absence of a process for stakeholder engagement is a significant gap, but is addressed under O-1 (a separate process for stakeholder engagement on downstream flows is not necessary).

Criteria met: Yes

19.2.4 Conformance / Compliance

Analysis against basic good practice

Scoring statement: *In the case of a need to address downstream flow regimes, processes and objectives in place to manage downstream flows have been and are on track to be met with no significant non-compliances or non-conformances, and downstream flow related commitments have been or are on track to be met.*

Processes, objectives and commitments related to downstream flows are in place or on track to be met: the commitments made in the 1984 licence are met; commitments to mitigate the effects of reduced downstream flows are met. There are no significant non-compliances or non-conformances.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In the case of a need to address downstream flow regimes, in addition there are no non-compliances or non-conformances.*

There are no non-compliances or non-conformances.

Criteria met: Yes

19.2.5 Outcomes

Analysis against basic good practice

Scoring statement: *In the case of a need to address downstream flow regimes and commitments to downstream flow regimes have been made, these take into account environmental, social and economic objectives, and where relevant, agreed transboundary objectives.*

There has been no need to alter downstream flow regimes during the operation of the project. The proposal to construct additional intakes on the western side could be considered a measure to reduce flows further, with the benefit of further flood prevention. The existing project already meets the objective of flood prevention – which is strongly appreciated in the local area – whilst generating an economic return.

The decision not to proceed with the proposal to construct additional intakes has balanced economic, social and environmental objectives: the benefits of the current flow regime to fishing, recreation and tourism have been balanced with the flood protection and revenue generation objectives.

Criteria met: Yes

Analysis against proven best practice

Scoring statement: *In the case of a need to address downstream flow regimes and commitments to downstream flow regimes have been made, in addition these represent an optimal fit amongst environmental, social and economic objectives within practical constraints of the present circumstances.*

These can be considered an optimal fit.

Criteria met: Yes

19.2.6 Evaluation of Significant Gaps

Analysis of significant gaps against basic good practice

There are no significant gaps against basic good practice.

0 significant gaps

Analysis of significant gaps against proven best practice

The absence of further management measures to prevent the impact of lowered water levels in Vivatjønni.

1 significant gap

19.3 Scoring Summary

Downstream flow issues are identified through Statkraft's ongoing discussions with local stakeholders and with NVE, and allows for the identification of risks and opportunities.

There is limited opportunity to alter downstream flow regimes other than by the closing of intakes. The proposal to construct additional intakes on the western side was considered and rejected, balancing objectives related to fishing, recreation and tourism, flood protection and revenue generation, in what can be considered an optimal fit.

There has been no requirement to mitigate the impacts of downstream flow regimes, other than through the mitigation of lowered flows below Vivatjønni. The absence of a management response to address the issues at Vivatjønni is a significant gap against proven best practice, resulting in a score of 4.

Topic Score: 4

19.4 Relevant Evidence

Interview:	5, 6, 7, 10, 11, 20, 21, 32
Document:	1, 2a, 2b, 3, 24, 25, 26, 27, 28, 54, 102
Photo:	7, 8

Appendix A: Written Support of the Project Operator



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ASSESSMENT OF THE JOSTEDAL PROJECT USING THE OPERATION TOOL OF THE HYDROPOWER SUSTAINABILITY ASSESSMENT PROTOCOL

Statkraft has contributed greatly to the development of the Hydropower Sustainability Assessment Protocol in recent years, and we are pleased to be one of the first Sustainability Partners of IHA.

Statkraft welcomes the application of the Operation Tool of the Protocol to the Jostedal project as part of this partnership, and hopes that the experience will provide important lessons for increasing adoption of the Protocol around the world, and the future development of the Protocol, as well as for Statkraft.

We provided our full support and coordination to the Assessment Team conducting this assessment of the Jostedal project.

Yours sincerely,
for Statkraft AS

Hilde Bakken
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PAGE:
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Appendix B: Verbal Evidence

