VALIDATION REPORT

PROJECT FOR THE REDUCTION OF GREENHOUSE GAS EMISSIONS OF HIDROELECTRICA LA CONFLUENCIA S.A. IN CHILE

REPORT NO. 2010-0270

REVISION NO. 01

DET NORSKE VERITAS

VALIDATION REPORT

Date of first issue: 2010-04-21		ConCert Project No.: PRJC-200967-2009-CCS-NOR
Recommended for approval by: Trine Kopperud	Approved by Trine Kopperud	Organisational unit: DNV Climate Change and Environmental Services
Client: SN Power Invest		Client ref.: Kristine Kjelaas

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Summary:

Project Name: Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A.
Country: Chile
Methodology: ACM0002
Version: 12.1
GHG reducing Measure/Technology: Renewable energy based electricity generation unit utilising hydro power resources
ER estimate: 423 120 tCO_2e per year (average)
Size
☒ Large Scale
☐ Small Scale
Validation Phases:
☒ Desk Review
☒ Follow up interviews
☒ Resolution of outstanding issues
Validation Status
☐ Corrective Actions Requested
☐ Clarifications Requested
☒ Full Approval and submission for registration
☐ Rejected

In summary, it is DNV's opinion that the project activity "Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A." in Chile, as described in the PDD, version 8 of 1 November 2010, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002, version 12.1. Hence DNV requests the registration of the project as a CDM project activity.

Report No.: 2010-0270	Subject Group: Environment
Report title: Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A. in Chile	
Work carried out by: Francisco Chávez V., Michael Lehmann	
Work verified by: Felipe Lacerda Antunes	

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Indexing terms

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Climate Change
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Abbreviations

BM	Build Margin
CAR	Corrective Action Request
CDEC	Centro de Despacho Económico de Carga (Chile), Economic Load Dispatch Center
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CH_4	Methane
CL	Clarification request
CM	Combined Margin
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CONAMA	Comisión Nacional del Medio Ambiente, Chile (National Environmental Commission)
DNA	Designated National Authority
DNV	Det Norske Veritas
EPC	Engineering, Procurement and Construction
EUR	European currency (Euros)
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
HLC	Hidroeléctrica La Confluencia S.A.
HPH/HLH	Hidroeléctrica La Higuera
HPP	Hydroelectric Power Plant
IFC	International Finance Corporation
IFC IM	IFC Investment Memorandum
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
kUSD	Thousand USD
LoA	Letter of approval
MUSD	Million USD
N_2O	Nitrous oxide
NGO	Non-governmental Organisation
OCGT	Open Cycle Gas Turbine
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
PPA	Power Purchase Agreement
SIC	“Sistema Interconectado Central”, or, the Central Interconnected System (Chile)
S/E	Sub-station (electrical)
SDDP	Stochastic Dual Dynamic Programming (model for dispatch scheduling of thermal-hydro electricity systems)
SNPI	SN Power Invest
SYNEX	Synex Consulting Engineers, Chile
tCO_2e	Tonnes of CO_2 equivalents

TSO	Transmission System Operator
UNFCCC	United Nations Framework Convention on Climate Change
USD	Currency of the United States of America (dollars)

1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the project activity "Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A." in Chile. The validation was performed on the basis of UNFCCC criteria for the Clean Development Mechanism, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party is Chile. The only project participant is Hidroeléctrica La Confluencia S.A (HLC). No Annex I project participant has yet been identified. The host Party fulfil the participation criteria and has approved the project and authorized the project participants Hidroeléctrica La Confluencia S.A. The DNA from Chile confirmed that the project assists in achieving sustainable development.

The project correctly applies the baseline and monitoring methodology ACM0002, version 12.1, "Consolidated methodology for grid-connected electricity generation from renewable sources".

As a result, the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The total emission reductions from the project are estimated to be on the average 423 120 tCO_2e per year over the selected 7 year renewable crediting period. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given that the underlying assumptions do not change.

The monitoring plan provides for the monitoring of the emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is DNV's opinion that the project participants are able to implement the monitoring plan.

In summary, it is DNV's opinion that the project activity "Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A." in Chile, as described in the PDD, version 8 dated 1 November 2010, meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodology ACM0002, version 12.1.

Oslo, 2011-01-20

Michael Lehmann
CDM Validator
DNV City, Country

Trine Kopperud
Head of Approval Centre
Det Norske Veritas Certification AS

2 INTRODUCTION

SN Power Invest has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the "Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A." in Chile (hereafter called "the project"). This report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of certified emission reductions (CERs).

2.2 Scope

The validation scope is defined as an independent and objective review of the project design document (PDD). The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology ACM0002. The validation was based on the recommendations in the Validation and Verification Manual /61/.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk review of the project design documentation

The following tables list the documentation that was reviewed during the validation.

3.1.1 Documentation provided by the project participants

/1/ Hidroeléctrica La Confluencia S.A. (HLC).: *CDM-PDD for project activity "Project for the reduction* of greenhouse gas emissions of Hidroelectrica La Confluencia S.A.*" in Chile*,

- Version 3 dated 4 December 2009
- Version 4 dated 28 May 2010
- Version 5 dated 14 July 2010
- Version 6 dated 09 September 2010
- Version 7 dated 15 September 2010
- Version 8 dated 1 November 2010

/2/ Hidroeléctrica La Confluencia S.A.: *IRR_HLC-Model 2dic09.xls*,

- "IRR_HLC-Model 2dic09.xls" version: 1.0, Date: 2 December 2009.
- "IRR_HLC-Model - May 2010 - v1.6.xlsm", version 1.6. Date: 25 May 2010
- "IRR_HLC-Model - May 2010 - v1.7.xlsx" version 1.7, Date: 14 July 2010
- "IRR_HLC-Model - May 2010 - v1.6_CL15_MAX.xlsx"
- "IRR_HLC-Model - May 2010 - v1.6_CL15_MIN.xlsx"
- "IRR_HLC-Model - May 2010 - v1.7.xlsx"

/3/ Valgesta Energía S.A.:

- *GRID EF LaConfluencia_HydroPP_(2006-2008)_2-12-2009.xls*, Date: 2 December 2009,
- *GRID EF LaConfluencia_HydroPP_(2006-2008)_19-03-2010.xlsx*, Date: 19 March 2010.
- GRID EF LaConfluencia_HydroPP_(2006-2008)_18-05-2010.xls, Date: 18 May 2010.
- GEF_Chile_2010-08-25.xls Date: 25 August 2010

/4/ Valgesta Energía S.A.: *Load_Duration_Curves_(2006-2008)_La Confluencia_HydroPP_2-12-2009.xls*, Date: 2 December 2009.

/5/ HLC: *Presentation shown at the stakeholder consultation* (*Public presentation v3.ppt),*

Date: 7 September 2007

/6/ HLC: *Asistencia B.Carbono.doc Listing of stakeholders present at the consultation of TINGUIRIRICA JOINT VENTURE*, Date: 7 September 2007

/7/ Hidroelectrica La Confluencia: *CONSULTAS DE LOS ASISTENTES A PRESENTACIÓN.DOC Issues from Stakeholders la Confluencia*, Date: 7 September 2007.

CL48_7_CONSULTAS DE LOS ASISTENTES A PRESENTACIÓN.pdf

/8/ Comisión Regional del Medio Ambiente de la VI Región del General Libertador Bernardo O'Higgins: *EIA approval for: La Higuera, Rio Tinguiririca - Exempt Resolution No. 116 dated 31-August 2004* (file: *RCA 116_2004.pdf)* Dated: 10 September 2004.

/9/ Comisión Regional del Medio Ambiente de la VI Región del General Libertador Bernardo O"Higgins: *EIA approval for: Optimization of La Confluencia HPP - Exempt Resolution No. 282/07 dated 31-August 2004 (file: RCA 282.pdf)*, Dated: 24 October 2006

/10/ Perspectives GmbH: *Assessment of the Prior Consideration of the CDM for the La Confluencia Hydroelectric Project, Chile*, Version 01, 11 September 2009

/11/ International Finance Corporation: *Confidential Information Memorandum with Pacific Hydro, SN Power, Hidroeléctrica La Confluencia S.A. - Syndicated IFC B Loan*, Final version July 2007.

/12/ International Finance Corporation: *Annex 2 – Financial Model, Confidential Information Memorandum with Pacific Hydro, SN Power, Hidroeléctrica La Confluencia S.A. - Syndicated IFC B Loan*, July 2007

/13/ Hidroeléctrica La Confluencia S.A.: *Extract from document: Hidroeléctrica La Confluencia S.A., Final Investment Case*, Document distributed to Board Members of the Board of Hidroeléctrica La Confluencia S.A. on 16 August 2007

/14/ SN Power: *Minutes from Board Meeting, 27-28 August 2007*

/15/ *EPC Contract for La Confluencia Hydropower Project, signed between Hidroeléctrica la Confluencia, Hochtief (international construction company) and Tecsa (local construction company)*, Date: 18 October 2007

CL48_15_EPC-Contract_Volumen.pdf;

CL48_15_EPCContract_Volumen 2.pdf;

CL48_15_EPC-Contract_Volumen3.pdf;

CL48_15_EPCContract_Volumen 4_1.pdf;

CL48_15_EPC-Contract_Volumen4_2.pdf

4254_001_Generator type.pdf

4255_001_Surface area_contractor drawing.pdf

4661_001_vol-pond_ flow_annual-production_gross-head.pdf

4661_005_2xFrancis_Gen-speed-freq-power_pond.pdf

EPC page C-20.pdf

CL2_EPC-references_v2.pdf

CL2_EPC-references_v3.pdf

/16/ *Notice to proceed given to the EPC contractor, Date 21 December 2007* :

- CL48_16_HLC-LH-CHT-00064.pdf, *Letter of Notice to Proceed (and*

acceptance from contractor)

- CL7_EPC_extract_Conditions-to-proceed.pdf
- CL7_EPC_extract_signed_2007-10-18.pdf

CL48_16_HLC-LH-CHT-00064.pdf

/17/ TRANSELEC S.A.: Agreement between HLH and TRANSELEC (re. *TSO's authorization to connect La Confluencia to the grid system)*, Version: HLH 1567/TRANSELEC C-No 021, Date:5 July 2010

CL48_17 - MOU Transelec.pdf

/18/ Evidence and definition of the SIC Grid

CDEC-SIC: *Annual report 2009 / Operation statistics 1999-2008*; Date: 2009

http://www.cdecsic.cl/datos/anuario2009/imagenes/cdec_ing.pdf

/19/ HLC & IFC: *Loan agreement signed on 23- Oct-2007 between HLC and the IFC (Investment number 25472)*, Date: 23 October 2007

CL48_19_Summary Loan Agreement.pdf

/20/ TÜV SÜV Industrie Service GmbH / HLC: Order - SN Power actions hiring TÜV SÜD for the validation of la Confluencia, Date: 16 January 2008

CL48_20 - TUV Order.pdf

/21/ Ministerio de Economía, Fomento y Reconstrucción, Chile, : *Official News of the Chilean Republic (Diario Oficial de la República de Chile) Num 38.681.- Year (Año) CXXIX- No 320.108 (M.R.)*, Date: Santiago Monday 5 February 2007

/22/ Chilectra S.A. & HLC: *Contrato de Compraventa de Potencia de Punta y Energía Eléctrica (Power Purchase Agreement)*, Date: 11 April 2007

/22/ CL48_22_Summary PPA_signed.pdf

/23/ SYNEX Consulting Engineers for IFC: *La Confluencia Revenues Assessment, Report Phase 2*, Date: 6- July-2007

/24/ Corporate Income Tax Law, Published in the "Diario Oficial" 31 December 1974 & updated on 13 February 2010:
-) Article 20, Section 1, Law 824 DFL, of Dec 27, 1974, (www.sii.cl/pagina/jurisprudencia/legislacion/basica/basica.htm)
-) Article 1 (unique), of the Law 19.753, in Sept 28,2001 (http://www.leychile.cl/Consulta/listaresultadosimple?cadena=19753).

CL48_24_Impuesto a la renta Ley No 824.pdf

/25/ *CDM Project 0248: La Higuera Hydroelectric Project, Chile*, Version 02, Date: 1 December 2005.

/26/ Ministry of Public Works, Water General Direction (D.G.A.), Administration of Hydrologic Resources Dept. *Construction permit - Construction of structures in watercourses D.G.A. no.: 2313*, Date: 27 September 2007

CL48_26_HLC-LH-CHT-00007 Hydraulic Works Authorization DGA 2313.pdf

/27/ COREMA: *Environmental Permit - Environmental Assessment Resolution "RCA", Resolucion Exenta No282/2007*, Date: August 1st, 2007

https://www.eseia.cl/documentos/documento.php?idDocumento=2292756

/28/ HLC: Various documents on energy generation in the SIC grid:

- CL39_Annual Generation SIC Power Plants (CDEC) 2008.xls

- CL39_Energy Generation SIC Power Plants (CDEC) 2006.xls
- CL39_Energy Generation SIC Power Plants (CDEC) 2007.xls
- CL39_Generation 2008_CDEC-SIC.xlsx

/29/ Secretaria Regional Ministerial de Agricultura: *Land use change – Power House, Resolution 323*. Date: 2 May 2008.

CL48_29_Resolucion 323 cambio uso suelo HLC.pdf

/30/ SYNEX Ingenieros Consultores: *http://www.synex.cl*

/31/ Various amendments to the initial Environmental Impact Report RCA No.282/07 /9/, issued by Regional Environmental Commission (COREMA) VI Region, Chile, for the project activity:

-) RCA 64 2009 - Extracción Mecanizada de áridos en río Tinguiririca, Central Hidroeléctrica La Confluencia

-) RCA 68_09 - Tratamiento de Aguas Túnel Central Hidroeléctrica La Confluencia

-) RCA 120-2009 - Nuevo Adit Riquelme y acceso.

-) RCA 122_2008 - Cambio de Trazado Camino Upper-Portillo

-) RCA 192-2009 - Línea de Media Tensión El Manzano-Portillo

-) RCA 219 - Ampliación Botadero El Shaft

-) RCA 236 - Línea de Transmisión de alta tensión 2x220 kV, La Confluencia-La Higuera.

-) RCA N°30 2009 - Botadero El Shaft

/32/ Hidroeléctrica la Confluencia S.A. : *Extract Final Investment Case – Presented to Board Memebers of La Confluencia Hydropower plant (Certified copy)*, Date 16 August 2007

/33/ Government of Chile: *Electric Law (Ley Nº20018)specifying the band of the free price projection -Nodal pricing*, Version, Date: May 19th May 2005

/34/ Various references for the determination of the Monomic Price:

-) Ministry of Economy, Development and Reconstruction, Official Daily of the Republic of Chile, No. 38.820, page 3: *Nodal Price Setting for Electricity Supply*, Date 24 July 2007

-) Ministry of Economy, Development and Reconstruction, Official Daily of the Republic of Chile, No. 38,777, main body page 7: *Nodal Price Setting to be effective from 1 May 2007*, Date: 1 June 2007

-) HLC: Analysis *based on bid results (CL30_Resum_Licit.xlsx),*

CNE data:
http://www.cne.cl/cnewww/opencms/12_Utiles/licitacion/licitaciones/licitacion20061.html.

/35/ CNE, Chile: *Nodal Price Setting for the SIC, Definitive Technical Report*, Date: October 2006,

Report for the month of October 2006 mentioning the price for the capacity at the Quillota 220 kV node

CL31_PNudo_Oct_2006.pdf

/36/ Ministry of Economy, Development and Reconstruction, Chile, CDEC-SIC: Decreto Supremo 62 (DS62), *Reglamento Transferencias de Potencia entre Empresas*

Generadoras Estableciadas en la Ley General de Servicios Eléctricos (Supreme Decree 62, Regulation for Power -capacity- Transfer among Generating Companies established in the General Law for Electrical Services) Date: 1 February 2006
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/37/ *Official data used in the emission reductions calculations, for each and all of the power plant connected to the SIC*

System Dispatch Center (CDEC) of the Central Interconnected System (SIC) www.cdec-sic.cl, Real Daily Operation data (restricted access).

CNE: *Final Technical Report "Informe Técnico Final" for the SIC (see links below)*, Date: 2006-2008
-) http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/octubre2008.html
-) http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/abril2008.html
-) http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/octubre2007.html
-) http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/abril2007.html
-) http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/octubre2006.html
-) http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/abril2006.htm

/38/ *National standard for the accuracy of the electricity meter*
CDEC-SIC: *MANUAL DE PROCEDIMIENTOS PARA LOS SISTEMAS DE MEDICIÓN Y SISTEMAS DE SUPERVISIÓN EN EL CDEC-SIC, Title IV, article 6*, page 2, Date: July 2000
CL48_39 - Manual_Medicion_Supervision.pdf

/39/ Voith Siemens Hydro, Power Generation GmbH & Co.: *Guarantees for elelctromechanical equipment (CAR2_Voith-Siemens_Technique_Volume IV extract.pdf)*, Version, Date: 19 September 2007

/40/ Hidroeléctrica La Confluencia S.A.: *Emission Reduction calculations (HLC_Emission-Reduction-Calculation_2010-05-25.xlsm)*, Date: 2 25 May 2010.

/41/ *Signature* of *EPC Contract for LA Confluencia Hydropower Project* /15/ *(CL7_EPC_extract_signed_2007-10-18.pdf)*, Date: 18 October 2007.

/42/ EPC Contractor: *As built drawing with the dimension of the surface area of the regulating pond (Autocad as-build drawing of HLCpond.pdf)*, Drawing number 05.0008 version A, Date: 8 February 2010

/43/ Tinguiririca Energia (DEV) Project Developement: *T*echnical data of the transmission line between HLC and the Tinguirirca substation (*CL9_DEV-LAT-PRO- Datos técnicos HLC-HLH-TIN _Draft_.pdf)*, Date: 10 February 2010

/44/ Government of Chile, National Energy Commission: *Informe Precio de Nudo SIC Abril 2007 Definitivo (Informe Precio de Nudo SIC Abril 2007 Definitivo.pdf)*, Date: April

2007

/45/ Benchmark reference value - Ministry of Economy, Development and Reconstruction, Sub-Secretary of Economy, Development and Reconstruction: *LAW-20220 14.09.2007, Norms: DFL-4 & DFL-4/20018*, Date: 12 May 2006.

/46/ Pacific Hydro Chile S.A.: *Start of Commercial Operation of Colmito Power Plant*, Date: 18 August 2008

/47/ Replacement of Omsic model by SDDP in Synex report.

SYNEX Ingenieros Consultores Ltda.: Correction letter to "Report Phase II Synex La confluencia 12 July 2007" *(CL-26-28_SYNEX_correction.pdf)*, Date: 5 May 2010

/48/ GHD: *IFC, Environmental and Social Audits Report, La Confluencia hydropower station, Period December 2009–February 2010*, Date: April 2010

/49/ Central Bank, Government of Chile: *Currency policy within the framework of inflationary objectives*, January 2007.

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/50/ Ministry of Economy, Development and Reconstruction, Chile, CDEC-SIC: Decreto Supremo 44 (DS44), *Modifica Decreto no. 62 de 2006, que aprueba el Reglamento Transferencias de Potencia entre Empresas Generadoras Estableciadas en la Ley General de Servicios Eléctricos (Supreme Decree 44, Modification to decree Nr. 62, which approves the Regulation for Power -capacity- Transfer among Generating Companies established in the General Law for Electrical Services)* Date: 10 January 2007

/51/ Various references on firm capacity estimation:

- Synex, *General description of methodology for firm capacity estimation based on Chilean bylaws DS62 and DS44 "Potencia de suficiencia 07jun10.pdf", and its translation: "Potencia de suficiencia 07jun10_translation.pdf*
- International Finance Corporation, *Investment Memorandum- Extract /11/: "Extract IFC Memo --HLC (part 4).pdf"*
- SN Power*: "Memo 1_firm capacity walkdown.docx"*
- SN Power*: "firm capacity walkdown.xlsx"*
- SN Power*: "Pfirme SIC.xls"*

/52/ Various documents on project location coordinates:

-) Hidroeléctrica La Higuera S.A. : "Declaración de Impacto Ambiental, Optimización Central Hidroeléctrica Confluencia" (Environmental Impact Declaration, Optimization of Confluencia Hydroelectric power plant), 24 October 2006, published in CONAMA website (Commission Nacional del Medio Ambiente – National Environmental Commission),
https://www.eseia.cl/documentos/documento.php?idDocumento=1763816

-) Coordinates for the various works in the project area (HLC Coord Obras.xls)

/53/ News coverage on the establishment of the La Confluencia power plant:

- 09-06-2010. Tinguiririca Energía sella venta de subestación Tinguiririca a Transelec en US$20 millones en Valor Futuro.pdf
- 09-06-2010. Tinguiririca Energía y Transelec cierran operación por US$20 millones en 123.cl.pdf
- 09-06-2010. Tinguiririca Energía y Transelec cierran operación por US$20 millones

en El Mostrador.pdf
- 09-06-2010. Tinguiririca Energía y Transelec cierran operación por US$20 millones en MSN Noticias.pdf
- 09-06-2010. Tinguiririca Energía y Transelec cierran operación por US$20 millones en Portal Minero.pdf
- 09-06-2010. Tinguiririca Energía y Transelec cierran operación por US$20 millones en Publimetro online.pdf
- 09-06-2010. Tinguiririca Energía y Transelec cierran operación por US$20 millones en Revista Electricidad Interamericana online.pdf
- 10-06-2010. Tinguiririca Energía en Transelec compra subestación Tinguiririca en US$20 millones en Estrategia p.10.pdf
- 10-06-2010. Tinguiririca Energía traspasa subestación a Transelec en US$20 millones en Portal Energía.cl.pdf
- 10-06-2010. Tinguiririca Energía y Transelec cierran negocio por US$ 20 millones en El Mercurio p.B4.pdf
- 10-06-2010. Tinguiririca vende activos por US$20 mills. en Diario Financiero p.10.pdf
- 10-06-2010. Tinguiririca y Transelec cierran negocio por US$20 millones en Revista Electricidad Interamericana online.pdf
- 17-06-2010. Tinguiririca Energía en Firma chilena de transmisión eléctrica Transelec compra subestación por US$20 millones.pdf

/54/ Chilean Gross Domestic Product growth in 2008: Chilean Central Bank: *Producto Interno Bruto. Serie anual. Precios constantes.*, Date: 2008 series
http://www.bcentral.cl/estadisticas-economicas/series-indicadores/index.htm,

/55/ HLC: various documents on the thermal power plant “El Colmito”:
-) IRR_HLC-Model - May 2010 - v1.7_Colmito.xlsx
-) Confirmation System Operator.pdf
-) CL14_Summary Shared Service Agreement.pdf
-) CL14_Carta_de_Sincronizacion_Colmito.tif

/56/ References to values presented in table 2 of the PDD - Extract of EPC contract /15/
HLC: *CL2_EPC_references.pdf*

/57/ GHD: *(Social and Environmental Performance) Informe de Desempeño Ambiental y Social HIDROELÉCTRICA LA CONFLUENCIA Período Diciembre 2009–Febrero 2010*, Date: April 2010.
CL47_Audit HLC REV0 Mar 2010.pdf

/58/ HLC: *Various references regarding monitoring and QA/QC procedures:*
- Control de Procedimientos OM Versión 0B-10.06.(JUN).24.xlsx
- Programa de Capacitación y Entrenamiento OM 10.07(JUL)06 FM.xlsx
- CL46_SN Power CDM monitoring and verification training_May 2010.pdf

/59/ HLC: *Various reference supporting the continued efforts to secure CDM status of the proposed CDM project activity*:
- TUV Order Complete.pdf
- HLC milestones table.docx
- Financial Propposal Confluencia_Val.pdf

- DNV validation contract Signed.pdf
- 20091023 Withdrawal letter to TÜV Sud.pdf

3.1.2 Letter of approval

/60/ Comisión Nacional del Medio Ambiente (DNA of Chile): *Letter of approval* dated 3 June 2008 and *Letter of approval* dated 26 November 2010

3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

/61/ CDM Executive Board: *Validation and Verification Manual*. Version 01.2

/62/ CDM Executive Board: *Baseline and monitoring methodology ACM0002*, version 12.1

/63/ CDM Executive Board: *Tool to calculate the emission factor for an electricity system*, Version 2

/64/ CDM Executive Board: *Tool for the demonstration and assessment of additionality*, Version 05.2

/65/ CDM Executive Board: *Guidelines on the assessment of investment analysis*, Version 03.1

3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

/66/ IPCC: *IPCC 2006 guidelines on National GHG Inventories*, 2006

/67/ UNFCCC CDM website: http://cdm.unfccc.int/index.html;

/68/ Det Norske Veritas (DNV): *Short Form Agreement between Det Norske Veritas AS and Hidroeléctrica La Higuera S.A. (Pacific Hydro) for the validation of La Higuera and La Confluencia projects*, 25 August 2005

/69/ Det Norske Veritas (DNV): *Proposal to Pacific Hydro for validation of La Confluencia project*, 24 September 2007

/70/ Hydropower Sector Expertise from DNV's Hydropower Sector Expert, Mr. Francisco Chávez V. (over 10 years working experience as Project Manager within the hydropower sector).

/71/ Power Systems Research Inc. (Brazilian company): *SDDP model – Hydrothermal dispatch model with representation of the transmission network and used for short, medium and long term operation studies of electricity systems*, © PSR 1987 - 2010 All rights reserved.
http://www.psr-inc.com.br/portal/psr/servicos/modelos_de_apoio_a_decisao/studio_opera/sddp/

/72/ Andy Philpott, Electric Power Optimization Centre, The University of Auckland: *On models for estimating the effect on prices of CO2 charges;* 26 October 2004
http://www.epoc.org.nz/papers/CO2Models.pdf

/73/ Evidence for raw material prices increase: London Metal Exchange website – www.lme.com.

3.2 Follow-up interviews with project stakeholders

On 25 November 2009, 9 March 2010, 16 March 2010, 30 August 2010 and 21 September 2010 DNV performed interviews with project stakeholders. Since the project was still under construction at the time of validation and since DNV received sufficient documentation on the project design, DNV selected to not perform a visit to the actual site of the project.

	Date	Name	Organization	Topic
/74/	2009-11-25	Knut Vrålstad	SN Power, Norway	
/75/	2009-11-25 2010-03-09 2010-03-16	Kristine Kjelaas	SN Power, Norway	• Prior consideration of CDM • Investment analysis
/76/	2009-11-25 2010-03-09 2010-03-16	Vinka M. Hildebrandt	SN Power, Chile	• Calculation of OM and BM emission factor
/77/	2010-03-16	N. Coquelet	SN Power, Chile	
/78/		Jaime Garcia	SN Power, Norway	
/79/	2010-08-30	Knut Vrålstad	SN Power, Norway	Clarification of various CLs and CARs.
/80/		Kristine Kjelaas	SN Power, Norway	
/81/	2010-09-21	Jaime Garcia	SN Power, Norway	Firm capacity estimation

3.3 Resolution of outstanding issues

The objective of this phase of the validation was to resolve any outstanding issues which needed be clarified prior to DNV's positive conclusion on the project design. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the project activity "Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A." in Chile is enclosed in Appendix A to this report.

A corrective action request (CAR) is raised if one of the following occurs:

(a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;

(b) The CDM requirements have not been met;

(c) There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.

3.4 Internal quality control

The validation report underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

				Type of involvement						
Role	***Last Name***	***First Name***	***Country***	Administrative	Desk review	Interviews	Reporting	Supervision of work	Technical review	Sectoral competence
Project manager	Lehmann	Michael	Norway	✓						
Technical team leader (CDM validator)	Lehmann	Michael	Norway		✓	✓	✓	✓		✓
Sector expert / GHG auditor	Chávez V.	Francisco	Norway		✓	✓	✓			✓
Technical reviewer	Antunes	Felipe	Brazil						✓	✓

The qualification of each individual validation team member is detailed in Appendix B to this report.

Validation Protocol Table 1: Mandatory Requirements for CDM Project Activities		
Requirement	***Reference***	***Conclusion***
The requirements the project must meet.	*Gives reference to the legislation or agreement where the requirement is found.*	*This is either acceptable based on evidence provided (**OK**) or a **corrective action request (CAR)** if a requirement is not met.*

Validation Protocol Table 2: Requirement Checklist				
Checklist question	***Reference***	***Means of verification (MoV)***	***Assessment by DNV***	***Draft and/or Final Conclusion***
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD	*Gives reference to documents where the answer to the checklist question or item is found.*	*Means of verification (MoV) are **document review (DR)**, **interview (I)** or any other follow-up actions (e.g., on site visit and telephone or email interviews) and **cross-checking (CC)** with available information relating to projects or technologies similar to the proposed CDM project activity under validation.*	*The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.*	*OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A **corrective action request (CAR)** is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A **clarification request (CL)** is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A **forward action request (FAR)** during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/ or clarification requests	***Ref. to checklist question in table 2***	***Response by project participants***	***Validation conclusion***
*The **CARs** and/ or **CLs** raised in Table 2 are repeated here.*	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants to address the CARs and/or CLs.*	*The validation team's assessment and final conclusions of the CARs and/or CLs.*

Validation Protocol Table 4: Forward Action Requests		
Forward action request	***Ref. to checklist question in table 2***	***Response by project participants***
The FARs raised in Table 2 is repeated here.	*Reference to the checklist question number in Table 2 where the FAR is explained.*	*Response by project participants on how forward action request will be addressed prior to first verification.*

Figure 1 Validation protocol tables

4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the project design as documented and described in the PDD, version 8 dated 1 November 2010.

4.1 Participation requirements

The project participant from the host Party Chile is Hidroeléctrica La Confluencia S.A. of Chile. No participating Annex I Party and project participant has yet been identified. The host Party (Chile) meets all relevant participation requirements and has ratified the Kyoto Protocol.

A letter of approval (LoA) /60/ was issued by the DNA for Chile (Comisión Nacional del Medio Ambiente – CONAMA) on 3 June 2008 and an updated LoA was issued on 26 November 2010, authorizing Hidroeléctrica La Confluencia S.A. as project participant and confirming that the project assists in achieving sustainable development.

The letters of approval were received from the project participants. DNV does not doubt the authenticity of the letters of approval. DNV considers the letters are in accordance with paragraphs 45- 48 of the VVM /61/.

The project is developed by Hidroeléctrica La Confluencia S.A. and the validation did not reveal any information that indicates that the project can be seen as a diversion of official development assistance (ODA) funding towards Chile. The project does not involve public funding. It has been verified from the Extract of the Confidential Information Memorandum issued by the IFC /11/ (Extract IFC Info Memo - HLC (part 1).PDF page 9), that the total investment capital is financed by IFC loans (60.9%) and the project participant's equity (39.1%).

4.2 Project design

The proposed project activity (further referred to as the project) is a new run of the river type hydropower project with several water intakes and a small pond. The project is located south-east of the capital of Chile, Santiago, the nearest city is San Fernando which is approximately 70 km northwest of the project site, and the nearest town is Puente Negro located in the same direction, approximately 30 km form the site. The coordinates of the project's power house are Lat 34.82972222 S and Long 70.55138889 W, which concurs with the data presented it the Environmental Impact Declaration /9/ and HLC Coordinates of works /52/, The location of the project allows for the utilization of the hydrological resources from the Tinguiririca, Portillo and Azufre rivers and their tributaries, which will provide an estimated design flow of 52.5 m^3/s /11/. The design of the project includes a small off-river regulation pondage of 1.2 million m^3 live storage for the flow coming exclusively from the Tinguiririca river /11/ and a surface are of 140 512 m^2 /42/. Water from the Portillo branch can be transferred to the Tinguiririca storage pondage in low flow periods to maximize generation during peak periods and provide maximum plant firm capacity rating /11/. Although the project creates a new pond, bearing in mind its high power density of 1 161.6 W/m^2, and its small volume

(maximum few operating hours at full flow), it can be confirmed that in reality the hydropower plant is of the run of the river type /70/.

The total installed capacity of the project activity is 163.22 MW. This capacity will be obtained via two identical Francis turbines and generators, and will provide at the San Fernando substation (grid connection point reached via the switchyard of La Higuera hydropower project /11/) an equivalent to 154.3 MW of net capacity, and a total predicted net electricity supply of 656 GWh/year /15/.

Based on the hydrological conditions and the catchment design of the project, the hydropower plant is expected to operate at or close to its full capacity from November to February (high plant load factors), while the period from April to September is the dry season leading to an expected range of plant load factors between 18-30%. The months of March and October are transitional months with very variable hydrology, resulting in a very wide range of plant factors /11/.

The electromechanical equipment is supplied by the European company Voith Siemens which has many years of experience in the manufacturing and installation of hydropower equipment /70/. The financial lifetime is 20 years while the designed operational lifetime is 30-50 years. /11/

The starting date of the activity is 21 December 2007, which is based on the date of notice to proceed given to the EPC contractor /16/ and is the earliest of any real actions or financial commitment by the project proponent.

The project developer has selected a renewable crediting period with the first 7 years crediting period starting on 1 April 2011 or the date of registration, whichever is later, with an estimated of the total emission reduction of 2 961 840 tCO_2e over the first seven years crediting period. The annual average emission reductions have been estimated to be 423 120 tCO_2e/year.

The project description to the consideration of DNV is complete and accurate, and uniquely identifies the project activity.

DNV considers the project description of the project contained in the PDD to be complete and accurate. The PDD complies with the relevant forms and guidance for completing the PDD.

4.3 Application of selected baseline and monitoring methodology

The project applies ACM002, version 12.1, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” /62/. The applicability of the methodology is justified because the proposed project:

a) is the installation of a new hydropower power plant (run of the river), as verified by reviewing the EIA approval /9/.
b) is a grid-connected renewable power generation which has been verified from the interconnection approval /authorization /permission letter from the TSO /17/.
c) The grid’s geography and system boundaries and characteristics are readily available through the electricity sector’s Regulatory bodies: CNE (www.cne.cl) and CDEC-SIC (www.cdec-sic.cl/imagenes/contenidos/File/documentos/mapa_sic.pdf). This is also confirmed by the IFC IM section 7.02 “Characteristics of the Chilean Electric Systems” /11/

d) Given that the project is a newly built run of the river hydropower plant (EIA approval /9/), the project activity does not involve any retrofit or refurbishment.
e) Given that the project is a newly built run of the river hydropower plant (EIA approval /9/), the project activity does not involve any capacity addition, retrofit nor replacement to existing power plant(s).
f) The Project does not involve any fuel switch at the project site; It is a new run of the river hydropower project as stated in the EIA approval /9/
g) The project is connected to the SIC whose geographical and system boundaries are clearly identified and information on the characteristics of this grid is available /11/.
h) In addition, in order to meet the applicability criteria, power plant should be with power density greater than 4 W/m^2. It has been verified via data from the EPC contract /15/ that the project is a run of the river hydropower plant and only a small pond is created resulting in a power density of the Project of 1 161 W/ m^2.

The methodology applied to the project ACM0002, version 12.1, is appropriate for the project activity, namely, electricity generation from renewable source (hydropower) connected to a grid. Furthermore, project complies with the applicability criteria as presented here above, and it is therefore DNV's opinion that the selection and applicability of the chosen methodology is appropriate for the project activity.

The assessment of the project's compliance with the applicability criteria of ACM0002 (version 12.1) are documented in detail in section B.2 of Table 2 in the validation protocol in Appendix A to this report.

4.4 Project boundary

The sources and gases included in the project boundary are as follows.

	GHGs involved	*Description*
Baseline emissions	*CO_2*	Emissions from electricity generation in fossil fuel-fired power plants belonging to the SIC that is displaced due to the project activity.
Project emissions	*None*	As the power plant is a run of the river with a small pond whose power density is 1 161 W/m^2 i.e. greater than 10W/m^2, there are no project emissions.
Leakage	*None*	No leakages apply for methodology ACM0002

The selected sources and gases are justified for the project activity.

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by ACM0002 (version 12.1).

The electricity system in Chile is divided in four areas /11/ /18/ without interconnection in between them:

- The Great Northern Interconnected System ("SING"): The SING supplies the northern zone of the country, from Arica in the north to Antofagasta in the south. The distance between both locations is approximately 700 km /11/.
- The Central Interconnected System ("SIC"): The SIC supplies the central zone of the country, from Taltal in the north to Quellón (in the Chiloé Island) in the south. The distance between both locations is approximately 2,100 km /11/.
- The Aysén Electric System: The Aysén Electric System supplies the main cities in the area through hydropower plants and diesel units /11/.
- The Magallanes Electric System: The cities located in the Magallanes area (Punta Arenas, Puerto Natales and Puerto Porvenir) are supplied by thermal generation based on natural gas /11/.

The project is connected to the SIC grid /17/ which supplies the central zone of Chile (including the capital city of Santiago) with electricity /11/ /18/. Therefore, the geographical boundary of the project will be the area of the project activity and all the power plants connected physically to the SIC grid. The boundary of the SIC grid electricity system is then limited to the spatial extent of the power plants connected to the SIC grid, and that can be dispatched without significant constraints /63/, and as per the methodology /62//63/, all the references to emissions within the baseline shall consider the plants connected to the SIC grid.

4.5 Baseline determination

As per the approved methodology ACM0002, version 12.1, the baseline scenario is the amount of electricity generated within the grid to which the project is connected to (SIC /11/), equivalent to the amount supplied to the grid by project activity, given that project activity is the installation of a new grid-connected renewable power plant. This means that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. The La Confluencia hydropower project is designed to have an installed capacity of 163.22 MW and an estimated net electricity supply of 656 GWh.

It is DNV's opinion that the selection of baseline for the project activity (the emissions produced by the power plants connected to the SIC grid and new additions, while generating an amount of electricity equal to the one generated by the proposed project activity) and the definition of the geographical and spatial boundaries of the grid where the power plant of the proposed project activity is connected to (SIC /17//18/) are both in compliance with the applied methodology and corresponding tools /62//63/.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PDD and/or supporting documents. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the PDD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed

reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD

4.6 Additionality

The project proponent used the "Tool for demonstration and assessment of additionality", version 05.2 /64/ in order to assess the additionality of the proposed project activity.

4.6.1 Evidence for prior CDM consideration and continuous actions to secure CDM status

Discussions regarding the project starting date:

The starting date of the project activity is 21 December 2007, which is the earliest financial commitment made for the project activity, as evidenced by the dates of the signature of the construction (EPC) contract /15/, which includes the order for the turbines and generators, and the notice to proceed given to the EPC contractor /16/. The parties of the EPC contract /15/ are HLC and JVHT (JVHT, is a joint venture between HOCHTIEF of Germany and Tecsa of Chile), the latter to be referred to as the EPC contractor /11/. As per EB41 paragraph 67 this start date is the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity.

DNV was able to arrive at this opinion based on review of the financial commitments made available by the project developer, which included:

1. The above mentioned EPC contact /15/, and,

2. The Confidential Information Memorandum issued by the IFC regarding the application for syndicated loans for the project /11/.

Prior consideration of CDM:

The Loan Agreement between the Hydroeléctrica La Confluencia S.A. and International Finance Corporation (IFC) was executed on 23 October 2007 /10//19//65/. Notice to proceed for the EPC Contractor was given on 21 December 2007 /16/, which is taken as the start of the project. The below evidences were provided to DNV to demonstrate that that CDM benefits were a decisive factor in the decision to proceed with the project:

- DNV signed a contract with Hidroeléctrica La Higuera S.A., owned by Pacific Hydro, which is one of the owners of Hydroeléctrica La Confluencia S.A., for the validation of the La Higuera and La Confluencia projects on 25 August 2006 /68/. This validation contract demonstrates that the CDM was considered in early stages of the project.
- The Information Memorandum of July 2007 between the International Finance Corporation and Pacific Hydro, SN Power and Hidroeléctrica La Confluencia S.A. considered in its investment analysis CER revenues /11/.
- Since the earlier contract expired, DNV submitted on 24 September 2007 a new proposal to Pacific Hydro for the validation of La Confluencia project /69/.
- The Final Investment Case, a document distributed to Board Members of the Board of Hidroeléctrica La Confluencia S.A. on 16 August 2007, includes a recommendation to

approve to commit to the EPC contract and the IFC loan as the "project IRR (assuming CER revenue at EUR 15.0) provides a sound project return" /13/.

- At the Board Meeting of SN Power on 27-28 August 2007 the board endorsed the proposition from the administration to invest in the development of La Confluencia Hydroelectric Project, through its 50% ownership in the joint venture Hidroeléctrica La Confluencia S.A. The board bases its decision on a "very high probability that the project will receive revenues from the sale of carbon credits under the Kyoto Protocol" /14/.

Furthermore, the following evidence provided, demonstrates that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation:

- SN Power contracted TÜV SÜD Industrie Service GmbH for the validation of the "La Confluencia Hydroelectric Project, Chile" and the first version of the PDD for the project was published for comments by Parties, stakeholders and NGOs on 31 January 2008 /20/. Validation of the project commenced thus only few days after the project start date. SN Power eventually terminated the validation contract with TÜV SÜD Industrie Service GmbH (Withdrawal letter to TÜV Sud dated 23 October 2009 /59/) and contracted DNV on 21 December 2009 for the validation of La Confluencia Hydroelectric Project /59/.

It is thus DNV's opinion that adequate evidence was presented to conclude that CDM benefits were a decisive factor in the decision to proceed with the project and that continuing and real actions were taken to secure CDM status for the project.

It is DNV's opinion that the proposed CDM project activity complies with the requirements of the latest version of the guidance on prior consideration of CDM.

4.6.2 Identification of alternatives to the project activity

The VVM /61/, the applied methodology /62/ and the tool to estimate the emission factor of an electricity system /63/ state that for project activities that consist of a new installation of a grid-connected renewable power plant, the baseline scenario is defined as "the electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the Combined Margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Therefore, no alternative scenarios are necessary to determine, and it is DNV's opinion that the baseline is adequately selected for the proposed project activity.

4.6.3 Investment analysis

Choice of approach

The project proponent selected the investment analysis as the method to demonstrate the additionality of the project, and within this, the benchmark analysis (comparison of IRR) given that neither of the other remaining options of the applied methodology, simple cost analysis and investment comparison are applicable to the project activity. The simple cost analysis requires that no revenues shall come from the project activity, while the project will benefit from the sale of electricity, and the investment comparison requires a comparison of the project activity with the baseline scenario considering the later as an specific investment,

while the SIC grid is obviously not an specific investment. Thus the choice of approach by the project proponent is appropriate.

Benchmark selection

A project will be financially attractive or acceptable when the project IRR (financial measure of the returns of the project) is better than the benchmark IRR used. The benchmark IRR selected shall be for a project of similar conditions and premises than the one under evaluation for the comparison to be appropriate.

In the case of the proposed project activity, the indicative benchmark to be used for the expansion of the generation and transmission assets (and regulated prices at generation level) has been established by the Ministry of Economy, Promotion and Reconstruction in the Article 174 of the DFL No 4 (Decree with the Force of the Law Nº 4) of 12 May 2006 /45/. The Law establishes an indicative annual discount rate of 10% for the financial estimations of the indicative generation and transmission expansion (plans) of the Chile and regulated prices at generation level, and consequently it sets a benchmark for potential investors looking to invest in generation and transmission assets.

The law was in force and valid at the time of the investment decision by the project participant, and thus the 10% benchmark IRR was adopted for the proposed project activity.