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
1	Svein Ove Slinde, Regional director	Statkraft, Gaupne	PGM	27/08/2012	Gaupne	Doug Smith
2	Norman Kjærvik, Communication Manger	Statkraft, Gaupne	PGM	27/08/2012	Gaupne	Aida Khalil
3	Tanja Haugen, Maintenance Manager Steinar Stensli, Maintenance Planner	Statkraft, Gaupne	PGM SJ	27/08/2012	Gaupne	Cameron Ironside
4	Bjarne Venjum, Administration Manager	Statkraft, Gaupne	PGM R	27/08/2012	Gaupne	Cameron Ironside
5	Edvard Leidal, Power Plant Manager, Trine Elgersma, Envriornmental Coordinator	Statkraft, Gaupne	PGM S, PGMP	27/08/2012	Gaupne	Doug Smith
6	Svein Nordberg	Jostedal bygdslag/Local Regional Society		27/08/2012	Jostedal	Doug Smith
7	Arne Bjørk, Bjarne Sperle,	Jostedal Grunneierlag /Landowner organisation		27/08/2012	Jostedal	Aida Khalil
8	Peder Kjærvik, General Manager	Breheimsenter et/Nationalpar k visitor centre		27/08/2012	Jostedal	Bernt Rydgren
9	Steinar Bruheim, General Manager/ Glacier Guide	Jostedal breførarlag/Gla cier hiking		27/08/2012	Jostedal	Cameron Ironside
10	Even Loe, Hydrologist	Statkraft, Gaupne	PGM P	27/08/2012	Jostedal	Bernt Rydgren
11	Andy Cullens, Owner/Leader	Ice troll , Glacier hiking and kayaking		28/08/2012	Styggvat n, Jostedal	Doug Smith
12	Ivar Kvalen, Major Luster Municipality	Luster Municipality		29/08/2012	Gaupne	Doug Smith
13	Jarle Skartun, Chief Municipal Officer (Rådmann)	Luster Municipality		29/08/2012	Gaupne	Doug Smith

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
14	Olav Grov, Manager business activities (Næringslivssjef)	Luster Municipality		29/08/2012	Gaupne	Doug Smith
15	Steinulf Skjærdal, Manager agricultur (Landbrukssjef)	Luster Municipality		29/08/2012	Gaupne	Doug Smith
16	Tom Ingar Hauståker, Production Manager Vidar Fossøy, Production Planner	Statkraft, Gaupne	PGMP	29/08/2012	Gaupne	Bernt Rydgren
17	Ivar Hårklau, employee representative, labour union	Statkraft, Gaupne	PGMSJ	29/08/2012	Gaupne	Cameron Ironside
18	Kåre Hønsi, Technical manager, Roar Lund, VTA	Statkraft, Gaupne	PGMT	27/08/2012	Gaupne	Bernt Rydgren
19						
20	Roy Langåker, DN	Direktoratet for naturforvaltning (DN)/ The Norwegian Directorate for Nature Management		29/08/2012	Gaupne	Doug Smith
21	Jon Arne Eie, Magne Maurset	Norges vassdrags- og energidirektorat (NVE)/ Norwegian Water Resources and Energy Directorate		30/08/2012	Videoconference	Doug Smith
22	Ketil Fodstad, Senior Vice President, Pål Strøm, Eivind Valhovd	Statkraft, Lilleaker	Market Nordic	30/08/2012	Oslo	Cameron Ironside
23	Astrid Løken, Vice President Technology and Maintenance	Statkraft, Lilleaker	PGT	30/08/2012	Oslo	Cameron Ironside
24	Kirsti Elsfjordstrand, Head of Administration	Statkraft, Lilleaker	PGA	30/08/2012	Oslo	Cameron Ironside

Ref	Interviewee(s) / Position	Organisation	Department	Date	Location	Lead Interviewer
25	Vegard Pettersen, Section Manager Environment and Concessions Sjurs Gammelsrud, Senior Environmental Advisor	Statkraft, Lilleaker	PGPE	30/08/2012	Oslo	Cameron Ironside
26	Tron Engebretsen, Senior Vice President	Statkraft, Lilleaker	PG	30/08/2012	Oslo	Cameron Ironside
27	Rachel Groux Nürberg, CR & HSE	Statkraft, Lilleaker	CR&HSE	30/08/2012	Oslo	Cameron Ironside
28	Thormod Shei, Climate Change Coordinator, Senior Advisor	Statkraft, Lilleaker	CR&HSE	30/08/2012	Gaupne	Bernt Rydgren
29	Annette Moritz, Senior Environmental Adviser	Statkraft, Lilleaker	PGPE	30/08/2012	Oslo	Cameron Ironside
30	Tom Dybwad, Protected Areas, John Anton Gladsø, Water and Freshwater Fish Management, Ministry of Environment's representative to the Fylkesman (County Chairman)	Fylkesmannen i Sogn og Fjordane/ County governor administration		30/08/2012	Leikanger	Bernt Rydgren
31	Henrik Røneid, Kjell Arne Stegagjerde (Røneid), and Hans Edin Prestegård (Gaupne)	Røneid grunneigarlag/ Landowner organisation and Gaupne grunneigarlag/ Landowner organisation		29/08/2012	Gaupne	Doug Smith
32	Olav Hermansen, Arne Øyen	Luster jakt og fiskelag/Fishing and hunting organisation		29/08/2012	Gaupne	Doug Smith