Input parameters

The input parameters used for the investment analysis are as follows:

Parameter	Value	Units	Evidence/Reference used to crosscheck the parameter
Installed Capacity	163.22	MW	EPC contract /15/
Firm Capacity (aggregated - PPA and capacity at nodal price)	113	MW	SYNEX Report /23/ General description of methodology for firm capacity estimation based on bylaw DS62 /49/ and DS44 /50/, SYNEX /51/. Firm capacity walk down, HLC /51/.
Net annual electricity generation (average). (aggregated - PPA and energy at spot price)	656	GWh/yr	IFC Investment Memorandum /11/ PPA /22/ SYNEX report /23/
Start date for supply of electricity	1 January 2011	-	PPA /22/ IFC Investment Memorandum /11/ Annex 2 Financial Model /12/.
Financial	20	Years	IFC Investment Memorandum /11/

Project Lifetime			Annex 2 Financial Model /12/
Total Investment	315.16	Million USD	IFC Investment memorandum /11/ Annex 2 Financial Model /12/ EPC contract /15/ SYNEX report /23/ Final Investment Case /32/ —adjusted assuming none financing
Income Tax	17	%	Article 20, Section 1, Law 824 DFL, of Dec 27, 1974, (www.sii.cl/pagina/jurisprudencia/legislacion/basica/basica.htm) /24/ Article 1 (unique), of the Law 19.753, in Sept 28,2001 (http://www.leychile.cl/Consulta/listaresultadosimple?cadena=19753) /24/.
Energy Price (average monomial energy and power price over the time horizon of the investment analysis) (aggregated for spot market and PPA)	43	USD/MWh	The energy price was calculated by SYNEX via the widely used SDDP model for dispatch scheduling of hydro-thermal electricity systems, and it is the basis for the revenue calculations presented in: - the financial analysis of the project activity /2/, - the investment memorandum issued by the IFC and the PP /11/ /12/ for presenting the project to potential investors, and, - for the PPA between HLC and Chilectra /22/ (distribution company in the SIC grid of Chile to which the La Confluencia hydropower plant is connected to).
O&M costs	4.58	Million USD/year	IFC investment memorandum, Annex 2 Financial Model /12/

Each of the input parameters to the investment analysis has been assessed as follows:

- Pricing of the sources of revenue: Chile has a deregulated (open) power market, where the prices are mainly driven by the spot prices at the connection point (the connection node of the electricity grid to which the electricity is delivered), and the purchase contracts (PPAs) made between the market participants. Therefore, it will be discussed here the prices used in the possible sources of revenue relevant to the project activity. In this respect, the project activity sources of revenue are sales to the spot market and the PPA (page 101 of IFC IM Final /11/, page 4 of the SYNEX report /23/ and the investment analysis /2/), each for both sales of energy and firm capacity. Pricing of energy for the spot market and firm capacity – The tariffs used in the financial analysis of the project activity were forecasted by SYNEX /11/ /12/ using the SDDP model for dispatch scheduling of thermal-hydro electricity systems /71/, developed by the Brazilian company Power Systems Research Inc. /71/. The model is widely used in South America /71/ and provides a forecast of the spot prices (short-

run marginal costs) for a hydro-thermal electricity system /71/. The same energy price was used in the Investment Memorandum used by the IFC (and the PP) to present the La Confluencia hydropower project to potential investors /11/ /12/. The price for energy was also compared with the spot price reported in the CNE Node Price Report /35/.

The price for these type of revenues is based on the spot price at the specific connection node where the energy is delivered (for the energy spot market sales the Tinguiririca 220 kV node, and for the PPA (see below) the Alto Jahuel 220 kV and Cerro Navia 220 kV nodes), as calculated by SYNEX /11/ /12/ via the SDDP model /11/. In the case of the project activity the energy (electricity) is dispatched from the project site to the switchyard of the La Higuera hydropower project /25/ via an 18 km transmission line. From there it will then be delivered to the central grid, Central Interconnected System –Sistema Interconectado Central ("SIC") – at the Tinguiririca substation near the town of San Fernando (connecting node), via a 38 km transmission line.

The determination of energy and firm capacity prices (price forecast) for the project activity is a very complex exercise given it is located in a deregulated market with nodal pricing system. In this case the spot price at a given node depends, among others, of the current (availability) and future (expectations) demand and energy at the specific node under consideration, the effect of the rest of the grid at any given time on this specific node (transmission and distribution system characteristics and utilization, and the effect of other nodes which also are each subject to their respective conditions and considerations), and the corresponding considerations specified by the law.

DNV has reviewed the report by SYNEX and has assessed the assumptions made by SYNEX. Considering the following, DNV was able to confirm that the electricity tariff used in the financial analysis of the project activity as forecasted by SYNEX /11/ /12/ is appropriate:

- the price forecast was done through the SDDP model which is widely used in Chile /71/ for this purpose,
- the forecast was done by SYNEX Ingenieros Consultores /30/, a Chilean independent 3rd party experienced in the energy sector and power systems analysis, including technical and economical analysis and price forecast, with knowledge on the Chilean energy sector,
- the price forecast was used by the International Finance Corporation in the investment memorandum to attract investors (lenders) to the project activity /11/ /12/, and,
- the simulation and its results have been assessed by DNV's hydropower sector expert based on his 12 years of experience working with hydropower projects and electricity systems /70/.

The following section provides a general description of the simulation and the main parameters selected, for information purposes. Parts of this text have been taken directly from the SYNEX report /23/.

As it has been mentioned above, the simulation of the behaviour of the system is necessary for determining the price forecast. Such simulation implies the selection of reasonable scenarios that can be expected within the time horizon of the analysis or simulation. The simulation presented in the SYNEX report /23/, considered the following 4 scenarios, from which, the Base Case scenario considered long term load growth rates, and moderate prices for fuels, which induced moderates electricity prices for the system at the moment the analysis was carried out, resulting a more realistic and thus more conservative stand point:

Base Case Scenario: This scenario was defined in accordance to the terms of reference set by IFC, which also defined it as the Base Case scenario /23/. The main drivers of this case are the following:

a) 3.0% GDP growth, resulting in 5.6% load growth.

b) Fuel long term prices: WTI 46 US$/bbl, FOB coal 40 US$/ton, LNG 6.3 US$/MBTUhhv

c) Capital cost to decide investments: 9% after tax in real terms.

d) Generation expansion based on coal fired power plants (coal price 55.5 US$/ton at the plant) and hydroelectric power plants.

e) Gasandes pipeline: Historical gas disruption that affected existing combined cycles in 2006 (equivalent to an average of 1.5 CC without gas per year) was considered for projecting gas availability until the expiring dates of the gas supply contracts (2013). Absence of Argentinean natural gas from 2014 on. Existing combined cycle gas turbines burn diesel when gas is unavailable in 2007-2013. From 2014 on they burn LNG.

f) Gas Pacífico pipeline: gas availability until 2017 pursuant to Innergy gas supply contract duration. Gas disruption of Campanario GT (SouthernCross) in accordance to information provided by the CNE and the project developer respectively.

g) In terms of the PPA's with Chilectra, the evaluation of the Base Case was done with the maximum contracted energy. This case is more conservative from the investor perspective when dry hydro conditions are analyzed, but also from CDM perspective given that the variation of the IRR among the 3 scenarions (maximum, base case and minimum) is only 0.01% (see CL 14), while as per the sensitivity analysis the variation of the output would have to be 29.8% for the project IRR to reach the benchmark.

Over Capacity scenario: In this case some hydroelectric power plants commissioning dates are advanced. The result is that contract and spot prices during 2014-2017 period are lower than coal units development cost.

Current Fuel Prices scenario: Fuel prices were kept constant, in real terms, equal to March 2007 prices.

LNG Expansion scenario: All basis are the same than the Base Case, except the LNG price that is equal to 4.0 US$/MBtu, from 2014 onwards. In these conditions, the generation expansion is based on combined cycle gas turbines instead of coal units.

In addition to the 4 scenarios above, the analysis also made consideration to the demand, and the forecast assumes an energy growth rate of 5.6% in the long term. This is in line with a GDP annual growth of 3% from 2008 /54/, in accordance to IFC estimation on Chilean economic growth.

The determination of the price forecast done by SYNEX upon the chosen "Base Case" scenario was made with basis on the Stochastic Dynamic Dual Programming (SDDP) model to optimize the generation system expansion, simulate the operation of the SIC and obtain the price forecast/11/ /23/. Following is the summary of the simulation and the results obtained /23/:

In the determination of generation expansion sequence new projects commitments were considered since these affect market prices, both short-term prices – based on spot market dynamics – and long term prices – based on contract market. Several main considerations for the generation expansion have been in the analyses which are commented in the SYNEX report /23/. Since the model (software) used, SDDP is a dispatch model, not a generation-transmission expansion model, an iterative process has been conducted, in order to define the investment sequence of the projects. Initially a sequential analysis is carried out by means of backward recursion, i.e. from the future to the present, to define the optimal strategy of operation for thermal and hydroelectric plants, based on an initial assumption of levels in the reservoirs. For each stage, a linear program is solved which defines the optimal strategy for minimizing the operation cost of the system. Thus, initial water values for each reservoir are calculated for each stage.

Afterwards, a simulation is performed using the water values found, in order to determine new levels for the reservoirs at each stage. The iteration of these processes of analysis (recursion and simulations) converges to the determination of optimal strategies for the system dispatch and of system's short-run marginal costs for each stage and each hydro condition (43 historical hydro conditions (1960-2002) have been simulated), as well as their expected values.

The results of the model are, among others:

- The dispatch of all power plants
- The thermal costs
- The energy short-run marginal costs in each country
- The incomes of power plants selling all the energy at the short-run marginal cost

These results are obtained on a monthly basis, for several hourly blocks representing the load duration curve and for each of the hydro conditions simulated.

The temporal variation (seasonal and daily) of demand is represented in the SDDP in monthly duration curves in four blocks per year. Also the characteristics and restrictions of the transmission lines between the nodes are reflected in the dispatch which takes into consideration both, the transmission capacity limitations and losses on the lines. The thermal units are represented with their individual features of peak capacity, variable cost and availability. Their variable cost takes into consideration specific consumption, the non-fuel variable cost and the evolution of fuel prices. Their availability takes into consideration the forced outage rate, which reduces peak

capacity, and scheduled maintenance, which is incorporated into the model. Restrictions as to the minimum capacity to be generated have also been taken into consideration for steam thermal units.

Regarding the hydroelectric power plants, the SDDP model permits a detailed representation of the plants, allowing for an optimal operation of the reservoirs together with the other power plants in the system. The model takes into consideration the locations of power plants in one single basin and their joint operations, the characteristics of the reservoir (volume, leakage, evaporation) and operation restrictions (minimum and maximum volumes of flow, variation of performance with level of reservoir, etc.).

The revenues of the project activity and La Higuera hydropower plant /25/ have been determined as the addition of the following:

1) The project activity generation business in the spot market: The energy and firm capacity are sold in the spot market. Energy generation and firm capacity are valued at the energy and capacity spot prices prevailing in the connection node, Tinguiririca 220 kV.

   The costs of the generation correspond to the project activity's fixed operating costs, which include operation and maintenance, transmission charges, CDEC fee, general costs, among others.

2) PPA 1 and PPA 2 with Chilectra: The Joint Venture will perceive the incomes for selling energy and capacity to Chilectra at the agreed prices. In order to comply with these contracts, the Joint Venture has to "purchase" in the spot market energy and firm capacity at the supply nodes (Alto Jahuel and Cerro Navia), at the corresponding spot prices. The net benefit of these contracts has been called in the SYNEX report /23/ "commercial margin", which is calculated as the difference between the contract's sales and the purchases in the spot market to supply the contract. The sum of the hydroelectric power plants spot revenues, the gas turbine net revenues and the commercial margin determines the total operating revenues of HLH (Joint Venture). As indicated in page 14 of the SYNEX Report /23/, for the price forecast calculations of the IFC base case, in terms of the PPA's with Chilectra, the evaluation was done with the maximum contracted energy. This case is more conservative from the investor perspective when dry hydro conditions are analyzed (see point g, under base case scenario above).

The electricity system in Chile is based on nodal pricing. The energy node prices have been determined using the energy spot prices, load growth and the generation expansion obtained from simulation results of the SDDP Model, and a free price projection based on the long-term energy price. The theoretical node prices (TNP) obtained with the SDDP model /71/ (see CL 24) were adjusted, whenever they were out of the band of the free price projection (FP), according to the amendments to the Electric Law (Ley Nº20018, May 19th 2005) /33/

The simulation exercise based on the above resulted in an average development cost, for a base load operation, of around 54 US$/MWh in Alto Jahuel 220 kV node. In short, the projected system expansion was then based on LNG Combined

Cycle (CC-LNG), Coal power plant with scrubber (TV-Carbon_scrubber) and Diesel Open Cycle Gas Turbines (TG-Diesel) type of units. The corresponding monomic system price at the Quillota 220 kV node, at 75% load factor is around 60 US$/MWh. This price is below the average monomic price informed in the tender for supplying distribution companies in the SIC, which was around 64 US$/MWh /34/. However, he difference is explained basically by the fact that the SYNEX report /23/ (study) has considered a drop in FOB coal price from 52 US$/ton (prices at the time of the elaboration of the report) to 40 US$/ton (projected price from 2008 onwards).

With respect to the capacity prices, the simulation results show a price of 7.3 US$/kW-month at the Quillota 220 kV node. Such estimation was considered in accordance to CNE October 2006 Node Price Report /35/.

Power Purchase Agreement PPA: The PPA /22/ presents the negotiated prices between the project developer and Chilectra S.A. for both energy and firm capacity. The actual prices presented have been aggregated with the spot prices. However, DNV has crosschecked the value of the prices indicated in the PPA /22/ against the breakdown of the prices used in the investment analysis calculations /2/, and found them to be consistent.

- Installed capacity: The installed capacity is one of the basic parameters influencing the value of expected revenues /70/. The 163.22 MW value is consistent with the evidence provided, as well as some other 3rd party documents such as the EPC contract /15//56/, demonstrating all together that the value is real and reasonable for the conditions of this run of the river hydropower station.
- Firm capacity: The methodology to determine the power plant's firm capacity in Chile, has been defined by the CNE in accordance to a regulation enacted on 1 February 2006 /49//50//51/. The methodology is based on four steps and it is intended to reflect the following concepts:
  - The firm capacity is calculated taking into account a period that considers the whole year (not only 5 months as the previous methodology);
  - The firm capacity of a hydro power plant take into account the way the energy can be dispatched in a load duration curve (not a fixed number of hours);
  - Fuel availability and fuel supply issues are taken into account for thermal power plants.

  As indicated in the SYNEX Report /23/, the estimation of the project's firm capacity is as follows: it is based on the inflow from April to March, which corresponds to the two driest hydro conditions of the series (1968/69 and 1998/99), the maximum capacity was allocated according to the load curve, which may vary annually depending on the growth rate of the demand and the installed capacity in the grid system (SIC grid for the project activity, IFC Investment Memorandum /12/). It then calculated the initial firm capacity taking also into account maintenance and self consumptions. The preliminary firm capacity is then the result of a probabilistic analysis that consider initial firm capacity and the forced outage rate of both thermal and hydroelectric power plants. Finally, this preliminary firm capacity is adjusted so that the sum of the firm capacities for all the power plants considered is equal to the peak demand during the

hours considered to determine the firm capacity. The resulting firm capacity is 113 MW /23/.

- Net annual electricity generation (average): This parameter is the final result of conjugating the basic technical, hydrological and operational parameters of the hydropower station /70/. The net annual electricity generation is, together with the electricity price, the main driving factor for the expected revenues of the project activity. In the case of the project activity the energy (electricity) generated will be dispatched from the project site to the switchyard of the La Higuera hydropower project /25/ via an 18 km transmission line. From there it will then be delivered to the central grid, Central Interconnected System –Sistema Interconectado Central ("SIC") – at the Tinguiririca substation close to the town on San Fernando (connecting node) via a 38 km transmission line. The SDDP /71/ analysis considers the monthly gross generation of the project activity for each hydro condition as an input to the dispatch model The generation injected to Tinguiririca substation in the SIC substation, close to San Fernando, considers then internal consumptions, transformer losses and transmission losses and power plant outages. Thus value of the energy to be delivered (measured) at the substation is 656 GWh/year /2//11//12//23//33/. This value is consistent with 3rd party documents such as the IFC investment memorandum for syndicated B loans /11/ and the corresponding Annex 2 /12/, as well as the annual energy output guaranteed by the EPC contractor /11//15/ (673,2 GWh/year at the La Higuera switchyard) demonstrating all together that the value is real and reasonable for the conditions of this run of the river hydropower station. In accordance with the Guideline for the reporting and validation of plant load factors (version 01), DNV was able to confirm that the annual electricity generation applied in the investment analysis was provided to IFC while applying for project financing and that the annual electricity generation was determined by a third party contracted by the project participants.
- Power Purchase Agreement – PPA: HLC has signed a power purchase agreement ("PPA") /22/ with Chilectra S.A., local distribution company within the SIC grid. Chilectra is the largest electricity distribution company in Chile /11/. Chilectra will purchase the energy and firm capacity from the Project for a term of 13 years from the initial date of supply, 1 January 2010 /22/. The agreement has predefined monthly commitments for the supply of energy and firm capacity, with the option to increase the purchase of energy and firm capacity within specific limits and for specific periods. Within the SDDP simulation, the evaluation of the PPA's with Chilectra was done with the maximum contracted energy /23/ which is a more conservative case from the investor perspective when dry hydro conditions are analyzed.
- Project Lifetime: For this parameter the project participant has used as reference the same timeframe that is used in the investment analysis presented in the Annex 2 -Financial Model- of the IFC Investment Memorandum /12/, namely 20 years. However, these type of installations (projects) normally have a much larger useful economic life, as evidenced by the 40 years accounting depreciation time stated in the IFC Investment memorandum /11/. Hence, in accordance with the Guidelines on the assessment of investment analysis /65/ a residual value of 182 MUSD has been assumed in the investment analysis. DNV finds this value to be reasonable and representative for the project activity.

- Total investment cost: DNV has verified that the project's total investment cost is 315.563 million USD as per the HLC Final Investment case /13/ and the IFC IM Final /11/. This amount differs from those shown in the previous references (/13//11/) by disregarding the financing costs (*i.e.* assuming no financing), which is a conservative assumption. Although the IFC IM Final /11/ mentions that the project developer was considering to exclude the 4 million USD Development Fee from the financial plan of the project activity, the PP has presented evidence /2/ showing that the amount was actually considered for the investment decision in all three scenarios, worst case, base case and best case. However, the effect of the development cost on the financial IRR of the project is rather marginal, and the IRR would be 7.85% instead of of 7.75% if the US$4 million of development fee would not be considered as part of the total investment cost. Hence, the IRR would still remain under the benchmark value and so additionality would not be affected. DNV has verified the value of the EPC contract of 242.894 MUSD /15/, which corresponds to 77% of the total investment costs. DNV considers the investment cost assumption used in the investment analysis reasonable.
- Tax: In the case of the project activity the only tax applied in the calculation is the corporate income tax. The PP has used a corporate income tax of 17% in the investment analysis which is in accordance with the law /24/ that was in force at the time of the investment decision. The investment analysis showing negative net cash flows until the last year of the time horizon (20^{th} year equivalent to 2026) does not incur taxes until that last year. The main reason for the negative cash flows is the carrying forward of the initial capital expenditures and the slow recovery provided by the project revenues. Also for the tax calculation the depreciation is discounted for each year but the residual value of the assets is added at the end of the time horizon. Finally, the interest payment is included in the total cost and is in accordance with the latest Guidelines on the assessment of investment analysis /65/.
- O&M costs: The O&M costs are estimated by the project participat (which is experienced in the field of hydropower generation) based on the O&M costs of the La Higuera project /25/ (also owns by the project participants), and represent less than 2% (1.6%) of the total investment costs, which is a reasonable value for the hydropower industry according to the hydropower sector experience from DNV's hydropower sector Expert, Mr. Francisco Chavez. /70/. Furthermore from the IFC investment memorandun /11//12/ it can also be seen that the IFC also recognizes these values as justifiable for the proposed CDM project activity. Likewise, these values are also used by SYNEX /30/ in the energy price estimation /23/, and as explained above in this report, SYNEX is a Chilean independent 3rd party company experienced in the energy sector and power systems analysis, including technical and economical analysis and price forecast, with knowledge on the Chilean energy sector.

Calculation and conclusion

The investment analysis /2/ presented for the project activity calculates the project IRR with and without CDM benefits over a 20 years period, as follows:

- It takes the revenues presented in the SYNEX report /23/ and calculates backwards the prices for energy and capacity, since the results from the SDDP model are prices and revenue, among other. However, the prices used does not concur exactly with the prices presented in the SYNEX report /23/ given that one is in real terms (adjusted for

inflation) while the other one is in nominal value, and appropriate justifications for this has been provided by the project participant;

- The values are presented in real terms (corrected for inflation).
- In the SYNEX report /23/ a "commercial margin" from the PPA is calculated based on the revenues of the PPA minus the cost of purchasing the not delivered energy at spot prices. It then assumes that all the production is sold at spot prices, and subtracts such commercial margin resulting from the compliance of the commitments agreed in the PPA.
- The calculation then subtracts first the O&M costs from the net revenues, and it then calculates the corresponding taxes after discounting for depreciation /11//24/ (escalations rates are applied for converting depreciation from nominal to real terms). However, the residual value of the assets is added at the end of the time horizon of the investment analysis.
- Next, the IRR of the project activity without CDM benefits is calculated upon the net cash flow after tax, and the resulting value is: 7.75%.
- The IRR for the project activity considering the CDM benefits is also calculated for a CER price of both 10 and 15 EUR/CER, and the corresponding IRR of the project activity is 9.18% and 9.86 %, respectively.

The PP has used an independent consultant, SYNEX, to estimate the future prices (forecast) of energy and firm capacity using the SDDP scheduling model, according to the industry practice in Chile. Based on the above analysis, the project IRR calculations provided in a spreadsheet /2/ were verified and found to be correct. It is DNV's opinion that the project IRR without CDM revenues is 7.75%, which confirms that the project in the absence of CDM benefits and compared to the benchmark of 10% is not financially attractive /2/. With CER revenues at 15 EUR/CER the project IRR increases to 9.94%, which brings the project's return close to the selected benchmark of 10 %.

Sensitivity analysis

Under the sensitivity analysis the four parameters with the largest impact in the investment analysis are considered. These are the investment costs, the energy price, the O&M costs and the generation output. The value of each one of these parameters is varied +/-10% and the effect on the IRR is calculated upon such variations. The IRRs considering +/-10% variations in these parameters does never exceed the benchmark. Furthermore, the PP estimated the value that each parameter needed to reach in order for the project IRR to reach the benchmark value.

- Total Investment Cost: -22.3%

In DVN's opinon, a reduction of more than 20% in the construction and equipment costs is unlikely, rather it is most likely that the costs will increase, at least due to the inflation. DNV confirmed that all commodities and raw materials required for the construction of the project have increased their prices since September 2008 /73/.

- Energy Price: 70.2%

As explained above, the energy prices (revenues) are calculated via a sophisticated model (SDDP) widely used in Chile. A scenario resulting in such an energy price increase of

70.2% is not foreseeable, and there is no indication that something may trigger this situation. Thus this scenario is considered unlikely in DNV's opinon.