Appendix C: Documentary Evidence

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
1	Kongelig resolusjon/govern ment	Reguleringsbestemmelser for statsreguleringer for utbygging av Jostedalsvassdraget	1984	Norwegian	Licence to operate Jostedal
2	Kongelig resolusjon/govern ment	Permanent manøvreringsreglement /Permanent maeuvering requirements	2001	Norwegian	Rules of operation Regulation of the watercourses in Jostedal, Municipality of Luster, Sogn and Fjordane County.
1,2a		Planning regulation (Translation of documents 1 and 2)	1984 and 2001	English	
1,2b	NVE	Licence conditions		English	Standard licence conditions
3	NVE	Pålegg om bygging av terskelbygging og oppmålingar/decree building weirs	1990	Norwegian	Decree on building weirs Vigdalen and Vivatjern and monitoring sedimentation in Jostedøla
4	NVE	Jostedal - Pålegg om hydrologiske undersøkelser/Decree hydrology investigations	1994	Norwegian	
5	Direktoratet for naturforvaltning	Avtale om fiskeoppgangstiltak i Jostedøla / Agreement fish measures Jostedøla	2001	Norwegian	Agreements on fish measures in Jostedøla
6 a, b, c	NVE	Jostedal pålegg anleggsvegerdecrece access roads	1991,1992,2 002	Norwegian	Decree and agreements about maintanence and operating Jostedalen access roads
7	Normann Kjærvik	Medieplan PGM 2012-2012/Communionplan PGM 2012-13		Norwegian / English	Communication plan. A short translation to english is included in the document.
8	Edvard Leirdal / PGM	Miljøaspekt gjennomgang PGM / Mapping environmental aspects		Norwegian	Yearly envionmental risk report, focused on envionmental aspects
9	Normann Kjærvik	Vertskommunar pgm møteplan		Norwegian	Stakeholder meeting plan

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
10	Normann Kjærvik	Vertskommunar pgm møtereferat		Norwegian	Minutes of meeting with municipalities. The document gives a short summary on meetings held with many different local communities.
11	Normann Kjærvik	Sponsorat PGM		Norwegian	Sponsorship PGM, includes sponsorships
13	Normann Kjærvik	Informasjonssjef		Norwegian	Information manager role and responsibility
14	Normann Kjærvik	Samfunnskontakt		Norwegian	Stakeholder coordinator role and responsibility
15	CFO	Statkraft Strategic Platform		English	Values, vision and strategy
16	CFO/Olav Hypher	Code of Conduct		English	
17	CFO/Olav Hypher	Supplier Code of Conduct		English	
18	Statkraft/T. H Elgersma, E. Leirdal	Tiltaksplan - oppfølging av vilkår - masseavlagring	2012	Norwegian	Plan for measures sedimentation Alsmo/Jostedøla
19	NVE	Jostedal vasskraftanlegg - lukking av avvik	2012	Norwegian	Confirm closing of non-conformance - sedimentation
20	Statkraft/T. H Elgersma, E. Leirdal	Retting av avvik etter NVEs miljørevisjon Jostedal vasskraftanlegg 10.01.2012	2012	Norwegian	Closing of non-conformance - sedimentation
21	NVE	Jostedal kraftverk - Oppfølging med tiltak etter vilkåra post 11 i konsesjonen av 29.06 1984 for utbygging av Jostedalsvassdraget	2012	Norwegian	Demand for measures on sedimentation at Alsmo/Jostedøla
22	Statkraft / T. H Elgersma	Referat frå synfaring Jostedøla	2012	Norwegian	Minutes of inspection with stakeholders at Alsmo/Jostedøla