- Annual O&M Costs: -185.8%

Any reduction in costs beyond 100% is not conceivable within the given framework, Therefore, it is DNV's opinion that this scenario is not considered likely to take place.

- Generation Output: 29.8%

In a similar manner as for the energy price above, the generation delivered to the grid is the result of a sophisticated model (SDDP) that takes into consideration all the thermal and power plants connected to the grid, as well as their individual production costs, the characterisitics of the transmission lines and the demand forecast. Thus for La Confluencia to have such a substantial increase in the generation output of almost 30%, several conditions such as the hydrology surplus, increase in the demand and/or reduction in the supply of energy, etc., shall come in place together, making the scenario highly unlikely to ocurr in DNV's opinion.

In conclusion, the investment analysis and sensitivity assessment have shown that the project activity is not the most financially attractive option.

4.6.4 Barrier analysis

Given that the project participant has chosen an investment analysis to demonstrate the additionality of the project, the barrier analysis is not required as per the tool for demonstration and assessment of additionality /64/.

4.6.5 Common practice analysis

The common practice analysis was conducted at the SIC (central interconnected grid) level as conditions differ from one grid system to another, especially given that the SIC grid is the largest in Chile. As per the "Tool for demonstration and assessment of additionality" projects are considered to be similar if they are from the same country or region and under the comparable regulatory framework, investment climate and technological and financial framework. In Chile, the electricity tariff, regulations and other related policies of power plants including (hydroelectric power plants) are set and determined at the national level by the CNE and the CDEC-SIC. However, the pricing of the electricity is based on a nodal system where the characteristics and conditions of the grid where the node in question is connected to are a major parameter in the price determination for a power plant (fuel availability - or water, in the case of hydropower -, and the plants characteristics are also other factors, as well as the connecting node of course). The SIC grid has been selected and DNV considers this approach reasonable for common practice analysis for the project activity.

The geographical scope for the common practice analysis is SIC grid in Chile /18/, where the project is connected to. DNV confirms that it is justified to select SIC grid as the geographical scope.

Given the charactristics of the project activity (run-of-the-river hydropower project with 163.22 MW installed capacity), from the run-of-the-river hydropower plants connected to the SIC grid in the last 25 years /18/ a conservative range excluding those under 100 MW was chosen to determine similar scale to the proposed project activity. Based on this perspective, only two power plants are comparable to the project activity: Recúe (178.4 MW, 1998) and

Alfalfal (178 MW, 1991) /18/. However, both power plants were set in operation more than 10 years ago where the the electricity law affecting the investment climate and the financing possibilities in Chile was different than the current situation (according to enactment dates to currently applicable laws /33//34//36/). Also the energy demand, a major component in the price forcast estimated via the SDDP model, has increased over the years. Therefore, it is DNV's opinon that there are no similar non-CDM projects to the project activity within the boundary of the project activity.

Based on the above analysis, it can be confirmed that the project is not common practice.

In conclusion, the assessment of the arguments presented above sufficiently demonstrate that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional

4.7 Monitoring

The project applies the approved methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 12.1 /62/, and the selected monitoring methodology is applicable for this project. The monitoring plan is in accordance with the monitoring methodology. The monitoring plan will give opportunity for real measurements of achieved emission reductions. PDD provides a brief description of monitoring procedures to address the following issues:

- registration, monitoring, measurement and reporting procedures
- procedures for maintenance of monitoring equipment and installations including description of calibration intervals.
- procedures for cases of emergencies
- procedures for reviewing and storing of the monitoring gained information, data and results, including reviewing periodicity and the responsible person (position)

The environmental impacts are considered minor and will be monitored by the local environmental authority during the project lifetime.

DNV confirms the feasibility of the monitoring plan and the ability of the project participants to implement the monitoring plan.

The project monitoring plan is in compliance with the monitoring methodology ACM0002 (version 12.1).

It is DNV's opinion, that the project participant are able to implement the monitoring plan.

4.7.1 Parameters determined ex-ante

The methodology requires monitoring of the following for grid-connected power projects:

- Data needed to calculate the operating margin emission factor, based on the choice of the method to determine the operating margin (OM), consistent with "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" /62/ and "Tool to calculate the emission factor for an electricity system" /63/;
- Data needed to calculate the build margin emission factor consistent with consistent with "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" /62/ and "Tool to calculate the emission factor for an electricity system" /63/.

For calculation of the emission factor, the project participants decided to use ex-ante data only. As per the "Tool to calculate the emission factor for an electricity system" /63/, in order to calculate the build and operating margins (BM and OM), the project participants used official data publicly available /37/ and the values obtained will be considered constant during the first crediting period.

As mentioned earlier the relevant grid system is the SIC (Central Interconnected System) /18/, which is the one where the project is connected to, and the project proponent chose to include in the calculations only those power plants connected to it as per the "Tool to calculate the emission factor for an electricity system" /63/.

Given that the operational grid data for the SIC are publicly available /37/, the OM was calculated (as per the "Tool to calculate the emission factor for an electricity system" /63/), via option A of the simple adjusted method the OM is calculated based on net electricity generation of each power unit and its corresponding emission factor /37/, since fuel consumption data are also provided by the governmental authority (CNE) /37/.

Thus, based on the 3 most recent years available at the time of submission of the PDD for validation (2006-2008), the calculations as per the "Tool to calculate the emission factor for an electricity system" /63/ result in an OM value of 0.797 tCO_2/MWh. The sources and calculation have been verified by DNV.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units during the most recent year, i.e. 2008 for which power generation data is available. For the calculation of the BM, the cohort of power units was chosen according to the "Tool to calculate the emission factor for an electricity system" /63/, based on the largest annual generation of either the 5 most recent power units (9 446 MWh), or those power plants most recently added to the system that comprised the 20% of the system generation (8 881 341 MWh). Based on the largest of these two values, i.e. the power plants that comprise 20% of the system generation (8 881 341 MWh), the BM was correctly calculated as 0.494 tCO_2/MWh. The sources and calculation have been verified by DNV.

Then, from the OM and BM values above, the value for the CM of 0,645 tCO_2/MWh for the SIC grid is correctly calculated according to the "Tool to calculate the emission factor for an electricity system" /63/ and considers a value of 0.5 for both weighing factors.

The corresponding annual project emission reductions calculated also as pert the "Tool to calculate the emission factor for an electricity system" /63/, (w_{om} and w_{bm}) is then 423 120 tCO_2/MWh.

The driving factors of the above mentioned data, monitored ex-ante, are:

Variable	Value	Data source
Operating Margin (OM) Emissions Factor ($EF_{grid,OM,y,}$ in tCO_2/MWh)	0.797	-) Energy Generation: CDEC-SIC Statistic of Operation 2006 - 2007 – 2008 -) Specific consumption: SC for each power plant were obtained from Node Price Reports (CNE) of April and October from the years 2006, 2007 and 2008 (Also April 2009) -) OM factor is determined ex-ante and applied to the CM with a weighting of 0.5 for the first crediting period. Please, see Annex 3 and provided worksheets (GRID EF LaConfluencia_HydroPP_(2006-2008)_18-05-2010.xls /3/ and Load_Duration_Curves_(2006-2008) /4/_La Confluencia_HydroPP_2-12-2009.xls)
Build Margin (BM) Emissions Factor ($EF_{grig,BM,y,}$ in tCO_2/MWh)	0.494	
Combined Margin (CM) Emissions Factor ($EF_{grid,CM,y}$)	0.645	Calculated parameter based on default weight values and OM and BM emissions factors.
$EG_{m,y}$ and $EG_{k,y}$ - Net electricity generated and delivered to the grid by power plant/unit *m,k* in year *y*	-	-) Energy Generation: CDEC-SIC Statistic of Operation 2006 - 2007 – 2008
$FC_{i,m,y}$, $FC_{i,k,y}$ and $FC_{i,y}$ - Amount of fossil fuel type *i* consumed by power plant / unit *m*, *k* or *n* (or in the project electricity system in case of $FC_{i,y}$) in year *y*	-	CNE Node Price Report: 6 monthly reports containing specific fuel consumption provided for each power unit in the system
$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$ - CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*	Coal :89.5 Diesel: 72.6 Nat.gas: 54.3 Petcoke: 82.9 IFO 180 (residual oil) 75.5	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 Energy of the 2006 IPCC Guidelines on National GHG Inventories
$NCV_{i,y}$ -Net calorific value (energy content) of fossil fuel type *i* in year *y*	Petcoke: 29.7 TJ/Gg Diesel: 41.4 TJ/Gg Natural Gas: 46.5 TJ/Gg Coal: 24.0 TJ/Gg Fuel Oil: 39.8 TJ/Gg	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories

4.7.2 Parameters monitored ex-post

As per PDD /1/chapter B.7.1 these parameters will be monitored:

- Net electricity delivered by the project activity to SIC at the Tinguiririca substation near the town of San Fernando – continously measured and recorded at least monthly.
- Total electricity produced by the project activity – continously measured and recorded monthly.

The pond is expected to operate on a daily hourly regulation basis, with maximum fluctuations of 10 meters. The max total water area of the pond is around 140 512 m^2 (at 1450 meters above see level) /42/. The volume is about 1 200 000 m^3 and changes about 10 meters in height. Hereby the change of water area between 1440 and 1450 meters above sea level is estimated to be around 12 900 m^2, which represents a live energy storage capacity of the pond for La Confluencia project of: 1 GWh, less than the 0.2% of total year expected production. Hence there is not relevant need to monitor this parameter.

All these monitored data will be stored electronically for the duration of the useful life of the power plant or until 2 years after the end of the crediting period, whatever is longest. All *ex-post* monitoring, as mentioned in the PDD, is in line with the methodology ACM0002 /62/.

Electricity generated by the project activity and delivered to the grid will be monitored using electricity meters with an accuracy of 0.2% according to national standard /38/.

The PDD provides information about registration, monitoring, measurement and reporting procedures. In addition, procedures have been described for maintenance and calibration of the monitoring equipment.

The monitoring plan includes provision to keep the receipts from the sell of energy and firm capacity, and prepare a monitoring report at the end of each year, including electricity quantity monitoring files, receipts files, repairs record files and emergency situation files.

4.7.3 Management system and quality assurance

A brief description of the management organization of the project activity and the main roles and duties is provided in the monitoring plan section of PDD.

The Commercial Manager will be responsible for the overall process of the emission reduction calculations and other CDM related activities and for the liaison (compliance) towards the external parties. The CDEC Coordinator will be responsible for overseeing all the interaction between the project activity and the SIC grid operator. The Plant Operators will be responsible for the plants performance and operation as well as monitoring equipment, communication links and data storage. Finally the Environmental and Social Manager will be responsible for ensuring the project compliance with the environmental regulations and the liaison with the Chilean authorities and the society at large.

The PDD presents provisions for training and other QA/QC procedures to ensure the proper management and operation of the project.

The application of the monitoring methodology is transparent and DNV considers the project participants able to implement the monitoring plan.

4.8 Algorithms and/or formulae used to determine emission reductions

The emission reductions (ER_y) by the project activity during the crediting period are the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

1) Baseline emissions: baseline emissions (BE_y in tCO_2) are the product of the grid emission factor ($EF_{grid,CM,y}$ in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh).

2) Project emissions: In line with ACM0002 there are no emissions from the project as the project is a renewable energy project. Given that the project has built a pond (although of a very small scale for hourly regulation only), the power density of the project (W/m^2) is estimated to be about 1 162 W/m^2, thus project activity complies with the CDM requirements in this respect.

3) Leakage: In line with ACM0002 no leakage has to be considered for the proposed project activity.

The grid emission factor of the SIC grid is determined *ex-ante* as a combined margin, consisting of combination of the operating margin (OM) and build margin (BM). It has been calculated as 50:50 as the weights of the operating margin and the build margin, based on the most recent information available.

The data used in the emission coefficient calculation /3//4/ is in accordance with data published from CNE and CDEC-SIC /18//35//37/ and IPCC 2006 guidelines /66/.

The annual electricity delivered to the SIC grid is expected to be 656 000 MWh /3//15/. The expected annual baseline emission of the project is 423 120 tCO_2e /3/. The baseline emission estimate can be replicated using the data and parameter values provided in the PDD and supporting files submitted for registration. Data sources mentioned have been verified by DNV.

In summary, the GHG calculations are complete and transparent, and the data accuracy has been verified.

Based on the calculations and results presented in the sections above the implementation of the project activity will result in an average ex-ante estimation of emission reduction conservatively calculated to be 423 120 tCO_2e per year for the selected crediting period.

All assumptions and data used by the project participants are listed in the PDD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PDD. All values used in the PDD are considered reasonable in the context of the proposed CDM project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PDD

4.9 Environmental impacts

Originally the La Confluencia Project was conceived/designed as part of the La Higuera project, and as such, the initial environmental surveys/reports and permits were issued under La Higuera Project. Due to various reasons, the PP decided to re-design the La Higuera Project and separate the part of the project corresponding to La Confluencia Project and declare it as a project of its own. Thus, the EIA for the project activity was presented as part of the La Higuera Project /8/. The project participant has presented the EIA plan submitted as part of the La Higuera Project and its approval by the corresponding authorities /8/, as well as the revised plan exclusively for the proposed CDM project activity “Optimization of the La Confluencia EIA plan” and its corresponding approval /9/.

The site of the project activity is located in a deserted canyon in mountainous area with little flora and fauna. The EIA discusses the risk presented by the project activity, which are mainly during the construction of the power plant. However, it also present some benefits from the social perspective, mainly the supply of power required for local development and source of labour.

The IFC /11/, Environmental and Social Audits Reports /57/ report about the EIA mitigating measures. The reports are available every 3 months since start of construction, where the most recent report presented to DNV was dated April 2010 /57/. This report demonstrates in the conclusions and recommendions section, that the project particpant is complying with all 7 applicable norms required, or is in the process of implementing and/or mitigating further the corresponding measures related to environmental impact by the project activity.

Finally, the Chilean authorities requires the environmental impact assessment as a prerequisite for starting the construction of the plant (refer to letter of notice to proceed /16/), and for issuing the corresponding LoA /60/.

Thus, it is DNV's opinion that the project activity is complying with the environmental legal requirements of the host country.

4.10 Comments by local stakeholders

Given that the project activity was originally developed in conjunction with the La Higurea hydropower plant, several of the environtmental and social acitivities for the project acitivity were initially carried under the plans of the La Higuera HPP. The project participant held four gatherings/meetings (two in 2003 and two in 2004) that were coordinated by CONAMA to present the project and the results of the EIA as dictated by the Chilean law. Subsequenty the PP held two additional voluntary meetings in 2007 to further expand the involvement of the stakeholders in the project activity /5//6//7/.

There were three main issues raised during the meetings regarding the project: a) dust and traffic use of the I-45, b) possible contamination of the Tinguiririca River, and, c) the impact on water downstream of the project /7/. With regards to points a) and b), the PP has started activities with the Road Authority to address these issues, and steps are well advanced in improving safety, maintenance, access and control of the I-45 in conjunction with all users. This includes the owner extending the paved section of the I-45 to the town limits of Puente Negro for safety and dust control improvements /57/. Regarding points b) and c), the contamination of the catchment as a result of the project activity; these have been addressed in the EIA requirements placed on the project activity, and consequently in the necessary/corresponding measures included in the EPC Contract /15/ to ensure the strongest control, monitoring and application of international best practice and standards by the Contractor /57/.

DNV considers the local stakeholder consultation carried out adequately.

4.11 Comments by Parties, stakeholders and NGOs

The PDD, version 03 dated 4 December 2009, was made publicly* available on the CDM website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 22 December 2009 to 20 January 2010.

(http://cdm.unfccc.int/filestorage/5P30YQDJUB1SAWE7VMX8RZ94OHG6N2/HLC_PDD_ver3_2009-12-04.pdf?t=SHN8MTI5NDQwMzQ4MS4zNQ==|YvGZNUILNU2YOfG16YWW6OlPNkc=.

No comments were received.

http://cdm.unfccc.int/Projects/Validation/DB/T5XNU23PS148GMPPMSI7O8JG3R2VCD/view.html

As part of an earlier validation of the project by TÜV SÜD Industrie Service GmbH (the project participants eventually terminated the validation contract with TÜV SÜD Industrie Service GmbH), version 01 of the PDD was published for comments from 31 January 2008 to 29 February 2008.

http://cdm.unfccc.int/Projects/Validation/DB/7OVKEW1CZ27EYHA3DD33TEXW5ZXBXO/view.html

No comments were received during this stakeholder consultation.

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* The project was published for comments under name “La Confluencia Hydroelectric Project, Chile” and this name was eventually changed to the name “Project for the reduction of greenhouse gas emissions of Hidroelectrica La Confluencia S.A.” to be consistent with the name in the LoA.

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory requirements for Clean Development Mechanism (CDM) project activities

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	OK
2. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	OK
3. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	OK
4. The project shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	OK
5. In case public funding from Parties included in Annex I is used for the project activity, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	Not applicable
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	Not applicable
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	Not applicable
About additionality		
10. Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	OK

Requirement	Reference	Conclusion
that would have occurred in the absence of the registered CDM project activity.		
About forecast emission reductions and environmental impacts		
11. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
For large-scale projects only		
12. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	OK
About stakeholder involvement		
13. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	OK
14. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
15. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
16. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
17. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
18. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	OK

Table 2 Requirements checklist

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A General description of project activity						
A.1	**Title of the project activity (VVM para 55-57)**					
A.1.1	Does section A.1 of the PDD include a clearly identifiable project title, version number of the PDD and date of the PDD?	/1/	DR	☒ Clearly identifiable title of the project activity ☒ Version number of the PDD is included ☒ Date of the PDD is included.		OK
A.1.2	Is the PDD is in accordance with the applicable requirements for completing PDDs?	/1/	DR	☒ Yes		OK
A.2	**Description of the project activity (VVM para 58-64)**					
A.2.1	How was the design of the project assessed?	/1/ /11/ /15/	DR	*What type is the project?* ☐ Project in existing facility or utilizing existing equipment(s) ☐ Large scale project ☐ bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year ☐ individual small scale project activity with emission reductions not exceeding 15 000 tCO_2e per year ☒ Greenfield project *How was the design of the project assessed?* ☐ Physical site inspection ☒ Reviewing available designs and feasibility studies The site visit was performed by the previous		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				DOE and the correspondent documentation was provided to DNV for validation of the project activity.		
A.2.2	If a greenfield project, describe the physical implementation of the project when the validation was commenced.	/1/	DR	Construction had started. Project construction is not yet completed.		OK
A.2.3	If physical site visits were performed based on sampling (only applicable for bundled small scale projects, each with emission reductions not exceeding 15 000 tCO_2e per year), justify the sampling through a statistical analysis:	/1/	DR	N/A		N/A
A.2.4	Is the description of the proposed CDM project activity as contained in the PDD sufficiently covers all relevant elements, is accurate and that it provides the reader with a clear understanding of the nature of the proposed CDM project activity?	/1/ /3/ /11/ /15/ /42/	DR	The project is a grid-connected run-of-the-river hydropower plant with a small pond for daily regulation capacity only. The project is located in central Chile, and the total installed capacity of the project is 163.22 MW. The project utilises hydrological resources from the Tiguiririca River and will generate electricity for the Centrally Interconnected System grid (SIC). The PDD clearly describes the technology employed. DNV was able to verify the total installed capacity of the project through the review of the IFC investment memorandum and the EPC contract. DNV was able to verify that the surface area of the new pond of the project through the review of the as built drawing from the EPC contractor The study clearly states that the surface area is 140 512 m^2, and with the installed capacity of the project activity gives a calculated power density of 1 161.6 W/m^2, which is greater than 10 W/m^2. The project is expected to supply annual net electricity of 656 GW/yr delivered to the SIC grid in Chile .	~~CAR 2~~ ~~CAR 4~~ ~~CL 2~~ ~~CL 3~~ ~~CL 6~~ ~~CL 35~~ ~~CL 38~~ ~~CL 45~~	OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				However, DNV had several questions on the description of the project design and refers to the questions in Table 3.		
A.2.5	Does the project activity involve alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	/1/ /15/	DR	No the project is the construction of a new greefield run-of-the-river hydropower project as demonstrated by the EPC contract		OK
A.2.6	Does the project design engineering reflect current good practices?	/1/ /15/ /70/	DR	Yes, the PDD is in accordance with the EPC. Based on DNV's sector expertise, the review of the equipment purchase contracts and the project engineering design, DNV confirms that the proposed project reflects current good practice. However, DNV had several questions on the the project design and refers to the questions in Table 3.	~~CAR 2~~ ~~CL 2~~ ~~CL 45~~	OK
A.2.7	Would the technology result in a significantly better performance than any commonly used technologies in the host country? Is any transfer of technology from any Annex-I Party involved?	/1/ /15/ /70/	DR	Based on DNV's sector expertise /70/, DNV's and review of the documentation corresponding to the EPC contract /15/, DNV confirms that the proposed project reflects current good practice. As per the EPC contract /15/, one of the contractors is an international company with principal offices in Germany (Annex-I country), thus it is implicit that there is a technologu tranfer from an Annex-I country due to the company's expertise/experience.		OK
A.3	**Participation requirements (VVM para 51-54, 123-125)**					
A.3.1	Do all participating Parties fulfil the participation requirements as follows:	/1/	DR			
		Chile (host)				
	a) Party has ratified the Kyoto Protocol	☒ Yes ☐ No				
	b) Party has designated a Designated National Authority	☒ Yes ☐ No				