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
23	NVE	Rapport frå revisjon 10.01.2012. Varsel om vedtak om retting.	2012	Norwegian	
24	Departement of Oil and Energy	Statkraft SF - Planendring for overføring av bekk fra Styggevatnet..	2001	Norwegian	Permission to transfer new creek into Styggevatn reservoir.
25	Luster commune / Steinulf Skjerdal	Overføring av bekk til Styggevatnet- låg vasstand i Vivatjønn	2005	Norwegian	Complaint on the conditions at Vivatjønn
26	Statkraft / Edvard Leirdal	Låg vasstand i Vivatjønn. Svar til Luster kommune	2005	Norwegian	Answer to the complaint in document 25
27	Statkraft / Edvard Leirdal	201000426-1 - Låg vannstand Vivatjønni	2010	Norwegian	Complaint on the conditions at Vivatjønn
28	Statkraft / Edvard Leirdal	201000426-2 - Låg vannstand Vivatjønni	2010	Norwegian	Answer to the complaint in document 27
29	Statkraft / Sjur Gammelsrud	201000187-11 Rapporter om fiskebiologiske undersøkelser i Jostedøla 2000-2011 og Leirdøla 2008-11	2011	Norwegian	Email summary report from fishmonitoring program
30	Laboratoriet for ferskvannsfisk (LFI) / Bjørn Barlaup	201000187-11 Rapport fiskebiologiske undersøkelser Jostedøla 2000-2010	2011	Norwegian	Report on fishmonitoring in Jostedøla
31	LFI / Sven Erik Gabrielsen	201000187-11 Hovedrapport Leirdøla 2008-2011	2011	Norwegian	Report on fish investigations and biotope measures at Leirdøla
32	Fylkesmannen Sogn og fjordane	200800282-3 Biotoptiltak gytebekk Leirdøla	2008	Norwegian	Permission to establish biotope measures in the spawningcreek at Leirdøla
33	Statkraft / T.H.Elgersma	200800282-1 Biotoptiltak gytebekk Leirdøla-søknad	2008	Norwegian	Application to establish biotope measures in the spawningcreek at Leirdøla
34	Statkraft/T.H.Elgersma	200800282-1 Biotoptiltak gytebekk Leirdøla- kart.	2008	Norwegian	Map, appendix to document 33
35	Statkraft	Miljøstatus Jostedøla - mfaktaark	2010	Norwegian	Facts about the seatrout in Jostedøla

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
36	NINA	Undersøkelse av laks og sjøørret i Jostedal i forbindelse med Jostedalutbygging 1986-92	2010	Norwegian	Impact assessment and monitoring on salmon and sea trout in Jostedal
37	Statkraft management system	Statkraft Process Chart - management system		English	Excerpt from Statkraft's Management System, providing an overview of processes defined in the Management System
38	Statkraft management system	Example - process chart on energy management		English	
39	Statkraft management system	Environmental Group Policy		English	
40	Statkraft management system	Environmental Group Procedure		English	
41	Statkraft management system	Group Policy for Social Responsibility		English	
42	Statkraft management system	Group Policy for Communication and Brands		English	
43	Statkraft management system	Corporate Emergency Response Plan		English	
44	Statkraft management system	Handlingsplan for unormale situasjoner i vassdragsanlegg - Sogn		Norwegian	
45	Statkraft management system	Instructions for mapping of environmental aspects (PG)		English	
46	Statkraft management system	KPI's in PG		English	
47	Statkraft management system	Reporting including KPI analysis for PG		English	
48	Normann Kjærvik	PGM handlingsplan 2011		Norwegian	PGM action plan 2011

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
49	Statkraft managment system	Operation and Maintenance model		Norwegian	
50	Statkraft managment system	Production and watercourse management		English	
51	Statkraft managment system	Availability planning		English	
52	Statkraft managment system	Vedlikehold / maintenance		Norwegian	
53	Statkraft / NVE	Glacial streams hydropower - Jostedalen-Norway	(1991 - translated and updated 1998)	English	Publication largely based on the results form scientific studies which the Norwegian parliament set as a condition for granting the licence to develop the Jostedøla watercourse for hydropower
54	Marilyn Marskar	A summary of certain decrees / instructions regarding of the license of Jostedalen	2012	English	
55	NVE	Oversendelse av datarapport fra sedimentundersøkelsene i Nigardsbreev 1999 – 1999 - NVE		Norwegian	This document was seen during the field assessment in Jostedal (no electronic document available)
56	NVE	Årsrapport Hydrometriske målinger Jostedalen, Vassdrag 076.z – 1999 – NVE		Norwegian	This document was seen during the field assessment in Jostedal (no electronic document available)
57	NVE	Årsrapport Hydrometriske målinger Jostedalen, Prosjekt 2500 1281 - 1999 – NVE		Norwegian	This document was seen during the field assessment in Jostedal (no electronic document available)
58	NVE	Glaciologiske undersøkingar Austdalsbreen (076.H). Årsrapport 1998. – 1998 - NVE		Norwegian	This document was seen during the field assessment in Jostedal (no electronic document available)