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	c) The assigned amount has been determined	☒ Yes ☐ No				
A.3.2	Do the letters of approval meet the following requirements?	/1/ /60/	DR	Yes	~~CAR 1~~	OK
		Chile (host)				
	a) LoA confirms that Party has ratified the Kyoto Protocol	☒ Yes ☐ No				
	b) LoA confirms that participation is voluntary	☒ Yes ☐ No				
	c) The LoA confirms that the project contributes to the sustainable development of the host country?	☒ Yes ☐ No				
	d) The LoA refers to the precise project activity title in the PDD	☒ Yes ☐ No				
	e) The LoA is unconditional with respect to (a) to (d) above	☒ Yes ☐ No				
	f) The LoA is issued by the respective Party's DNA	☒ Yes ☐ No				
	g) The LoA was received directly by the DNA or the PP	☐ DNA ☒ PP				
	h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic	DNV has no doubts regarding the authenticity of the LoA.				
A.3.3	Have all private/public project participants been authorized by an involved Party?	/1/ /60/	DR	At the time of validation no Annex I country has been selected for the project activity. The LoA from the host country Chile authorises the project participant Hidroeléctrica La Confluencia S.A..	~~CAR 1~~	OK
A.4	**Technical description of the project activity (VVM para 58-64)**					
A.4.1	Is the project's location clearly defined?	/1/ /9/ /52/	DR	The coordinates of the project's power house are Lat 34°49'47" S and Long 70°33'05" W approximately, which concur with the data presented it the Environmental Impact Declaration and HLC Coordinates of works.	~~CL 3~~	OK
A.5	**Public funding of the project activity**					
A.5.1	In case public funding from Parties included in Annex I is	/1/	DR	The project does not involve public funding. It		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	used for the project activity, have these Parties provided an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties?	/11/		has been verified from the Exttract of the Confidential Information Memorandum issued by the IFC (Extract IFC Info Memo - HLC (part 1),PDF page 9), that the total investment capital is financed by the IFC loans (60.9%) and the project participant's equity (39.1%).		
B	Application of a baseline and monitoring methodology					
B.1	**Methodology applied (VVM para 65-76)**					
B.1.1	Does the project apply an approved methodology and the correct version thereof?	/1/	DR	The PDD was prepared according to ACM0002 version 12.1.		OK
B.2	**Applicability of methodology (and tools) (VVM para 65-76)**					
B.2.1	How was it validated that project complies with the following applicability criteria: *The project activity is the installation, capacity addition, retrofit or replacement of a hydro power plant/unit.*	/1/ /11/ /15/	DR	The project activity entails the construction of a new run of the river hydropower plant as demonstrated by the IFC Investment Memorandum and the EPC contract.		OK
B.2.2	How was it validated that project complies with the following applicability criteria: *In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity*	/1/ /11/ /15/	DR	N/A - The project activity entails the construction of a new run of the river hydropower plant as demonstrated by the IFC Investment Memorandum and the EPC contract.		OK
B.2.3	How was it validated that project complies with the following applicability criteria: *In case of hydro power plants, one of the following conditions must apply:*	/1/ /11/ /15/	DR	The project activity is a run of the river hydropower plant with a small off-river regulation pondage of 1.2 million m^3 live storage for the flow coming exclusively from the	~~CL 35~~ ~~CL 38~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	-) The project activity is implemented in an existing reservoir, with no change in the volume of reservoir *-) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density (installed power generation capacity divided by the surface area at full reservoir level) of the project activity, is greater than 4 W/m2* *-) The project results in new reservoirs and the power density of the power plant is greater than 4 W/m^2*	/70/		Tinguiririca river and a surface area of 140 512 m^2. Although the project creates a new pond, bearing in mind its high power density of 1 162 W/m², and its small volume (maximum few operating hours at full flow), it can be confirmed that in reality the hydropower plant is of the run of the river type.		
B.2.4	How was it validated that project complies with the following applicability criteria: *This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity.*	/1/ /11/ /15/	DR	The project activity entails the construction of a new run of the river hydropower plant as demonstrated by the IFC Investment Memorandum and the EPC contract, and as such does not involve any switching from fossil fuels to renewable energy at the site of the project activity.		OK
B.2.5	How was it validated that project complies with the following applicability criteria: *This methodology is not applicable to Biomass fired power plants.*	/1/ /11/ /15/	DR	N/A - The project activity entails the construction of a new run of the river hydropower plant as demonstrated by the IFC Investment Memorandum and the EPC contract		OK
B.2.6	How was it validated that project complies with the following applicability criteria: *This methodology is not applicable to hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m^2.*	/1/ /11/ /15/ /70/	DR	The project activity is a run of the river hydropower plant with a small off-river regulation pondage of 1.2 million m^3 live storage for the flow coming exclusively from the Tinguiririca river and a surface area of 140 512 m^2. Although the project creates a new pond, bearing in mind its high power density of 1162 W/m², and its small volume (maximum few operating hours at full flow), it can be confirmed that in reality the hydropower plant is of the run of the river type	~~CL 35~~ ~~CL 38~~	OK
B.2.7	Is the selected baseline one of the baseline(s) described in the	/1/	DR	The approved methodlogy ACM0002 refers to		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	methodology and this hence confirms the applicability of the methodology?	/15/ /63/		the "Tool to calculate the emission factor for an electricity system" for the determination of the baseline. The baseline scenario is then defined as: "The electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations" described in the Tool. Thus the basline scenario is the power deliverd to the grid, 656 GWh/year, that would have otherwise been generated by the operation of SIC grid-connected power plants and by the addition of new generation sources.		
B.3	**Project boundary (VVM para 77-79)**					
B.3.1	What are the project's system boundaries (components and facilities used to mitigate GHGs)? Are they clearly defined and in accordance with the methodology?	/1/ /18/	DR	According the approved methodlogy ACM0002, the spatial extent of the project boundary includes the HLC power plant and all power plants physically connected to the Chilean Central Interconnected Grid (SIC) grid to which the proposed project is also connected.	~~CL 32~~	OK
B.3.2	Which GHG sources are identified for the project? Does the identified boundary cover all possible sources linked to the project activity? Give reference to documents considered to arrive at this conclusion.	/1/	DR	The GHG emission sources and gases included in the project boundary are CO_2emissions from the baseline defined by the approved methodology ACM0002. The GHG emission reduction is achieved by replacing the electricity generated by thermal power plants in the SIC grid.		OK
B.3.3	Does the project involve other emissions sources not foreseen by the methodologies that may question the applicability of the methodology? Do these sources contribute with more than 1% of the estimated emission reductions of the project?	/1/ /62/	DR	The project does not involve other emissions sources not foreseen by the methodology that may question the applicability of the methodology.		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.4	**Baseline scenario determination (VVM para 80-87, 103-105)**					
B.4.1	Which baseline scenarios have been identified? Is the list of baseline scenarios complete?	/1/ /62/	DR	The applied methodology does not require the identification of other baseline scenarios. The applied methodology defines the baseline scenario to be used.		OK
B.4.2	How have the other baseline scenarios been eliminated in order to determine the baseline?	/1/ /62/	DR	The applied methodology does not require the identification of other baseline scenarios. The applied methodology defines the baseline scenario to be used.		OK
B.4.3	What is the baseline scenario?	/1/ /15/ /63/	DR	The approved methodlogy ACM0002 refers to the "Tool to calculate the emission factor for an electricity system" for the determination of the baseline. The baseline scenarion is then defined as: "The electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations" described in the Tool. Thus the basline scenario is the power deliverd to the grid, 656 GWh/year that would have otherwise been generated by the operation of SIC grid-connected power plants and by the addition of new generation sources.		OK
B.4.4	Is the determination of the baseline scenario in accordance with the guidance in the methodology?	/1/ /62/	DR	The determination of the baseline scenario is in accordance with the guidance in the approved methodology.		OK
B.4.5	Has the baseline scenario been determined using conservative assumptions where possible?	/1/ /62/	DR	The applied methodology requires the use of a pre-defined baseline scenario for new grid connected renewable power plant. The determination of the baseline did not require		OK

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				using any other assumptions.		
B.4.6	Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/ /62/	DR	The baseline scenario from the approved methodology selected takes into account relevant Chilean policies, macro-economic trend and political aspirations. The validation of the project activity did not reveal any laws or regulation compelling the project owner to develop any specific kind of energy source or project.		OK
B.4.7	Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /62/	DR	The baseline scenario determination is compatible with the available data and literature; and sources are clearly referenced, as per the approved methodlogy.		OK
B.4.8	Is the baseline determination adequately documented in the PDD? • All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. • All documentation is relevant as well as correctly quoted and interpreted. • Assumptions and data can be deemed reasonable • Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. • The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity	/1/ /62/	DR	The baseline determination is adequately documented in the PDD as per the approved methodlogy: - All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. - All documentation is relevant as well as correctly quoted and interpreted. - Assumptions and data can be deemed reasonable - Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD. The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity		OK

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Checklist Question		Ref	MoV	Assessment by DNV		Draft Concl.	Final Concl.
B.5	**Additionality determination (VVM para 93-119)**						
B.5.1	What approach/tool does the project use to assess additionality? Is this in line with the methodology?	/1/ /64/	DR	The project additionality is demonstrated by applying the "Tool for the demonstration and assessment of additionality".			OK
B.5.2	Have the regulatory requirements correctly been taken into account to evaluate the project activity and the alternatives?	/1/ /62/	DR	The approved methodology requires the use of a pre-defined baseline scenario for new grid connected renewable power plant. The regulatory requirements were correctly applied.			OK
B.5.3	Is sufficient evidence provided to support the relevance of the arguments made?	/1/	DR	The review of the evidences and explanations received during the validation process, demonstrate that the basis for the demonstration of addicionality is relevant for the prolect acivity			OK
B.5.4	What is the project additionality mainly based on (Investment analysis or barrier analysis)?	/1/ /2/	DR	The project additionality is based on an investment analysis.			OK
	Prior consideration of CDM (VVM para 96-102)						
B.5.5	What is the evidence for serious consideration of CDM prior to the time of decision to proceed with the project activity?	/1/ /10/ /11/ /13/ /14/ /16/ /19/ /20/ /68/ /69/	DR	25.08.2005	DNV contract with La Higuera, for the validation of the La Higuera and La Confluencia projects. This validation contract demonstrates that the CDM was considered in early stages of the project	~~CL 7~~	OK
				15.07.2007	Memorandum with IFC considered CDM revenues		
				16.08.2007	Investment case presented to La Confluencia Board		
				28.08.2007	SN Power board approved Project via CDM revenues		
				24.09.2007	New DNV proposal for la Confluencia to Pacific Hydro		
				23.10.2007	Loan with IFC executed		

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				21.12.2007 Start construction – Notice to proceed given to the EPC contractor 31.01.2008 TÜV SÜD published first PDD for global consultation 11.09.2009 Perspectives GmbH: Assessment of the Prior Consideration of the CDM for the La Confluencia Hydroelectric Project, Chile.		
B.5.6	If the starting date is after 2 August 2008 and before the global stakeholder consultation, has the DNA and UNFCCC confirmed that the project participants have informed in writing of the project's intention to seek CDM status?	/1/	DR	The project starting date is before the 2 August 2008. The CDM consideration was demonstrated by the actions (and corresponding evidence) presented in point B.5.5 above.		OK
	Continuous efforts to secure CDM status (only to be completed if starting date is before 2 August 2008)					
B.5.7	What initiatives where taken by the project participants from the starting date of the project activity to the start of validation in parallel with the physical implementation of the project activity?	/1/ /16/ /20/	DR	The start of the project activity is marked by the start of construction, initiatied by the notice to proceed given to the EPC contractor dated 21 December 2007. Within one month the first PDD was publlished for global consultation on 31 January 2008.	~~CL 7~~ ~~CL 47~~	OK
B.5.8	When did the construction of the project activity start?	/1/ /16/	DR	The start of the project activity is marked by the start of construction, initiatied by the notice to proceed given to the EPC contractor dated 21 December 2007.	~~CL 7~~	OK
B.5.9	When was the project commissioned?	/1/	DR	The project is still under constrction at the time of the validation process, expected to start commercial operation before the end of 2010.		OK
B.5.10	Does the timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status?	/1/	DR	The timeline of the project confirm that continuous actions in parallel with the implementation were taken to secure CDM status.		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	Investment analysis (VVM para 106-112) *The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.*					
B.5.11	Does the project activity or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PDD?	/1/	DR	Yes. The project activity apart from CDM still generates revenues through the sales of the energy and firm capacity, which has been reflected in the PDD.		OK
B.5.12	Do any of the alternatives to the project activity involve investment? Is this reflected in the PDD?	/1/	DR	There is no alternative to the project that involves investment		OK
B.5.13	Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?	/1/ /2/ /62/	DR	As the proposed project generates financial and economic benefits other than CDM related income through the sales of electricity, therefore a benchmark analysis (option III) is justified for conducting the investment analysis. This is in line with the approved methodology ACM0002.		OK
B.5.14	Is the benchmark/discount rate the latest available at the time of decision?	/1/ /14/ /44/ /45/	DR	According to the Article 174 of the Chilean Ministry of Economy, Promotion and Reconstruction's DFL Nº 46 (Decree with the Force of the Law Nº 4) of 12 May 2006, an annual discount rate of 10% shall be used to determine the indicative generation and transmission expansion, and regulated prices at generation level. The law was in force and valid at the time of the investment decision (28 August 2007).	~~CL 9~~	OK
B.5.15	What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?	/1/ /2/ /45/	DR	The financial indicator is a project IRR after tax. The financial indicator is in correspondence with the applied benchmark rate is the project IRR 10% after tax. However, DNV had several questions concerning	~~CAR 3~~ ~~CL 4~~ ~~CL 9~~ ~~CL 10~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				the input parameters to the investment analysis and refers to the questions in Table 3.	~~CL 16~~ ~~CL 17~~ ~~CL 22~~ ~~CL 23~~ ~~CL 30~~ ~~CL 31~~ ~~CL 46~~	
B.5.16	Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?	/1/	DR	The underlying assumption is correct.	~~CAR 3~~	OK
B.5.17	Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?	/1/ /11/ /24/	DR	Yes, the depreciation is taken into consideration in the income tax calcualtion. HLC is depreciating all tangible costs, including civil works and equipment, over 40 years for accounting purposes. For tax purposes, the Company uses an accelerated depreciation based on useful lives allowable under Chilean Tax Laws. However, DNV had several questions concerning the application of taxes in the investment analysis and refers to the questions in Table 3.	~~CL 10~~ ~~CL 18~~	OK
B.5.18	Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?	/1/ /11/ /70/	DR	The electromechanical equipment is supplied by the European company Voith Siemens which has many years of experience in the manufacturing and installation of hydropower equipment. The financial lifetime is 20 years while the designed operational lifetime is 30-50 years. However, DNV had several questions concerning the input parameters to the investment analysis and refers to the questions in Table 3.	~~CL 5~~	OK
B.5.19	When a feasibility study report or similar approved by the	/1/	DR	In Chile, the feasibility report is not approved by		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?	/11/		the government. Howevre, the Investment Memorandun, was prepared by an independent company, Synex, and under the request of the IFC to promte the project among potential investors. The IFC is reputable organization, reporting to the World Bank.		
B.5.20	How was the amount of output (sales of electricity) assessed?	/1/ /11/ /23/ /71/	DR	☒ The plant load factor provided to banks and/or equity financiers while applying the project activity for project financing, or to the government while applying the project activity for implementation approval ☒ The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company) ☒ Other approach. The determination of the price forecast done by SYNEX, upon the chosen "Base Case" scenario, was made with basis on the Stochastic Dynamic Dual Programming (SDDP) model to optimize the generation system expansion, simulate the operation of the SIC and obtain the price forecast Following is the summary of the simulation and the results obtained: In the determination of generation expansion sequence it have been considered new projects commitments since these affect market prices, both short-term prices – based on spot market dynamics – and long term prices – based on contract market. Several main considerations for the generation expansion have been in the analyses which are commented in the SYNEX report. Since the model (software) used, SDDP is		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			a dispatch model, not a generation-transmission expansion model, an iterative process has been conducted, in order to define the investment sequence of the projects. Initially a sequential analysis is carried out by means of backward recursion, i.e. from the future to the present, to define the optimal strategy of operation for thermal and hydroelectric plants, based on an initial assumption of levels in the reservoirs. For each stage, a linear program is solved which defines the optimal strategy for minimizing the operation cost of the system. Thus, initial water values for each reservoir are calculated, for each stage. Afterwards, a simulation is performed using the water values found, in order to determine new levels for the reservoirs at each stage. The iteration of these processes of analysis (recursion and simulations) converges to the determination of optimal strategies for the system dispatch and of system's short-run marginal costs for each stage and each hydro condition (43 historical hydro conditions (1960-2002) have been simulated), as well as their expected values. The results of the model are, among others: - The dispatch of all power plants - The thermal costs - The energy short-run marginal costs in each country - The incomes of power plants selling all the energy at the short-run marginal cost These results are obtained on a monthly basis, for		

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				several hourly blocks representing the load duration curve and for each of the hydro conditions simulated.		
B.5.21	How was the output price (electricity price) assessed? Were the data available and valid at the time of decision?	/1/ /11/ /12/ /71/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants The output price was calcualted by SYNEX via the SDDP model (see B.5.19), and was used by the IFC in the investment memorandum.		OK
B.5.22	How were the investment costs assessed? Were the data available and valid at the time of decision?	/1/ /11/ /12/ /15/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants The invesment costs were assessed against the EPC contract and the IFC Invesment Memorandum.		OK
B.5.23	How were the O&M costs assessed? Were the data available and valid at the time of decision?	/1/ /11/ /12/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices) ☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants The invesment costs were assessed against the IFC Invesment Memorandum. However, DNV had several questions concerning the input parameters to the investment analysis and refers to the questions in Table 3.	~~CAR 2~~ ~~CAR 4~~ ~~CAR 5~~ ~~CL 4~~ ~~CL 16~~ ~~CL 23~~	OK
B.5.24	Describe the assessment of the other input parameters. Were the data available and valid at the time of decision?	/1/ /11/	DR	☒ Cross-check against third-party or publicly available sources (e.g. invoices or price indices)	~~CAR 2~~ ~~CAR 4~~	OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	/12/ /14/ /15/ /22/ /23/ /24/ /32/ /49/ /50/ /51/		☐ Review of feasibility reports, public announcements and annual financial reports related to the project and the project participants The invesment costs were assessed against the -) IFC Invesment Memorandum, and SYNEX report -) EPC Contract -) Firm capacity estimations -) PPA -) Final Investment Case -) Chilean income tax law All of thesewere available available at the time of the decision made by the PP. However, DNV had several questions concerning the input parameters to the investment analysis and refers to the questions in Table 3.	~~CL 2~~ ~~CL 4~~ ~~CL 5~~ ~~CL 10~~ ~~CL 11~~ ~~CL 12~~ ~~CL 13~~ ~~CL 14~~ ~~CL 15~~ ~~CL 16~~ ~~CL 17~~ ~~CL 18~~ ~~CL 19~~ ~~CL 20~~ ~~CL 21~~ ~~CL 22~~ ~~CL 23~~ ~~CL 24~~ ~~CL 25~~ ~~CL 26~~ ~~CL 27~~ ~~CL 28~~ ~~CL 29~~ ~~CL 30~~ ~~CL 31~~ ~~CL 33~~ ~~CL 45~~ ~~CL 46~~	