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
59	NVE	Observasjoner av is- og vanntemperaturforhold i vassdrag og temperatur- og saltmålinger i fjorder. – 1998 - NVE		Norwegian	Observations of snow and water temperature in river, temperature and salt content in the Fjord
60	NVE	Sedimenttransportundersøkelser i Nigardsbreeelv 1997 (Vassdrag nr. 076:E) – 1998 - NVE		Norwegian	Transport of sediments
61	Statkraft	List of governance document HMS PG (from the '360' system)		Norwegian	
62	Statkraft	PG - Sustainability Report		Norwegian	Sustainability report according to GRI indicators
63	Statkraft	Long-term planning (LTP) - Jostedal	2012	Norwegian	Description of long-term planning projects for Jostedal - ongoing and planned maintenance work
64	Statkraft	Investment strategy PG 2012	2012	English	
65	Commercial High School in Bodø	SIB rapport 2009. Statkraft i Nord-Norge; Samfunnsnytt og lokal betydning. Handelshøyskolen i Bodø, Senter for Innovasjon og Bedriftsøkonomi	2009	Norwegian	2009 Report on societal benefits and local importance of Statkraft in Northern Norway by the Commercial High School in Bodø
66	Statkraft	PA toolkit - communication (intranet)	2012	English	Stakeholder engagement tools
67	Statkraft	HMS group meeting and RU - meetings	2012	Norwegian	Labour rights and working conditions in the region
68	Statkraft	R&D PG strategy	2012	English	R&D strategy for PG
70	Svein Ove Slinde	Årsrapport 2011 PGM/Annual report 2011 PGM	January 2012	Norwegian	Annual Report of PGM Midt-Norge
71		Overskjønn Jostedal 1990 (Groundwater)	1990	Norwegian	Agreement with land owners regarding the groundwater fee
72	Bjarne Venjum	Referat fra ledermøte PGM 13.08.2012	August 2012	Norwegian	Minutes from PGM management meeting
73	Svein Ove Slinde	Status PGM veke 34	August 2012	Norwegian and English	Example of a weekly report on mail from PGM Midt-Norge

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
74		Beredskapsplan for Statkraft Midt Norge		Norwegian	Emergency Response Plan of PGM
76	PGM	5 års KPI Jostedal	2012	Norwegian	KPI Results of the last 5 years - Jostedal
77		Communication Process Statkraft	2012	English	Excerpt from Statkraft management system
78	Astrid Løkken	Final outage and failure report, 2011	2011	English	Annual technical report on failure and outage
79	Astrid Løkken	PG Technical report	2012	English	Main focus areas, challenges and concerns on long and short term from the technical department
80	Jostedal - maintenance department	Daily maintenance plans	2012	Norwegian	Seen during the interview with the maintenance department
81	Kjell Odd Halmøy/ Jostedal	HMS-arkiv	2012	Norwegian	Legal requirements within HS&E for PGM, with links to archive system in 360 (showing how PGM follows laws and regulations)
82	Fylkeskommunen / County Management Division	Jostedalsdevelopment- transfer of the Vestsideelvene to Tunsbergvatn, registration of cultural heritage areas	1985	Norwegian	States "Development plans of the Vestsideelvene will not have any significant effects on the cultural heritage sites"
83	University of Bergen, History Museum	Leirdøla powerplant-transfer of Vestsideelvene to Tunsbergvatn	1985	Norwegian	States that the planned developed area (area of direct influence) is not of any significant value to any cultural heritage
84	Slinde, SK	Budget PGM 2012	2012	Norwegian	
85		Presentasjon av dambruddsbølgeberegninger i Jostedalen		Norwegian	
86		Evaluering av øvelsen		Norwegian	Emergency Response Training, Evaluation Report
87		Øvelse - Død fisk nedstrøms 23.05.11	2011	Norwegian	A 'What if' risk assessment
88		Øvelse - Værfast på arbeid 23.05.11	2011	Norwegian	A 'What if' risk assessment

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
89		89--2012-03890 Årsdiagram Styggevatn and 715186_1_0.xlsx		Norwegian	Leakage measurements of Styggevatn dam
90		90--2012-03889 Rapport Styggevatnet 2011 and 716367_1_0.docx		Norwegian	Inspection report on dam safety
91		91--2010-00756 Tilsynsprogram Sogn feb 2012 and 707473_1_0.xlsx	February 2012	Norwegian	Inspection plan on infrastrucure safety
92	Multiconsult	92--2012-03888 Styggevatn revurderingsrapport nov 2009 and 718682_1_1.pdf	November 2009	Norwegian	Inspection report of the dam (NVE-requirement)
93		93--2010-01073 Styggevassdammen tilsyn vår 2012 and 716516_1_0.docx		Norwegian	Checklist from the inspection of Styggevassdammen
94	TI	94--ISO certificat 14001 & 9001	February 2010	Norwegian and English	ISO certification
95	Kirsti Elfjordstrand	95--2012-00729 Overordnet Handlingsplan for PG 2012 and 669540_1_1.pdf	January 2012	Norwegian	PG Action Plan 2012
96	Dagens Næringsliv	<u>Best Place to Live in Norway</u>	August 2008	Norwegian	http://www.google.com/url?sa=t&rct=j&q=luster+norges+beste+kommune&source=web&cd=1&cad=rja&ved=0CCIQFjAA&url=http%3A%2F%2Fwww.dn.no%2Fforsiden%2FpolitikkSamfunn%2Farticle1461694.ece&ei=4D1PUJyvItHLsgbsv4D4DA&usg=AFQjCNEI3mdpFi6QY_bXxj5Zyxe27abRzg
97		<u>www.Jostedal.no</u>		Norwegian	http://www.google.com/url?sa=t&rct=j&q=Bloggebygda+&source=web&cd=1&cad=rja&ved=0CCIQFjAA&url=http%3A%2F%2Fwww.jostedal.no%2Fbloggebygda%2F&ei=AD9PUJnjD4botQbnrICADA&usg=AFQjCNEPdoY3QDUGFU2XHw2_onKH9P1zRQ WEB-page - gives an overview of different blogs in Jostedal

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
98		Screenshots from the Statkraft management system	September 2012	English	Screenshoots from Statkraft intranet showing the process description environmental management system, ISO- 14001
99	Luster County	Annual Report 2011	2011	Norwegian	Includes summary of funding of the Business Development Fund in 2011
100	Statkraft	Sponsor and Support Jostedalen	2011	Norwegian	Summary of sponsorships in Jostedalen/Luster, 1997-2011
101	Statkraft	Communication actions concerning Jostedalen	2006	Norwegian	Communication actions concerning Luster county, landowners, Sogn og Fjordane Energy management and others
102	LFI Trondheim / NTNU	Evaluering av celleterskler som avbøtende tiltak	2012	Norwegian	Evaluation of cell weirs in streams: this document is an example of Statkraft's R&D projects and reviews.
103		Flood mark and information board Fossøyane Jostedalen	2005	Norwegian	This document describes the plans to build a marker of the level of the previous floods.
104	Statkraft	Reservoir level curves for Styggevatnet, 1996-2011	1996-2011	Norwegian	
105	Statkraft	Vedtekter Kongsesjon (Guidelines for the Business Development Fund)		Norwegian	
106	Statkraft	Grunnlag næringsfond (Business Development Fund)	2012	Norwegian	

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
107	Statkraft	Enquiry (invitation to bid) on maintenace and upgrading of creek intakes Jostedal	2009	Norwegian	Example of use of an environmental plan (MOP)
108	Statkraft	H-10/150Mal for miljøoppfølgingsprogram i prosjekt	2005	Norwegian	Environmental Program for Projects
109	Statkraft	Referat ledermøte 13.8.12	2012	Norwegian	Minutes of PGM management meeting
110	Statkraft	Status PGM veke 34	2012	Norwegian	Weekly status report by email
111	Statkraft/slinde	2012-01357 Månedsrapport PGM august 2012.docx 721798_2_0	2012	Norwegian	Monthly report
112	Statkraft	Emendo report	2012	Norwegian	
113	Statkraft	2010-00756 Tilsynsprogram Sogn feb 2012.xls 707473_1_0	2012	Norwegian	Program for periodic inspections on dam safety
114	Statkraft	2010-01073 Styggevasdammen tilsyn vår 2012.doc 716516_1_0	2012	Norwegian	Periodic inspection
115	Statkraft	2010-01074 Hovedtilsyn Styggevasdammen 2011.pdf 667650_1_1		Norwegian	Main audit by NVE Styggevasdammen
116	Multiconsult	2012-03888 Styggevatn 116-revurderingsrapport nov 2009.pdf 718682_1_1		Norwegian	Re-evaluation of Styggevasdammen; an example of use of external expertise
117	Statkraft	Jostedal Info kommune politi fylkesm 180604	2004	Norwegian	Presentation used in a meeting with the county manager, regarding dam safety and flood calculations
118	Statkraft	Næringsfondet Balanseregnskap 2011		Norwegian	Accounting for Business Development Fund
119	NVE	http://www.nve.no/no/allekonsesjoner/?soknad=660&stadium=&type=11	2012	Norwegian	Public hyperlink to NVE licence