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.25	Was the financial calculation spreadsheet verified and found to be correct?	/1/	DR	Yes, the financial analysis has been verified and the final version is found to be correct. However, DNV had several questions concerning the input parameters to the investment analysis and refers to the questions in Table 3.	~~CAR 2~~ ~~CAR 3~~ ~~CAR 4~~ ~~CL 4~~ ~~CL 5~~ ~~CL 10~~ ~~CL 11~~ ~~CL 12~~ ~~CL 13~~ ~~CL 14~~ ~~CL 15~~ ~~CL 16~~ ~~CL 17~~ ~~CL 18~~ ~~CL 19~~ ~~CL 20~~ ~~CL 22~~ ~~CL 23~~ ~~CL 26~~ ~~CL 27~~ ~~CL 29~~ ~~CL 30~~ ~~CL 31~~ ~~CL 46~~	OK
B.5.26	Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?	/1/ /23/ /71/	DR	The key parameters contributing more than 20% to the revenue costs and studied under the sensitivy analysis, and their correposnding change for the project acitivty IRR to reach the benchmark value of 10%, are as follows:	~~CAR 5~~	OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				1. Total investment cost of the Project: -22.3% 2. Power generation output: 29.8% 3. Energy sale prices: 70.2% 4. Operation and maintenance (O&M) costs: -185.8% The spot component (non-PPA) of the power generation output and the energy sales price are related since the spot price depends on the demand at the node of delivery, and these are calculated together via the SDDP model and reported in the Synex report.		
B.5.27	Sensitivity analysis: Is the range of variations is reasonable in the project context?	/1/	DR	See B.5.26	~~CAR 5~~	OK
B.5.28	Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?	/1/	DR	The value of the key parameters has been varied to see when the project activity's IRR reached the benchmark value (See B.5.26), and it was found tha it is not likley for the parameters to reach these values (see "Sensitivity Analysis" in section 4.6.3 above).	~~CAR 5~~	OK
Barrier analysis (VVM para 113-116)						
B.5.29	Are the barriers identified complimentary to a potential investment analysis? Does the barrier have a clear impact on the financial returns so that it can be assessed in an investment analysis? Each barrier is discussed separately.	/1/	DR	N/A		OK
B.5.30	How were the investment barriers assessed to be real? Are the investment barriers substantiated by a source independent of the project participants?	/1/	DR	N/A		OK
B.5.31	How does CDM alleviate the investment barriers?	/1/	DR	N/A		OK
B.5.32	Is the project activity prevented by the investment barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	N/A		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.5.33	How were the technological barriers assessed to be real? Are the technological barriers substantiated by a source independent of the project participants?	/1/	DR	N/A		OK
B.5.34	How does CDM alleviate the technological barriers?	/1/	DR	N/A		OK
B.5.35	Is the project activity prevented by the technological barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	N/A		OK
B.5.36	How were the barriers due to prevailing practise assessed to be real? Are the barriers due to prevailing practise substantiated by a source independent of the project participants?	/1/	DR	N/A		OK
B.5.37	How does CDM alleviate the barriers due to prevailing practise?	/1/	DR	N/A		OK
B.5.38	Is the project activity prevented by the barriers due to prevailing practise and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	N/A		OK
B.5.39	How were the other barriers assessed to be real? Are the other barriers substantiated by a source independent of the project participants?	/1/	DR	N/A		OK
B.5.40	How does CDM alleviate the other barriers?	/1/	DR	N/A		OK
B.5.41	Is the project activity prevented by the other barriers and at least one of the possible alternatives to the project activity is feasible under the same circumstances?	/1/	DR	N/A		OK
Common practice analysis (VVM para 117-119)						
B.5.42	What is the geographical scope of the common practice analysis? Is this justified?	/1/ /18/	DR	The geographical scope of the common practice analysis is the SIC grid in Chile, and it is clearly justified with the evidence presented.		OK
B.5.43	What is the scope of technology and size (e.g. capacity of power plant) for the common practice analysis and how has this been justified?	/1/ /15/	DR	In the common practice analysis the project activity was compared withh all the run of the river hydropwoer plants connected to the SIC		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
		/18/		grid (CDEC-SIC: Annual report 2009 / Operation statistics 1999-2008). From these only those with a installed capacity above 100MW were considered comparable to the project activity (163.22 MW, EPC contract)		
B.5.44	What is the data source(s) used for the common practice analysis?	/1/ /18/	DR	The data source for the common proactice analyis is the CDEC-SIC: Annual report 2009 / Operation statistics 1999-2008	~~CL 32~~	OK
B.5.45	How many similar non-CDM-projects exist in the region within the scope?	/1/	DR	From the technical characteristics, two non-CDM projects similar to the project activity were idenitfied within the regional scope: Recúe (178.4 MW, 1998) and Alfalfal (178 MW, 1991) /18/		OK
B.5.46	How were possible essential distinctions between the project activity and similar activities assessed?	/1/ /33/ /34/ /36/	DR	Due to the changes in the law and the market occurred between the time of construction of Alfalfal & Rucúe, and the project activity.		OK
B.5.47	What is the conclusion of the common practice analysis?	/1/	DR	In conclusion, the assessment of the arguments presented above sufficiently demonstrate that the project is not a likely baseline scenario, and that emission reductions resulting from the project are additional		OK
	Conclusion					
B.5.48	What is the conclusion with regard to the additionality of the project activity?	/1/	DR	Based on the above analysis of the additionality of the project activity, it is concluded that the proposed project acitvity is additional.		OK
B.6	**Calculations of GHG emission reductions**					
	Data and parameters that are available at validation and that are not monitored (VVM para 198-200)					
B.6.1	How was the Operating emission factor of grid verified?	/1/ /3/	DR	EF grid,OM-adj,,y, Operating emission factor of grid, was verified via the emission reduction calculations and the publicly available SIC grid		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
		/18/		data published by the National Energy Commission (CNE)		
B.6.2	How was the Build margin emission factor of grid verified?	/1/ /3/ /18/	DR	EF grid,BM,,y y, Build margin emission factor of grid, was verified via the emission reduction calculations and the publicly available SIC grid data published by the National Energy Commission (CNE). However, DNV had some questions concerning the calculation of the BM emission coefficient and refers to the questions in Table 3.	~~CAR 6~~	OK
B.6.3	How was the Combined margin emission factor verified?	/1/ /3/ /18/	DR	EF grid,CM,,y, Combined margin emission factor, was verified via the emission reduction calculations and the publicly available SIC grid data published by the National Energy Commission (CNE)		OK
B.6.4	How was the Net electricity generated and delivered to the grid by power plant/unit *m,k* in year *y* verified?	/1/ /18/	DR	EGm,y and EGk,y, Net electricity generated and delivered to the grid by power plant/unit *m,k* in year *y*, was verified via the publicly available SIC grid data published by the National Energy Commission (CNE)	~~CL 8~~	OK
B.6.5	How was the amount of fossil fuel type *i* consumed by power plant / unit *m*, *k* or *n* (or in the project electricity system in case of $FC_{i,y}$) in year *y* verified?	/1/ /35/		FCi,m,y , FCi,k,y and FCi,y, amount of fossil fuel type *i* consumed by power plant / unit *m*, *k* or *n* (or in the project electricity system in case of *FCi,y*) in year y, was verified via the publicly available CNE Node Price Report: 6 monthly reports containing specific fuel consumption provided for each power unit in the system.	~~CL 1~~	OK
B.6.6	How was the CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y* verified?	/1/ /66/		$EFCO_{2,i,y}$ and $EFCO_{2,m,i,y}$, CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*, was verified via the IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories		
B.6.7	How was the Net calorific value (energy content) of fossil fuel type *i* in year *y* verified?	/1/ /66/		$NCV_{i,y}$, Net calorific value (energy content) of fossil fuel type *i* in year *y*, was verified via the IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories /66/		OK
	Baseline emissions (VVM para 88-92)					
B.6.8	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /3/ /62/	DR	The calculations are documented according to the approved methodology. Data source for each parameter is provided and evidenced with the correct documentation publicly available, and data from the review documentation was found to be consistent with the data used for the emission reduction calculations.	~~CAR 6~~ ~~CL 36~~ ~~CL 37~~	OK
B.6.9	Have conservative assumptions been used when calculating the baseline emissions?	/1/ /3/ /62/	DR	Assumption made for the emission reduction calculations are in accordance with the approved methodology.		OK
B.6.10	Are uncertainties in the baseline emission estimates properly addressed?	/1/ /3/ /62/	DR	Baseline emission calculation is in accordance with the approved methodology, the validation did not reveal any uncertainty in the data and calculations.		OK
	Project emissions (VVM para 88-92)					
B.6.11	Are the calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /15/ /3/	DR	The project activity is renewable electricity generation (EPC contract /15/) and the regulatd pond created has a power denisty of 1 161.6 W/m^2 (EPC contract /15/), hence no project emissions are expected to result from the project activity /3/.		OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.6.12	Have conservative assumptions been used when calculating the project emissions?	/1/ /15/ /3/	DR	The project activity is renewable electricity generation (EPC contract /15/) and hence no project emissions are expected to result from the project activity /3/.		OK
B.6.13	Are uncertainties in the project emission estimates properly addressed?	/1/ /15/ /3/	DR	The project activity is renewable electricity generation (EPC contract /15/) and hence no project emissions are expected to result from the project activity /3/.		OK
	Leakage (VVM para 88-92)					
B.6.14	Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	/1/ /15/ /3/ /62/	DR	The project activity is renewable electricity generation (EPC contract /15/) and as per the methodology requirements /62/, no leakage emissions are expected to result from the project activity /3/.		OK
B.6.15	Have conservative assumptions been used when calculating the leakage emissions?	/1/ /15/ /3/ /62/	DR	The project activity is renewable electricity generation (EPC contract /15/) and and as per the methodology requirements /62/no leakage emissions are expected to result from the project activity /3/.		OK
B.6.16	Are uncertainties in the leakage emission estimates properly addressed?	/1/ /15/ /3/ /62/	DR	The project activity is renewable electricity generation (EPC contract /15/) and and as per the methodology requirements /62/no leakage emissions are expected to result from the project activity /3/.		OK
	Emission Reductions (VVM para 88-92)					
B.6.17	Algorithms and/or formulae used to determine emission reductions: • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced	/1/ /3/ /62/	DR	• All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and		OK

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Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
• All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.				interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.		
B.7	**Monitoring plan (VVM para 120-122)**					
	Data and parameters monitored					
B.7.1	Do the means of monitoring described in the plan comply with the requirements of the methodology?	/1/ /62/	DR	The means of monitoring describe in the plan comply with the requirement of the applied methodology		OK
B.7.2	Does the monitoring plan contains all necessary parameters, and are they clearly described?	/1/ /62/	DR	The monitoring plan contains all necessary parameters, and they are clearly described.		OK
B.7.3	In case parameters are measured, is the measurement equipment described? Describe each relevant parameter.	/1/	DR	*EGPJ,y = EGfacility,y*, Quantity of net electricity generation supplied by the project plant/unit to the grid in year y, will be measured continuously and recorded at least monthly. The measurement will be done using an electric meter. *TEGy*, Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y, will be measured continuously and recorded at least monthly. The measurement will be done using an electric meter	~~CL 38~~	OK
B.7.4	In case parameters are measured, is the measurement accuracy addressed and deemed appropriate? Describe each relevant parameter.	/1/ /38/	DR	*EGPJ,y*, and *TEGy*, the meter quality is governed by the "*Normas Tecnicas"(Technical regulations)* and are required to have a maximum error of 0.2% under Chilean law.	~~CL 41~~	~~OK~~

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
B.7.5	In case parameters are measured, are the requirements for maintenance and calibration of measurement equipment described and deemed appropriate? Describe each relevant parameter.	/1/	DR	Meters are calibrated periodically according to local standards for electricity transactions in CDEC-SIC. The data is utilised by CDEC-SIC for determining the energy balance between generators	~~CL 40~~	OK
B.7.6	Is the monitoring frequency adequate for all monitoring parameters? Describe each parameter.	/1/	DR	See B.7.3 above		OK
	Ability of project participants to implement monitoring plan					
B.7.7	How has it been assessed that the monitoring arrangements described in the monitoring plan are feasible within the project design?	/1/ /70/	DR	The monitoring set up is simple, based on DNV expertise of similar projects and sectoral expertise, the monitoring plan is considered feasible within the project design.	~~CL 34~~ ~~CL 43~~	OK
B.7.8	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)?	/1/ /58/	DR	Procedure will be developed to ensure that from the start the project is well organised in terms of collection and archiving of complete and reliable data.	~~CL 34~~ ~~CL 43~~ ~~CL 39~~	OK
B.7.9	Are the data management and quality assurance and quality control procedures sufficient to ensure that the emission reductions achieved by/resulting from the project can be reported ex post and verified?	/1/	DR	Quality control and quality assurance procedures will guarantee the quality of monitored data. The data management and quality assurance and quality control procedures are sufficient to ensure that the emission reductions achieved by the project can be reported ex post and verified	~~CL 34~~ ~~CL 43~~	OK
B.7.10	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later?	/1/	DR	Quality control and quality assurance procedures will guarantee the quality of monitored data. Data will be kept until two years after the end of the crediting period or the last issuance of CERs whichever occurs later.	~~CL 34~~ ~~CL 43~~ ~~CL 42~~	OK
	Monitoring of sustainable development indicators/ environmental impacts					
B.7.11	Is the monitoring of sustainable development indicators/	/1/	DR	Yes, the Chilean legislation requires the	~~CAR 1~~	OK

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	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	environmental impacts warranted by legislation in the host country?	/8/ /9/ /27/		monitorig of the environmental impacts identified as a consequence of the project activity. This are required both for the start and during the construction of the project activity, and for issuing the LoA.	~~CL 45~~	
B.7.12	Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/ /8/ /9/ /11/ /19/ /27/ /62/	DR	Yes, The monitoring plant provides for the collection and archiving of relevant data concerning environmental, social and economic impacts. This is in line with the approved methodology, the IFC loan conditions and the legislation in Chile.		OK
B.7.13	Are the sustainable development indicators in line with stated national priorities in the host country?	/1/ /8/ /9/ /27/ /52/	DR	Yes, the legislation in Chile regarding environmental priorities is inforced via the National Environmental Commission – CONAMA, and reflected through the EIA for the project activity.		OK
C Duration of the project activity / crediting period						
C.1.1	**Start date of project activity (VVM para 96-97, 102)**					
C.1.2	How has the starting date of the project activity been determined? What are the dates of the first contracts for the project activity? When was the first construction activity?	/1/ /15/ /16/ /41/	DR	The project activity was determined by the notice to proceed issued to the EPC contractor following the conditions of the EPC contract.		OK
C.1.3	Is the stated expected operational lifetime of the project activity reasonable?	/1/ /11/ /12/	DR	Yes, the lifetime regarding the project activity is 20 years (IFC Investment Memorandum and Annex 2 Financial Model), although these types of constructions usully last longer under proper maintenance conditions.		OK
C.1.4	Is the start date, the type (renewable/fixed) and the length of	/1/	DR	The PP has chosen a 7 year renewable crediting		OK

MoV = Means of Verification, DR= Document Review, I= Interview, CC= Cross-Checking

	Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
	the crediting period clearly defined and reasonable?			period, starting on 1 April 2011. This seems reasonable for the project activity.		
D	Environmental Impacts (VVM para 129-131)					
D.1.1	Are there any host country requirements for an Environmental Impact Assessment (EIA), and if yes, is an EIA approved? Does the approval contain any conditions that need monitoring?	/1/ /8/ /9/ /27/ /52/ /57/	DR	Yes, an EIA is required by the Chilean law, and it is a pre-requisite for both the start of construction and the issuance of the LoA. The EIA was approed . In accordance with the issues found in the EIA, the PP is monitoring these issues throughout the construction of the project activity.		OK
D.1.2	Does the project comply with environmental legislation in the host country?	/1/	DR	Yes, The project complies with environmental legislation in the host country.		OK
D.1.3	Will the project create any adverse environmental effects?	/1/ /57/	DR	There are 7 issues (norms) identified thourgh the EIA which are specificaaly addressed/mitigated during the construction of the project activity. The IFC, Environmental and Social Audits Reports report about the EIA mitigating measures. The reports are available every 3 months since start of construction, where the most recent report is dated April 2010.	~~CL 44~~	OK
D.1.4	Have identified environmental impacts been addressed in the project design?	/1/	DR	Yes, see D.1.1 and D.1.3 above.		OK
E	Stakeholder Comments (VVM para 126-128)					
E.1.1	Have relevant stakeholders been consulted?	/1/ /5/ /6/ /7/	DR	The PP held 4 gatherings/meetings (2 in 2003 and 2 in 2004) that were coordinated by CONAMA to present the project and the results of the EIAas dictated by the Chilean law. Subsequenty the PP held 2 additional voluntary meetings in 2007 to		OK

Checklist Question		Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
				further expand the involvement of the stakeholders in the project activity. This is in addition to the publication of the PDD in the UNFCCC website.		
E.1.2	Have appropriate media been used to invite comments by local stakeholders?	/1/ /52/	DR	The Owner carried out the EIA between December 2001 and December 2003, with the obligation to carry public community consultations through publications in local newspapers and public hearings at a community level. These actions have been appropriate to invite to present comments by local stakeholders		OK
E.1.3	If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	According to the Chilean Environmental Law, a project of the size and characteristics of La Confluencia is required to develop an Environmental Impact Assessment (EIA). The consideration of the local stakeholders is part of this EIA. The actions taken by the PP has been described in E.1.1, E.1.2, E.1.4, and E.1.5.		OK
E.1.4	Is a summary of the stakeholder comments received provided?	/1/ /7/	DR	Yes, a summary of the stakeholders comments was provided to DNV for validation.		OK
E.1.5	Has due account been taken of any stakeholder comments received?	/1/	DR	Yes, the comments were directed at the use and state of the I-45 and possible contamination of water in the Tinguiririca. The Owner had already commenced activities to address these, which includes the extention of the paved section of the I-45 to the town limits of Puente Negro for safety and dust control improvements. Contamination of the catchment as a result of the Project activity have been strongly addressed thorugh both the EIA requirements placed on the Project, and additional measures included in the EPC Contract to ensure the strongest control, monitoring and	~~CL 44~~	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			application of international best practice and standards by the Contractor.		

Table 3 Resolution of corrective action requests and clarification requests

<table>
<tr><th>Corrective action and/ or clarification requests</th><th>Reference to Table 2</th><th>Response by project participants</th><th>Validation conclusion</th></tr>
<tr><td>CAR 1
The PP shall present the LoA from the host country for validation</td><td>A.3.2
A.3.3
B.7.11</td><td>A copy of the LoA by the Chilean DNA is enclosed.

Documentation provided:
-) CAR1_HLC_LoA_2008-06-03.pdf

The current LoA was based on the following environmental permits of the project: RCA 282/07 from year 2007 and R.E.116/04 from year 2004, both issued by the Regional Environmental Commission (COREMA) VI Region, Chile.

New amendments to the environmental permit of the projects were approved afterwards due to changes in the original project:
<table><tr><td>Change in layout of road Upper-Portillo</td><td>RCA N°122/2008</td></tr><tr><td>Mechanic extaction of rocks in the Tinguiririca river, La Confluencia hydroelectric power plant</td><td>RCA N°64/2009</td></tr><tr><td>Construction dumping site “El Shaft”</td><td>RCA N°30/2009</td></tr></table></td><td>DNV has been able to verify the RCA’s presented by the PP, as the pre-requisite for obtaining the LoA from the host country. However the LoA has not yet been presented for validation.

A letter of approval (LoA) /59/ was issued by the DNA for Chile (Comisión Nacional del Medio Ambiente – CONAMA) on 3 June 2008 and an updated LoA was issued on 26 November 2010, authorizing Hidroeléctrica La Confluencia S.A. as project participant and confirming that the project assists in achieving sustainable development.

Therefore this CAR is closed.</td></tr>
</table>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion

Water treatment tunnel La Confluencia hydroelectric power plant	RCA N°68/2009
New access Adit Riquelme	RCA Nº120/2009
Medium voltage line El Manzano-Portillo	RCA Nº192/2009
Expansion of the construction dumping site “El Shaft”	RCA N°219/2009
High voltage transmission line 2x220 kV, La Confluencia-La Higuera	RCA N°236/2009

Additional environmental permits are required by the project for some minor changes in azufre and los humos intakes. An updated LoA will be requested to Chilean DNA, once all environmental permits of the project area available. Once the new LoA is available it will be submitted to DOE.

Provided documentations:

-) RCA 282/07 is available from the EIA electronic system (“SEIA” abreviation form the spanish) at https://www.e-

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		seia.cl/documentos/documento.php?idDocumento=2292756 -) RCA 64 2009 -) RCA 68_09 -) RCA 120-2009 -) RCA 122_2008 -) RCA 192-2009 -) RCA 219 -) RCA 236 -) RCA N°30 2009	
CAR 2 The project proponent is requested to verify the total installed capacity given that: a) in Tables 2 and 6 of the PDD /1/ (pp 7 & 15 respectively) it says 160 MW; b) while in the IFC investment memorandum /11/ (pp x, 21, 23 & 31) it is written 158 MW; c) and in the 3rd Article of the EIA Approval /9/, general characteristics of the project (pp 3), it is specified the range of 145 – 155 MW. The PDD shall be updated, or evidence shall be presented to justify the difference.	A.2.4 A.2.6 B.5.23 B.5.24 B.5.25	a) Supplier informed a total installed capacity of: 81.61 MW each turbine, it is, a total of 163.22 MW for the plant. Capacity informed is given by the design hydraulic conditions, which are: • Net head (nominal): 335.1 m • Rated Flow: 26.25 m^3/s Installed Capacity is theoretical, and responds to a design issue. Real capacity in this and any other hydraulic point will be verified in the field with tests. b) In the real scale, if estimation (a value) is required before any field verification (which is now the case), it must be given mentioning where the output is "measured". Indeed, there are at least three different outputs to be informed under such case. They are: • Turbine Shaft output (hydraulic torque,	Although at the design phase all values are theoretical, the equipment supplier normally guarantees a minimum output based on a given set of conditions, which sometimes are referred to as nominal values. Such values are then verified through tests run after commissioning to ensure that the equipment does delivers at least the minimum output at the nominal values. The guaranteed efficiency provided by the equipment supplier is calculated as a mean weighted efficiency for a range of net heads (335.1 to 343.1 m) and set of corresponding flows /39/. According to this the turbine efficiency will be not less than 93.92%. However for the effects of the project activity the PP has chosen to use the specific efficiency determined by the equipment supplier for ht nominal head value, namely, 94.9% at 335.1 m head with

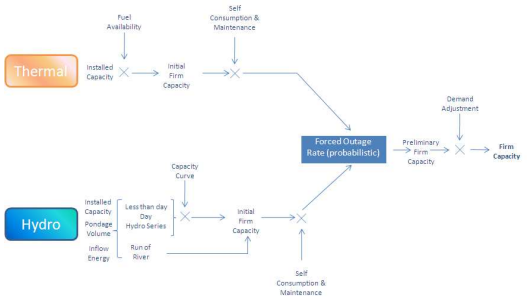
Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		converted in mechanical torque, less mechanical losses, which is the indicated in a), • At the generators terminals (must include turbine and generator efficiencies and all mechanical and electrical losses up to) and, • At the main step up transformers terminals (including efficiencies and all mechanical and electrical losses of all power train) c) Therefore, due that today, field test have not been performed yet, only an estimation starting from the design conditions could be made. It is: HPA: Hydraulic power available: (γ*Q*Hn), where: ✓ γ: water density ✓ Q: flow turbined ✓ Hn: Net head (include hydraulic losses) Minimum = 329.3 m Nominal = 335.1 m Maximum = 346.0 m Doing the calculus for nominal case, we have:	a 26.25 m^3/s flow /39/. Based on the guaranteed efficiency the output power at the generator is then calculated as follows: HPA = Hydraulic power available, and, Turbine output (O_T) = HPA – losses and, Generator output (O_G) = O_T – losses Thus: HPA= γ*Q*Hn , where: • γ: water density (1000 kg/m^3) • Q: flow turbined (26.25 m^3/s) • Hn: Net head (include hydraulic losses). Nominal = 335.1 m HPA = 86.4 MW and, given that the losses applied to the turbine are: turbine efficiency, ηt (94.9%) and turbine guide bearing losses, TBG (0.333MW), then: O_T = 86.4 MW * 0.949 – 0.333MW O_T = 81.61 MW 2 * 81.61 MW = 163.22 MW

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		HPA: 1000 * 26.25 * 335,1 / 100000 MW = 86.4 MW Then: ➢ Turbine output: 81.61 MW (ηt=94.9% + TGB losses) ➢ Generator output: 80.3 MW (ηg=98.43%) ➢ Transformer output: 79.9 MW (ηtr=99.5%) TGB: turbine guide bearing. (333 kW) (Equipment's efficiency considered for the design operation point. Contractor's data) d) Also, Net head (Hn), which is a very important item into de Output calculations, should be re-calculated during the field test. Such Net Head, function of the flow (hydraulic losses), is a dynamic value changing all the time in operation, and it will depend of incoming water from rivers in both branches, reservoir and surge shaft water level, turbine flow, and if one or two machines in operation simultaneously. e) However, if we consider a minor impact (neglect just for this exercise, because we know that it will be not, due flow increment) in the variations of the Hn when both units are in operation, Output	Such a value is now used in the PDD /1/, in the investment analysis /2/and the project's grid and emission reductions calculations /3/ /40/. Although the installed capacity has now been verified, the PP shall explain the differences to the other documents provided also as reference to the validation. The PP presented for validation a capacity walkdown /51/ explaning the various values used for installed capacity which are according to the corresponding chilean bylaws /36/ /50/. Therefore this CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		(Nominal), (depending of the " measuring" point) will be: ➢ Turbine output: 163.22 MW ➢ Generator output: 160,6 MW ➢ Transformer output: 159.8 MW In conclusion, the mistake or misunderstanding is due that for "Capacity" wasn't indicated "where" into the power train line is informed, and probably it provoke the confusion. In the PDD we shall therefore use the turbine output of 163.22 MW, also called turbine rated or nominal output, as the estimate for installed capacity of the power plant. EPC Contract establishes • Net head (nominal): 335.1 m • Rated Flow: 26.25 m^3/s Documentation provided: "CAR2_Voith-Siemens_Technique_Volume IV extract.pdf"	
CAR 3 The project proponent shall include the interest payments in the financial analysis as per the CDM Guidelines on the assessment of investment	B.5.15 B.5.16 B.5.24	An updated version of the financial analysis is attached. Interest payments for determining the tax payments have been included according to Guidelines on the assessment of investment analysis	In the updated version of the investment analysis /2/, the PP has subtracted the interest payments, depreciation and operational costs values from the total income in order to calculate the net cash