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
120		Plan for interne miljøtilsyn	2012	Norwegian	Plan for internal environmental inspections followed up in the SAP maintenance system
121	Rydgren et al.	Ecological Design is More Important Than Compensatory Mitigation for Successful Restoration of Alpine Spoil Heaps	2012	English	Sstatkraft sponsored R&D project relevant for Jostedal key challenges
122		Confirmation letter		Norwegian	Related to document 117
123	Statkraft	Framework for handling Climate Change (CC) consequences in the Statkraft group	2012	English	
124	Statkraft	Bekkeinntak Jostedal kraftverk Innholdsfortegnelse	2009	Norwegian	Project documentation upgrading river creek intakes including environmental management plan
125	Statkraft	Corporate communication strategy statkraft		English	
126	Statkraft	Visitor centre information sheets		English	
127	Sogn Avis	Press Articles		Norwegian	Press articles on various events
128		http://www.lovddata.no/		Norwegian	Link to web site where you can find information on Court of Appeal.
129		Link til ulike nettsteder m. offentlig tilgjengelig informasjon om konsesjonssøknad Vigdøla/ Link to available information on the concession application Vigdøla project	2012	Norwegian	Vigdøla concession application - Example on public process and information made available for public (link from Statkraft web site, from NVE web-site and from Luster Municipality web-site)
130	Statkraft	Report from environmental inspection of weir in river Vigdøla		Norwegian	Example of report from internal environmental inspection of weirs in Vigdøla
131	Statkraft, Trine H Elgersma	Møteinnkalling miljøtilsyns kurs	2006	Norwegian	Meeting agenda - training for internal environmental inspections
132	Statkraft, PGPP	List of payments to land owners year 2011	2012	Norwegian	

Ref	Author/ Organisation	Title	Date	Language	Description / Notes / Weblink
133	OED/Øyvind Jenssen	Benefit sharing på norsk	2011?	Norwegian	Presentation made for Norwegian Statkeholders with focus on benefit sharing. The last page in this document compares the Norwegian model with interantional model for benefit sharing
134	A.Moritz/Statkraft	Steering wheel in PGPE	2011	English	Illustration of the annual reporting process in PG, with focus on environment
135	A.Moritz / Statkraft	ISO 9001_14001-i PG	2009	Norwegian	Presentation on the environmental mangement system EMS).
136	Normann Kjærvik	Kommunikasjon i prosjekter	2010	Norwegian	PPT presentation
137	Normann Kjærvik	Kommunikasjon Bysveen	2011	Norwegian	PPT presentation
138		Statkraft website, www.statkraft.com			
139		Annual Report of Statkraft Energi			
140		RCM System			
141		www.miljostatus.no			

Appendix D: Visual Evidence



Photo 1: Entrance to the plant



Photo 2: Powerplant visitor's hall



Photo 3: Quarry wall



Photo 4: Warning signs for possible wave creation from calving icebergs (risk has been determined as negligible)



Photo 5: Tourist cabin in proximity to quarry wall



Photo 6: Visitor centre information panel



Photo 7: Vivatjønni



Photo 8: Vivatjønni threshold



Photo 9: Notice describing the high water mark of the



Photo 10: Hydrological and sedimentological gauging

1979 floods	station in the lower Jostedøla (run by NVE)
	
<p>Photo 11: Styggevatn reservoir with dam in foreground and the calving Austdalsbreen glacier in the far background</p>	<p>Photo 12: The higher of the two spillway levels, at 1 202 m.a.s.l.</p>
	
<p>Photo 13: The lower of the two spillway levels, at 1 200 m.a.s.l.</p>	<p>Photo 14: Iceberg obstacles in front of the 1 200 m.a.s.l. spillway</p>



Photo 15: Automated measurement equipment for through-the-dam leakage

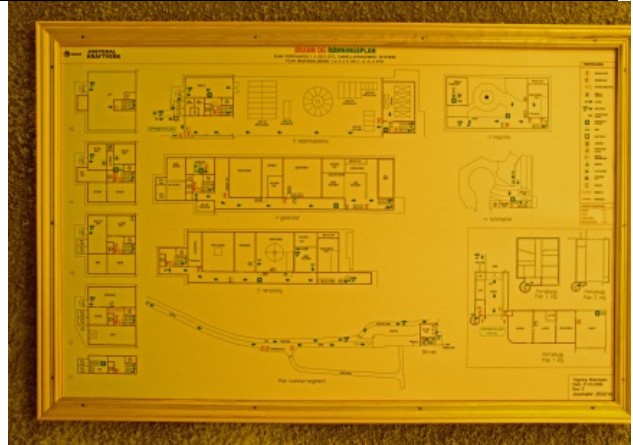


Photo 16: Fire and evacuation plan signage



Photo 17: First-aid instructions for accidents with chemicals



Photo 18: Stretcher and oxygen masks for fire emergencies



Photo 19: Clearly marked evacuation line on the floor in the power house



Photo 20: Community Centre football pitch



Photo 21: Community Centre main building



Photo 22: Community Centre school



Photo 23: Flood mark of 1979 flood



Photo 24: Photograph of the re-located old cabin



Photo 25: Kayaks of a local tourist business near the spillway



Photo 26: Oxygen masks for emergencies, at the powerplant



Photo 27: First aid kit, at the powerplant



Photo 28: Fire-fighting hose, at the powerplant

ANIMAL AND BIRD LIFE
 Breheimen is the home of the wild reindeer. The wild reindeer area of Ottadalen is the third largest habitat for wild reindeer in Norway, and Breheimen includes large parts of this area. It is typical for wild reindeer to change their grazing and calving areas over time. This means that areas not used by the reindeer at present may have great value in the future. Reindeer calving takes place in May. The wild reindeer is part of a mountain ecosystem that includes wolverines and birds of prey. The valleys are also well stocked with red deer, and elk are very common on the eastern side. The mountains are home to common birds such as snow buntings and northern wheatears. Other characteristic species are the golden plover, dotterel, and horned lark. In valleys that provide a richer habitat, there are several endangered and rare bird species, such as the white-backed woodpecker and twite.

Wild reindeer are vulnerable to environmental impact and disturbance. Walking or cycling in an area can disperse the reindeer. To come across wild reindeer can however be a memorable experience. If this happens to you, watch the reindeer from a distance, and move away afterwards. Take the wind direction into account so that the reindeer do not pick up your scent.

WHAT PLANTS GROW IN BREHEIMEN?
 The flora of Breheimen is unusually rich and varied because of the climatic and geological variation. There is an abundance of plants related to the mountain environment, scree, old pine forests, calcareous birch forests, rich and old broad-leaved deciduous forests and waterfall spray zones. Interesting species that illustrate this range include Lithuanian mangrass and the lady's slipper orchid. Typical mountain plants that you can find in Breheimen include the purple saxifage, mountain avens rose and alpine gentian in rich areas, and the three-leaved rush, dwarf willow and glacier buttercup in poorer soil.

OLD AND NEW USE OF THE MOUNTAINS
 Over the centuries, the people who have lived in the Breheimen area have had strong links to the mountains, with hunting, fishing, mountain summer farms and transport routes between eastern and western Norway.

The wild reindeer is important to an understanding of Breheimen's cultural heritage. We assume that by 7000 BC Breheimen was a habitable area for people who hunted reindeer for their livelihood. Here, cultural relics and traces of wild reindeer hunting abound, both in the form of small articles such as arrowheads and in fixed hunting and trapping systems. The pitfalls are especially noteworthy. Hunting of wild reindeer still takes place today, an unbroken tradition that has lasted nine thousand years.

There are many mountain summer farms with buildings that have been looked after and used, with especially valuable cultural landscapes in Markridsdalen, Mysubytta, Haydalen and Vigdalen.

Photo 29: Cultural heritage information sign, on the road towards Styggevatn



Photo 30: Refurbished traditional farm cabin



Photo 31: Remains of the old access road



Photo 32: Reindeer trap, Fagredalen



Photo 33: Fåbergstølgrandane



Photo 34: Langøyhjelet, location of fish passage



Photo 35: Fossøygelet, location of fish passage



Photo 36: Spawning creek (just visible in middle-left)



Photo 37: Newspaper article: 50 years since of a large fish was caught in 1962

Photo 38: Re-vegetated spoil heap, Fagredalen



Photo 39: The sedimentation area at Alsmo

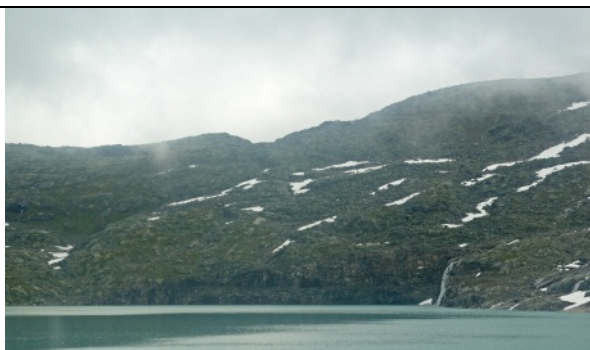


Photo 40: Styggevatn with tourist cabin at centre left and vertical cliff wall of quarry at low centre