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
analysis.		(paragraph 5). Documentation provided: ➢ Revised Financial Model - "IRR_HLC-Model - May 2010 - v1.6"	flow, which in turn is used to calculate the corresponding taxes. However the net cash flow value is negative for each year throughout the time horizon of the financial analysis /2/, and thus the value of the tax is zero. The depreciation and interest payment values are added again to the calculations in order to calculate the project IRR. Therefore this CAR is closed.
CAR 4 The project proponent is requested to verify and justify in a consistent manner with all the submitted documentation and evidence the value chosen for firm capacity.	A.2.4 B.5.23 B.5.24 B.5.25	The firm capacity was calculated by Synex using the methodology guidelines of the Firm Capacity bylaw (DS62, from 2006). It is worth to mention that this bylaw is not has been officially enacted but its application upon definition for the ancillary services regulations. Please refer to Synex Report, paragraph 3.4. on page 10.	The project proponent is required to : 1) clarify/rephrase the following sentence: "It is worth to mention that this bylaw is not has been officially enacted but its application upon definition for the ancillary services regulations." 2) Furthermore, the PP is requested to present explicitly the calculations resulting in a value for firm capacity of 112 MW, and that considered the text in the Synex Report /23/, paragraph 3.4, on page 10, and the "Firm Capacity" table shown on page 11. 3) Explain the differences between the firm capacity value of 112 MW and those values shown in the other documents provided as reference to the validation.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
			This CAR (CAR 4) continues below.
CAR 4 (continued) The PP is required to : 1) clarify/rephrase the following sentence: "It is worth to mention that this bylaw is not has been officially enacted but its application upon definition for the ancillary services regulations." 2) Furthermore, the PP is requested to present explicitly the calculations resulting in a value for firm capacity of 112 MW, and that considered the text in the Synex Report /23/, paragraph 3.4, on page 10, and the "Firm Capacity" table shown on page 11. 3) Explain the differences between the firm capacity value of 112 MW and those values shown in the other documents provided as reference to the validation.		1) Even though the DS62 bylaw established that the methodology should be applied after the issue of the bylaw itself, in order to maintain coherence with the rest of the regulation, the authority issued DS44/2007 that modified the DS62 in order to establish that the first application of the new methodology should be carried out once the "ancillary services" regulations were in force. The methodology is described in section 2.5 of the Synex report. 2) The calculation of the firm capacity has been conducted by Synex. The methodology to calculate the firm capacity (now called "adequacy capacity") as applied by Synex/IFC can be divided in four steps: i) First step: Determination of the initial firm capacity of thermal and hydro power plants (For Hydropower plants, the initial firm capacity is a function of the maximum installed capacity, the inflow energy corresponding to dry hydrological conditions (average of the two driest hydro conditions of the system), pondage volumes and the stored energy at the beginning of the hydrological year. Irrigation constrains are deducted from inflows.) ii) Second step: the initial firm capacity is	DNV has been able to verify that the by law DS62 /36/ and its application amendment as per the decree DS44/2007 /50/, establishes a general methodology for the calculation of the firm capacity. Based on this, and as part of the project activity the PP and IFC requested the chilean company Synex /36/ to estimate the firm capacity to be considered in the project activity in accordance to the methodology specified in the bylaws DS62 /36/ and DS44/2007/50/. DNV has found that the evidence presented for validation sufficiently addresses the issue raised. Therefore this CAR is closed

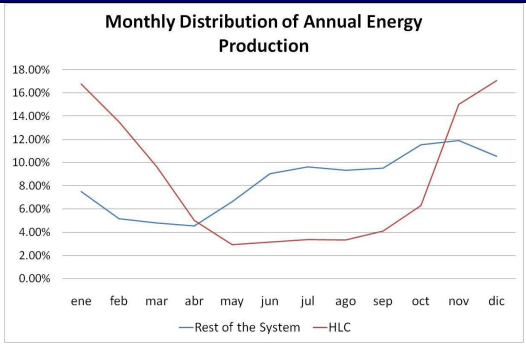
Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		reduced, according to the scheduled maintenance periods and self consumption iii) Third step: take into account the forced outage rate of each power plant through a convolution model. This result is called preliminary firm capacity. iv) Fourth step: the preliminary firm capacities of each plant are adjusted so that the sum of these capacities matches the peak demand. These adjusted firm capacities correspond to the firm capacity of the units. Firm capacity methodology:  Please find attached a report by Synex explaining in detail how the calculations are done (Potencia de suficiiencia 07jun10.pdf; Potencia de suficiiencia 07jun10_ translation.pdf).	

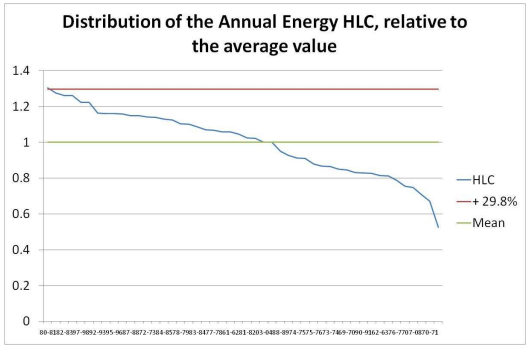
Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		3) The firm capacity varies according to this calculation methodology for each year. In the period 2011 – 2020 the estimated annual firm capacity for HLC fluctuates between 104 and 119 MW according to the Synex report (para 5.1.4, page 25). The exact same values are given in the IFC IM [IFC IM (July 2007), Annex 2: Revenues Sheet (Extract IFC Memo -HLC (part 4).pdf))]. The 112 MW mentioned in the Synex Report /23/, paragraph 3.4, on page 10, and in the "Firm Capacity" table on page 11 is presented as the average firm capacity over the period 2010-2018 (see footnote under the table). However, it is not the average but the annual firm capacity numbers that are used in the financial analysis, as can be verified by comparing the Synex base case capacity revenues (base case, page 27) and those stated in the financial model ("FIRR and Sensib" sheet, line 21). They are the same, which proves that the firm capacity assumption behind the PDD financial analysis is exactly the same as the Synex Report mentions. Documentation provided: ➢ Potencia de suficiencia 07jun10.pdf ➢ Potencia de suficiencia 07jun10_translation.pdf ➢ Extract IFC Memo -HLC (part 4).pdf	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		➢ Memo 1_firm capacity walkdown.docx ➢ firm capacity walkdown.xlsx ➢ Pfirme SIC.xls	
CAR 5 The sensitive analysis shall be revised to find the values at which each of the parameters chosen bring the project IRR above the benchmark value, and analyse the likelihood and eventual driving factors for reaching such a change respectively.	B.5.23 B.5.26 B.5.27 B.5.28	The sensitive analysis has been revised to find the main parameters deviations that bring the projects IRR above the benchmark value (10%). The results are: • Energy Price: + 14.8% for the entire study horizon. Due to 52-58% of the production is sold via PPA, the spot prices would have to increase by more than 30% in a permanent way. The main driving factors are demand, fuel prices, and the absence of enough offers of new projects. • Investment Costs: -22.3%. Due to the characteristics of the project, it is more probable that costs rise instead of decrease at such level. • O&M Costs: -185.8%. Scenario impossible to reach. • Generation: + 29.8%. The available hydrological statistic doesn't allow inferring such a permanent deviation of the inflow energy of this run-of-river project. Otherwise, the occurrence of wet scenarios produces lower prices due to the hydrothermal composition of the system, so reaching the final IRR goal is unlikely.	The calculation and resulting values at which each of the factors driving the project's IRR shall change in order for the project activity to reach the benchmark value of 10%, is shown in the revised sensitivity analysis included in the investment analysis /2/. The assessment on the analysis of the individual driving factors is as follows: -) Energy price: The PP is requested to present the calculations leading to the percentages presented in the answer provided. -) Investment costs: the analysis presented by the PP is reasonable and justifiable, since there is no indication leading to believe that the value of the costs shall reduce. -) O&M Costs: the analysis presented by the PP is reasonable and justifiable, since any scenario reducing below 100% is impossible. -) Generation: The PP is requested to substantiate further the response since the

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		The sensitivity analysis has been updated and the value at which each parameter brings the project's IRR above the benchmark has been added. The necessary changes of the parameters are summarised as follows: ***Total Investment Cost*** Required change of parameter to reach benchmark: -22.3% ***Energy Price*** 14.8% ***Annual O&M Costs*** -185.8% ***Generation Output*** 29.8% Documentation provided: ➢ Revised Financial Model - "IRR_HLC-Model - May 2010 - v1.6"	project design considers that the project activity will be able to produce highest when the production of the rest of the power generation plants connected to the grid will be at its lowest. Therefore, a "wet scenario" for the project activity will may indicate "dry scenario" for the rest of generation in the system, which will lead to higher prices for the project activity. The reference for the reasoning above is taken from the following extract from page 74 of the IFC Investment Memorandum /11/. Here it can be seen that the production regime of the project activity is opposite to the general regime for hydropower generators in Chile: "La Confluencia hydrologic regime is different from most of the hydropower generators in Chile, for which January to May are typically the driest months. As a result, the Project is expected to benefit from the high spot market prices over this period." This CAR (CAR 5) continues below.
CAR 5 (continued) -) Energy price: The PP is requested to present the calculations leading to the percentages presented in the answer provided. -) Generation: The PP is requested to substantiate further the response since the project design considers that the project activity will be able to		The sensitivity analysis has been revised to establish the reduction or increase needed in the main parameters to bring the project's IRR above the benchmark value (10%). The results are: • Energy Price: + 70.2% for the entire study	DNV has found thath the evidence presented for validation sufficiently addresses the issue raised. Therefore this CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
produce highest when the production of the rest of the power generation plants connected to the grid will be at its lowest. Therefore, a "wet scenario" for the project activity will may indicate "dry scenario" for the rest of generation in the system, which will lead to higher prices for the project activity. The reference for the reasoning above is taken form the following extract from page 74 of the IFC Investment Memorandum /11/. Here it can be seen that the production regime of the project activity is opposite to the general regime for hydropower generators in Chile: "La Confluencia hydrologic regime is different from most of the hydropower generators in Chile, for which January to May are typically the driest months. As a result, the Project is expected to benefit from the high spot market prices over this period."		horizon. Due to the fact that part of the production is sold via PPA, the increment of the spot prices produces both increased injection revenues and increased purchase costs for supplying the PPA. The main driving factors are demand, fuel prices, and the absence of enough offers of new projects. The previous value of 14.8%, considered only the price increase at the injection point of the plant, neglecting the adverse effect of increasing the costs to supply the PPA, so a relevant component was not taken in consideration in the calculation. The actual value of 70.2% considers correctly both effects, the increase of the price for the energy generated and the increase of the costs to supply the PPA. - Generation: The average monthly distribution of the annual generation is shown in next figure, for both La Confluencia and the rest of the hydropower plants of the system.	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		 It is shown that within a year, the production on HLC is relatively higher in summer. This fact has already been considered in the model (SDDP) used to estimate the revenues assessment of the project. This model allows maintaining the right coherence between production and prices for different scenarios, hydrologically independent.Finally Synex uses the average value to determine the expected revenues of the project. In other hand, the correlation factor among the production of HLC and the rest of the system has been estimated in 85.7%, so it is not possible to say that the annual production regime of the project is opposite to the general regime. The next figure shows the distribution of the annual generation of HLC, relative to the average value of the total statistics. It is clear that the scenario of a permanent increase of 29.8% of average annual generation is not feasible.	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		 Documentation provided: ➢ CAR6_Graphs_Production.pdf ➢ IRR_HLC-Model - May 2010 - v1.7	
CAR 6 The calculation of the BM emission coefficient needs to be corrected as the current determination of the BM considers generation by registered or proposed CDM project activities.	B.6.2 B.6.8	CDM project activities have been removed from the set of power plants for determine the BM. Please see updated calculation enclosed. Documentation provided: "GRID EF LaConfluencia_HydroPP_(2006-2008)_18-05-2010.xls"	The PP has removed the CDM project activities from the Grid Emission Reduction calculations /3/. Therefore this CAR is closed.
CL 1 The project proponent is requested to provide evidence and precise reference for the Net Heating Values used in the calculations (file: "GRID EF LaConfluencia_HydroPP_(2006-2008)_2-12-2009.xls", tab: "NCVs EFs	B.6.5	Precise reference for the NHV used has been added in the file: "GRID EF LaConfluencia_HydroPP_(2006-2008)_18-05-2010.xls", tab: "NCVs EFs Conversions", cells: "G4-G10 & G34"	DNV has found thath the evidence presented for validation sufficiently addresses the issue raised. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Conversions", cells: "F4-F10 & F34")		Please see National Energy Balance 2007, National Energy Commission, in Worksheet "CUADROA2" under DENSIDAD (Ton/m3) and PODER CALORIF. (KCal/Kg). National Energy Balances can be downloaded at: http://www.cne.cl/cnewww/opencms/06_Estadisticas/Balances_Energ.html Node Prices Report Oct. 2004 can be downloaded at: http://www.cne.cl/cnewww/export/sites/default/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/archivos_bajar/Octubre_2004/InfSicOct2004d.pdf	
CL 2 The project proponent is requested to present the EPC Contract (evidence) and the precise references (page and paragraph) for the information presented in table 2 of the PDD (pp7) /1/ referenced to such document.	A.2.4 A.2.6 B.5.24	Please see side document CL2_EPC_references.pdf providing a list of references to the EPC contract. Documentation provided: CL2_EPC_references.pdf	The PP is requested to correct the table in the PDD /1/ to include the appropriate references for those parameters that are not found in the EPC contract. Also the original evidence shall be presented for validation purposes. This CL (CL 2) continues below.
CL 2 (continued) The PP is requested to correct the table in the PDD /1/ to include the appropriate references for those parameters that are not found in the EPC		The PDD has been updated as well as the documentation (see CL_EPC_references_v2.pdf).	The PDD has been corrected as per the response of the PP. Therefore this CL is closed.

<table>
<tr><th>Corrective action and/ or clarification requests</th><th>Reference to Table 2</th><th>Response by project participants</th><th>Validation conclusion</th></tr>
<tr><td>contract.
Also the original evidence shall be presented for validation purposes.</td><td></td><td>Additionally, the original evidences are provided as extracted pages from the EPC.

Documentation provided:
➢ CL2_EPC_references_v2.pdf
➢ CL2_Extracts_EPC.rar
➢ CL2_EPC_references_v3.pdf
➢ EPC page C-20.pdf</td><td></td></tr>
<tr><td>CL 3
The project proponent is requested verify and provide evidence and precise reference (page and paragraph) for the coordinates of the project, given that in the PDD /1/ these are specified as “UTM (PSAD56) 358,100, 6,144,550 approximately”, and while the north coordinate falls within the values specified in both: the EIA Approval /9/ (pp 17) “Discharge points”, and the EIA approval /8/ (pp 4) “Geographical location of the main components of the Project in UTM coordinates”, the east coordinate is out of the range of the corresponding values in the same references.
If necessary the PP shall correct the information in the PDD to match the values in the evidence to be provided. Furthermore, the PDD shall be exhibit the location in standard geographic coordinates (degrees, minutes and seconds for longitude and latitude) as per the UNFCCC requirements.</td><td>A.2.4
A.4.1</td><td>As is mentioned in the PDD the coordinate correspond to the Powerhouse, and considering that La Confluencia project can be divided in two branches Tinguiririca and Portillo names of the rivers where the main intakes take the water from, the coordinate of the entire project is represented by the coordinates that were reported in the Environmental Impact Declaration and available at the following web page https://www.e-seia.cl/documentos/documento.php?idDocumento=1763816, where is shown that the coordinate reference used is UTM 19 PSAD 56 and the coordinates are:

<table><tr><th>North</th><th>East</th><th>Long</th><th>Lat</th></tr><tr><td>6152110</td><td>367685</td><td>70°26’44”</td><td>34°45’52”</td></tr><tr><td>6145465</td><td>357380</td><td>70°33’34”</td><td>34°49’23”</td></tr><tr><td>6135400</td><td>362784</td><td>70°30’07”</td><td>34°54’52”</td></tr></table></td><td>The PDD shall also include the reference to which the coordinate is give (e.g. intake, power hours, etc.).

This CL (CL 3) continues below.</td></tr>
</table>

<table>
<tr><th>Corrective action and/ or clarification requests</th><th>Reference to Table 2</th><th>Response by project participants</th><th>Validation conclusion</th></tr>
<tr><td></td><td></td><td>The PDD has been corrected in order to match with the update values.</td><td></td></tr>
<tr><td>CL 3 (continued)
The PDD shall also include the reference to which the coordinate is give (e.g. intake, power hours, etc.)</td><td></td><td>The PDD has been updated with following table:

The coordinates of the HLC power house, Portillo intake and Tinguiririca intake are as follows:

<table><tr><th></th><th>North</th><th>East</th><th>Long</th><th>Lat</th></tr><tr><td>Power house</td><td>6144669</td><td>358127</td><td>-70.55138889</td><td>-34.82972222</td></tr><tr><td>Portillo intake</td><td>6151803</td><td>367576</td><td>-70.44694444</td><td>-34.76666667</td></tr><tr><td>Tinguirica intake</td><td>6135541</td><td>362648</td><td>-70.50361111</td><td>-34.91277778</td></tr></table>
Documentation provided:
➢ HLC Coord Obras.xls</td><td>DNV has found thath the evidence presented for validation sufficiently addresses the issue raised.

Therefore this CL is closed.</td></tr>
<tr><td>CL 4
The project proponent is requested provide justification (and if necessary evidence and precise reference) for the financial life time of the project of 25 years as indicated in the C.1.2 of the PDD, while in the IFC investment memorandum</td><td>B.5.15
B.5.23
B.5.24
B.5.25</td><td>Regarding financial life time, considering a period from first debt drawdown (December 2008) until last principal payment (June 2027) there is a financial life time of 19 years, and if the loan execution date is considered the financial life time</td><td>The PDD /1/ has been corrected as per the response received (20 years), which is according to the “Guidelines on the Assessment of Investment Analysis” /65/.

Therefore this CL is closed</td></tr>
</table>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
(pp 52 & 54) it's indicated that the investment value is calculated with basis on 30 years, and in the investment analysis it is only 20 years including the construction period.		increase to 20 years. Regarding IFC IM, the A Loan has a term of 20 years (including the construction period) and the B loan has a term of 15 years (including the construction period) (see page 33 of the IFC IM) Pages 52-54 of the IFC investment memorandum talks about transmission pricing and the mechanism that the authority use in order to calculate the transmission tolls, which assume 30 years of useful life for transmission assets. So it does not have relation with the hydro project life. The financial analysis use a period of evaluation of 20 years because regarding the "Guidelines on the Assessment of Investment Analysis" paper (page 1 – guidance number 3) "…In general a minimum period of 10 years and a maximum of 20 years will be appropriate". Regarding this, the analysis was made using a period of 20 years and also a fair value of the project activity assets was included at the end of the assessment period. (The financial model considers that the power plant is depreciated in 40 years) For the project activity the period of	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		financial assessment has been defined to be 20 years including construction time. In general, for large hydropower projects, both greenfield and major upgrades, Hidroeléctrica La Confluencia S.A. (SNPower / PacificHydro) uses a 20 year perspective for financial analyses. This period is commonly used for investment assessments within the power sector. According to the "Guidelines On The Assessment Of Investment Analysis" (EB51 / Annex 58) paragraph 3 and 4 a residual value of the assets has been applied after this period considering that the operational life time of the project is estimated to 40 years.	
CL 5 The project proponent is requested to present the evidence and precise reference for the expected operational/useful lifetime of the project of 30-50 years indicated in section C.1.2 of the PDD. Furthermore, the PP shall have a consistent value throughout the PDD and the evidences provided. If necessary the PDD shall be corrected accordingly, and a justification for the different values presented in the evidences provided shall be submitted.	B.5.18 B.5.24 B.5.25	For accounting purposes the financial model considers that the power plant will be depreciated in a 100% in 40 years. Please see also the IFC Investment Memorandum which states on page 104 the following: ***"Depreciation.*** HLC is depreciating all tangible costs, including civil works and equipment, over 40 years for accounting purposes. For tax purposes, the Company uses an accelerated depreciation based on useful lives allowable under Chilean Tax Laws." (IFC IM, page 104)	The PDD /1/ has been corrected to reflect the response of the PP which is reasonable and justifiable, 20 years for the financial lifetime according to CDM guidelines and 40 years for depreciation and operational/useful lifetime. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		A fair/residual value of the project activity assets has been included at the end of the financial assessment period of 20 year in order to consider the additional life time accordingly. Documentation provided: HLC-IM FINAL VERSION July 30 2007 (clean).doc	
CL 6 The PP is requested to present the evidence and precise reference (page and paragraph) to the authorization from the TSO to connect at the substation of San Fernando via La Higuera hydropower plant.	A.2.4	The document is included under the list of documents requested for CL48 (doc n°17). It is important to highlight that the authorization from the operator of the system to connect La Higuera will come only once all the tests are completed. This is scheduled to happen in the short term. What is included as evidence in the attachment is an agreement between HLH and Transelec, the main transmission system owner, which states that: 1. HLH promises to sell to Transelec the Tinguiririca substation and the Tinguiririca – San Fernando transmission line to Transelec. 2. The date the sale will take place will be the date the system operator authorizes the substation to operate. 3. Transelec will support HLH all the time to enable a successful interconnection. 4. HLH declares that both the design	As per the response of the PP, the actual connection permit from TSO is not presented (available) for validation. The frame agreement and promise between TRANSELEC and HLH does indicate in clauses 2.4& 2.5 that the sell of the substation will be effective at the moment of the connections to the SIC grid, according to the approval given by the CDEC-SIC. Therefore it can be inferred from here that serious efforts have been made by the PP (represented/via by HLH) to obtain the corresponding permit from the system operator to connect to the SIC grid. However the original of the contract between TRANSELECT and HLH shall be presented for validation purposes. This CL (CL 6) continues below.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		and the construction of the substation have been done in accordance to the applicable Chilean legislation. The attached version of the agreement is the initialized version. Documentation provided: 17 - MOU Transelec.pdf	
CL 6 (continued) The original of the contract between TRANSELECT and HLH shall be presented for validation purposes.		Please, find attached a confirmation by Transelec stating that the contract exists and that the ownership of the substation has effectively been transferred from HLH to Transelec. The original contract is currently at the Notaria (a kind of registry or legal entity that certifies the signature). Additionally, some news coverage is enclosed confirming the transaction. Documentation provided: ➢ CL6_Confirmation_Transelec.pdf ➢ CL6_News_Coverage.rar	DNV has found that the evidence presented for validation sufficiently addresses the issue raised. Therefore this CL is closed
CL 7 The project proponent is requested to clarify and substantiate with the correct evidence and precise reference (page and paragraph) when was the EPC	B.5.5 B.5.7 B.5.8	The EPC contract between Hidroeléctrica la Confluencia, Hochtief (international construction Co.) and Tecsa (local construction Co.) was signed on 18 October 2007. Attached are the relevant pages.	The evidence presented /41/ shows that the EPC contract was signed on 18 October 2007. Also the evidence shows that the conditions for issuing the Notice to Proceed to the EPC contractor are:

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
contract signed, under which conditions regarding the notice to proceed and when was the notice to proceed given to the EPC contractor.		The notice to proceed was given to the EPC contractor on 21st December 2007. Please see attached EPC extract on Clause 9.1.2 Volume II (VOLUME II CONDITIONS OF CONTRACT, Section 9 COMMENCEMENT, DELAYS AND SUSPENSION, (pages 86 and 87 of 469) stating conditions for the Notice to Proceed. Documentation provided: ➢ CL7_EPC_extract_signed_2007-10-18 ➢ CL48_16_HLC-LH-CHT-00064 CL7_EPC_extract_Conditions-to-proceed.pdf	a) Required insurance is in effect. b) Contractor has full access to site and access land c) All required government permits and other approvals are in effect. d) HLC shall have received all Securities and gurantees agree in the EPC contract /15/ e) Satisfactory evidence received by HLC of the acceptance of this contract and the Guarantee by the Contractor and the Guarantor. The PP shall present evidence of the Notice to Proceed issued to and the corresponding acceptance issued by the EPC Contractor, where the date in question is clearly specified in both documents. This CL (CL 7) continues below.
CL 7 (continued) The PP shall present evidence of the Notice to Proceed issued to and the corresponding acceptance issued by the EPC Contractor, where the date in question is clearly specified in both documents.		The Notice of Proceed and its acceptance has been submitted as CL48_16_HLC-LH-CHT-00064.pdf under CL48. The contractor has accepted and signed the Notice of Proceed on page 3. Documentation provided: ➢ CL48_16_HLC-LH-CHT-00064.pdf	DNV has found thath the evidence presented for validation sufficiently addresses the issue raised. Therefore this CL is closed.
CL 8 The project proponent is requested to clarify and substantiate with the correct evidence and precise reference (page and paragraph) the productions losses (in GWh) experienced between the La	B.6.4	La Higuera run-of-river hydro power plant will connect to the SIC Grid a Substation called Tinguiririca. The real production losses between La	The electrical substation originally referred to as San Fernando (for being located near the town of the same name), changed the name to Tinguiririca once the formal process for the construction of this

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Higuera switchyard and the substation of San Fernando, as well as the internal power consumption at the project activity site.		Higuera switchyard and the S/E Tinguiririca, as well as La Higuera plant internal consumption has not been experienced so far, given that the hydro plant has still not started operation. Due to the appearance of unexpected constraints at the SIC, the owner`s transmission lines are probably going to operate until 2013 at 154 kV. At 154 kV voltage, the total losses are estimated to be 10.91 GWh, corresponding 4.02 GWh to the energy losses between La Confluencia switchyard and La Higuera switchyard (18 km) and being 6.89 GWh the expected losses between La Higuera Switchyard and S/E Tinguiririca (38 km). According to la Confluencia EPC contract (Volume III Part C Page 30) the 18 km transmission line between La Confluencia and La Higuera shall be designed in such way, that electrical losses remain under 0.68% considering a voltage level of 220 kV. Once the transmission line start working at 220 kV losses will diminish, given that the higher voltage level. Additionally, the internal plant power	installation began to take place. The PP has presented some technical data /43/ of the transmission line between HLC and HLH and the Tinguiririca substation. However no evidences neither the corresponding substantiation of the estimated losses has been presented for validation. Given that the losses are intended to be measured during the operation of the La Confluencia power plant, and that this will change dependign on the transmission voltage level. This CL will be closed upon issuing a corresponding FAR 1 to ensure that the losses are determined precisely and include only those pertaining the operation of the HLC are taken into consideration in the emission reduction calculations. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		consumption is expected to be 0.4MW representing about 3.5 GWh, according to Owners Engineer (Aqua Energy) estimates. Once La Higuera and La Confluencia hydro power plants are in operation, the losses will be defined in accordance to the energy measurements that will be done by the meters for billing purposes and allocated according to the respective technical data of the transmission line. For more info about the transmission line please review document: Transmission La Confluencia -La Higuera - Tinguiririca (CL9_DEV-LAT-PRO- Datos técnicos HLC-HLH-TIN _Draft_.pdf Documentation provided: ➢ CL9_DEV-LAT-PRO- Datos técnicos HLC-HLH-TIN _Draft_.pdf	
CL 9 The project proponent is requested to further justify the choice of 10% as benchmark, since the IFC's Investment memorandum presented 9% for their base case based on the report from SYNEX, and with the agreement of HLC.	B.5.14 B.5.15	The benchmark of 10% chosen for the project activity is the official rate of return for electric projects defined by the Chilean electrical law: According to Article 174 of the Ministry of Economy, Promotion and Reconstruction's DFL Nº 4 (Decree with the Force of the Law Nº 4) of 12th of May 2006, an annual discount rate of 10% shall be used to determine the indicative generation and transmission expansion, and	As presented in the response of the PP the chosen benchmark is publicly accessible and transparent. Although the benchmark value of 10% issued Government of Chile /44/ (page 22 article 5.9) and /45/ (DFL Nº4/2006(M)) is of an indicative nature regarding the expansion of the generation, it is clear that the market will have a tendency to use this

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		regulated prices at generation level. The law also mandates to use a discount rate of 10% to determine the allowed revenues for transmission and distribution activities. According to this regulation the 10% discount rate can be seen as a governmentally defined opportunity costs general for all energy transmission and generation activities and therefore as a general benchmark for the electric sector. Hence, also the "Fijacion De Precios De Nudo Abril De 2007 Sistema Interconectado Central (SIC) Informe Tecnico Definitivo" (on page 22) is referring to the 10% mentioned in Article 174 of DFL N°4 in order to calculate the cost of generation for the generation expansion plan in SIC. In its report Synex based its assumption on an expected internal rate of return of 9% (after tax) on their experience in the development of the Chilean power sector. According to the "Guidelines On The Assessment Of Investment Analysis" (EB51, Annex 58) under paragraph 13 in "cases of projects which could be developed by an entity other than the project participant the benchmark should be based on publicly available data sources which can be clearly validated by the DOE. Such data sources may include local lending and borrowing rates, equity indices, or benchmarks determined by relevant	value as the investment reference for the generation projects. Therefore, it is the opinion of DNV that the benchmark of 10% is reasonable and suitable for the project activity. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		national authorities." The HLC hydro power plant is a new greenfield investment that also could be developed by others. Hence the benchmark for the electric power sector defined by the Ministry of Economy in DFL N°4 is deemed appropriate, since the Synex assumption is based on its own experience, is not publicly available and not determined by a relevant national authority. Additionally, registered CDM projects (UNFCCC Ref. No. 2417) in Chile used the 10% benchmark recently. Documentation provided: ➢ "Informe Precio de Nudo SIC Abril 2007 Definitivo.pdf" ➢ "Chile_DFL_N4.pdf"	
CL 10 The project proponent is requested to clarify and substantiate with the correct evidence and precise reference (page and paragraph), why is the depreciation of the assets taken only for 12 years in the investment analysis while in the IFC Investment Memorandum it is stated that for accounting purposes the depreciation was done in 40 years.	B.5.15 B.5.17 B.5.24 B.5.25	For accounting purposes the financial model considers that the power plant will depreciates in a 100% in 40 years. For tax purpose the accelerated depreciation was considered and in order to be consistent, the financial analysis used the same values and timing (in real basis) as the investment financial model (IFC IM Annexes). Please see also the IFC Investment Memorandum which states on page 104, that the accelerate depreciation is based on useful lives allowable under Chilean Tax	The financial analysis /2/ prepared by the PP comprises a time horizon of 20 years considering also the investment years. Also DNV has been able to verify that the documentation presented does specify a depreciation of 40 years. To comply with the conservativeness principle stated in the "Guidelines on the Assessment of Investment Analysis" /65/, the PP has added the residual value of the project at the last year (year 20) of the investment analysis. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Laws: "Depreciation. HLC is depreciating all tangible costs, including civil works and equipment, over 40 years for accounting purposes. For tax purposes, the Company uses an accelerated depreciation based on useful lives allowable under Chilean Tax Laws." (IFC IM, page 104) Documentation provided: ➢ HLC-IM FINAL VERSION July 30 2007 (clean).doc	
CL 11 The project proponent is requested to clarify the difference between the revenue values presented in the financial analysis (database tab), versus those presented in both: those found in the table summarizing the project's Base Case financial projections of the IFC Investment Memorandum section 14.02 (which are the same as those found in the Summary found in the IFC Investment Memorandum Annex 2), and the aggregated value of the revenues presented in the tables of "La Confluencia generation business in the spot market" and "*La Confluencia – Chilectra PPA.*" in the IFC Memorandum .	B.5.24 B.5.25	The difference is produced by two factors: a) Values presented in the financial analysis (database tab) are in real basis and the values presented in the IFC IM are in nominal basis. This is the main difference. When values are transfer from the IFC data to the financial model an escalation adjustment is done to bring the values from nominal to real terms, according to IFC indexes. b) IFC IM revenue values includes a small values related with "Colmito Margin transferred from HLH", amount that is not included in the financial analysis file.	DNV has been able to verify as stated in the response from the PP that the main differences are: difference between real and nominal values, and the addition of another component, understanding to be the "Colmito Margin transferred from HLH". DNV find this explanation reasonable and has no effects in this respect for the calculations presented in the financial analysis. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 12 The project proponent is requested to explain how/where is the Capacity Price estimated.	B.5.24 B.5.25	The capacity price is implicit in the firm capacity revenues, which were calculated by Synex as indicated in their report in page 25 (first table). It is worth to mention that the capacity price is calculated and published by CNE every six months, in the Node Price Report, and consider the annual marginal cost of increasing the installed capacity of the electric system with the most economic type of generation unit, in order to supply the additional power required by the system during the annual peak hours. In practice, it corresponds to the investment and fix operative costs of a 70 MW gas-diesel turbine. The capacity price used in the report was 7.3 US$/kW-month, according to CNE October's Node Price Report. Node Price Report October 2007: http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/octubre2007.html (See SIC "Informe técnico definitivo")	The PP is requested to present in an explicity manner the calculation that lead to the Capacity Price presented in the reference document, namely SYNEX Report. Also the PP is requested to submit the specific reference (page number and paragraph/table) within the reference given (CNE October's Node Price Report), for the investment reference used in practice (within the reference given (70 MW gas-diesel turbine), and the capacity price used in the report of 7.3 US$/kW-month, This CL (CL 12) continues below.
CL 12 (continued) The PP is requested to present in an explicit manner the calculation that lead to the Capacity Price presented in the reference document, namely SYNEX Report (see also CAR 4 DNV response, point 2).		The reference report has been corrected, and it corresponds to the CNE October's 2006 Node Price Report. (In practice, it corresponds to the investment and fix operative costs of a 112.73 MW gas-diesel turbine.)	The PP has presente the logic (process) behind the calculation of the fimr capacity, and DNV was able to verify the discrepancy between the installed capacity and the value used for firm capacity.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
Also the PP is requested to submit the specific reference (page number and paragraph/table) within the reference given (CNE October's Node Price Report), for the investment reference used in practice (within the reference given (70 MW gas-diesel turbine), and the capacity price used in the report of 7.3 US$/kW-month,		Node Price Report October 2006: http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/octubre2006.html (See SIC "Informe técnico definitivo" and report attached) The calculation of the Capacity Price is contained and explained in the CNE October's 2006 Node Price Report, section 12.2, page 39. Both the connection busbar of the project (San Fernando) and Quillota busbar, belong to "SIC Centro-Norte" subsystem. According to the result shown in section 12.2.1, the capacity price in the reference node (Polpaico) is 7.5496 US$/kW-month. According to the Table N° 19 (page 35), the capacity node factor of Quillota is 0.9667. Threfore, the capacity price in Quillota is 7.5496*0.9667 = 7.298 US$/kW-month. Please, see also the responses on CAR 5. Documentation provided: ➢ CL13_Informe_Precio_de_Nudo_SIC_October06	Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 13 The project proponent is requested to justify why are the Colmito revenues not included in financial analysis given that it will be cheaper to meet the committed supply agreed in the PPA from the Colmito power plant than purchasing it in the spot market. This consideration will have an effect in the result of the investment analysis .	B.5.24 B.5.25	The project activity is the construction of the HLC HEPP. The Colmito gas turbine is neither part of the project nor element of the project boundary. Hence, revenues resulting from its operation are not related to the project and its financial analysis. The Colmito is a back-up system for the grid system not for a specific plant. As confirmed in the SYNEX report on page 17, for backup or peaking generation in dry years open cycle gas turbines burning diesel, like Colmito, are convenient. Hence, the La Confluencia PPA does not refer to the Colmito gas turbine. Colmito gas turbine is located in V Region of Chile and started operation in 18/08/08 (Please see attached letter from Pacific Hydro submitted on 18th August 2008 to the System Operator, to inform that Colmito GT is handed over to the system for dispatch.) On the other hand La Confluencia Project is located in VI Region of Chile (in a linear distance of about 230 km from Colmito GT), and will start operation during 2010. The coordinates for Colmito gas turbine location are as follows:	The following text is an extract of from the reference which DNV's issue is referreing to (IFC IM /12/): "HLC's Back-Up Strategy: To mitigate the risk of negative margins resulting from the Project having a shortfall in generation relative to supply commitments under the PPA, the Project will utilise HLHPP's 60 MW Colmito gas/diesel back-up plant ("Colmito") under the terms of a Shared Services Agreement between HLH and HLC. Use of Colmito will effectively cap any negative margins the PPA may trigger, ensuring that the maximum negative margin will be equal to the difference between the PPA price and the cost of energy supplied by Colmito under the Shared Services Agreement…." It is clearly stated there that HLC has, as part of their business plan, a back up strategy that includes the Colmito power plant, in order to reduce the risk of negative margins. In DNV's opinion the intention to reduce negative margins is directly linked to the financial analysis. Thus although the Colmito power plant may be physically located outside the physical/geographical boundaries of the project activity, it has

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		North **East** 32°55'52" 71°28'32" 32°55'49" 71°28'32" 32°55'49" 71°28'26" 32°55'49" 71°28'26" Documentation provided: CL14_Carta_de_Sincronizacion_Colmito /46/	(may have) an effect in the profitability of the project activity and consequently the additionality principle. Thus, the PP is request to either: provide an acceptable justification for not including the Colmito power plant (partially or totally) as part of the project activity, or, modify the project documentation accordingly to include in the financial analysis the (effect of the) Colmito power plant (other documents shall be updated accordingly as necessary). This CL (CL 13) continues below.
CL 13 (continued) The PP is request to either: provide an acceptable justification for not including the Colmito power plant (partially or totally) as part of the project activity, or, modify the project documentation accordingly to include in the financial analysis the (effect of the) Colmito power plant (other documents shall be updated accordingly as necessary).		La Confluencia and Colmito GT projects are physically and operationally unbundled. In fact, the Colmito GT is a system back-up unit connected to the SIC Grid, and will only be dispatched when the system operator does not see a cheaper alternative available in the SIC generation portfolio (see [System Operator confirmation letter]). Neither HLC nor HLH can decide on dispatching Colmito GT to service any PPA shortfall or otherwise. However, according to the Shared Services Agreement with HLH (see "CL14_Summary Shared Service Agreement.pdf"), HLC has the right to share the Colmito revenues. The very limited importance of this revenue stream is already acknowledged by DNV through the	Based on the response from PP, DNV agrees that the EL Colmito gas power plant is out of the scope of the project activity , and its impact on the project acivity is marginal, and does not justify further consideration. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		review and closure of CL12. In fact, they were only estimated to approximately 0.24% (1.45 MUSD) of the total revenues realized by HLC through energy and capacity sales (612 MUSD) during the investment assessment period of 20 years (please see attached version of Financial Model considering Colmito's revenues and IFC IM (July 2007), Annex 2: Revenues Sheet (Extract IFC Memo -HLC (part 4).pdf)). If the revenues from Colmito were taken into account, the IRR would change by 0.03% from 7.75% to 7.78%. Hence even if they were deemed relevant, the potential impact of the Colmito revenues on the IRR is marginal. The Colmito GT investment decision was taken before La Confluencia investment decision in August 2007. The GT has been in operation since August 2008, about 2 years earlier than the start of operations of any other power plant of the Company. Since Colmito was already in the portfolio of the owner, the transferral of the right to the revenues to HLC did not bring any new value to the owners. The revenues were therefore not included in the financial model backing up the investment decision at the time. Lastly, the PPA between La Confluencia	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		and Chilectra is not related in any way to Colmito GT, the power plant is not even mentioned in the whole contract text. Documentation provided: ➢ Shared Service Extract (CL14_Summary Shared Service Agreement.pdf) ➢ Confirmation System Operator ➢ Extract IFC Info Memo -HLC (part 4).pdf (the whole IFC IM was already submitted to DNV) ➢ IRR_HLC-Model - May 2010 - v1.7_Colmito.xls (IRR calculation including Colmito revenues)	
CL 14 The project proponent shall demonstrate the effect of the options of the PPA on the financial analysis.	B.5.24 B.5.25	It has been simulated the scenarios with a maximum and minimum energy value purchased by Chilectra: • Base Case: IRR 7.753% • Maximum use: IRR 7.746% • Minimum use: IRR 7.756% Documentation provided: • IRR_HLC-Model - May 2010 - v1.6_CL15_MAX.xlsx • IRR_HLC-Model - May 2010 - v1.6_CL15_MIN.xlsx	DNV has revised the calculations presented and are transparent and consistent for proper comparsion aamong the presented scenarios. For the sake of completeness and clarity, the PP is requested to include in their response a brief explanation describing the main driving factors behind each scenario (Base Case, Maximum and Minimum), and summarizing the differences among them. This CL (CL 14) continues below.
CL 14 (continued)		The only thing separating the three	DNV finds the reponse from the PP

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
For the sake of completeness and clarity, the PP is requested to include in their response a brief explanation describing the main driving factors behind each scenario (Base Case, Maximum and Minimum), and summarizing the differences among them.		variations of the base case mentioned above is the amount of energy purchased by Chilectra under the PPA. The "maximum use" variation considers an increment of 4% in the energy purchased by Chilectra, relative to the base case. The "minimum use" variation, considers a decrement of between 2% and 8% according the year. In general, the average PPA selling price is slightly lower than the average predicted spot price, so an increase in the energy off-take under the PPA slightly reduces the IRR relative to the base case.	reasonable and sufficient to address the issue raised. Therefore this CL is closed.
CL 15 The project proponent is requested to demonstrate that the transmission charges are determined according to the Electricity Law (March 2004), and provide copy of the methodology presented in the reference law.	B.5.24 B.5.25	The transmission charges from the FA were calculated by Synex following the methodology guidelines of the Electricity Law, which establishes that the transmission charges must be determined using simulation and flows-participation models previously approved by CNE. At that moment, there is a precedent of using the GGDF (Generalized Generation Distribution Factors) model in the Decree N°158/2003 (attached below). Later on, on January 2008, the Decree N° 207/2008 established the use of GGDF for the computation of trunk transmission tolls (attached below). Documentation provided: • CL16_Decreto_158	DNV has looked at the explanation and evidence provided by the PP in their response and finds it reasonable and authentic. Therefore this CL is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		• CL16_DS 207_2008	
CL 16 The project proponent is requested to clarify the determination of prices: Spot & Nodal (energy firm capacity monomic) and PPA energy and firm capacity, and correlate these to the values presented in the financial analysis and those presented in the Synex report and in the IFC IM. The PP is requested to present evidence showing a clear correlation between the prices of firm capacity in spot market presented in the investment analysis and the one resulting from the SDDP simulation. Specially the values presented in the SYNEX report pp 25-26, given that the SYNEX report is the basis for IFC. Is monomic the same as or based on the spot or nodal?	B.5.15 B.5.23 B.5.24 B.5.25	The energy spot prices correspond to the short run marginal cost of the system which represents the cost of supplying a marginal increment of demand energy at any given moment. In an hydrothermal system as the SIC, the marginal cost can be given by the variable cost of thermal power plants and/or by a hydropower plant with reservoir by means of the so called water value. The capacity spot price corresponds to the long run capacity marginal cost of the system, which represents the cost of supplying a marginal increment of power. In the case of the SIC, it corresponds to the capital plus O&M cost of a gas-diesel turbine. The energy node price is calculated by the CNE every six months and corresponds to the price between Generators and Distribution Companies to supply regulated clients. It has also historically been considered as relevant price of the market, therefore as benchmark for PPA between generators and de-regulated customers, like the case of the PPA between HLC and Chilectra. This, because the calculation process of the node price has to be within a band of the free price of the market (prices of PPA for de-regulated customers)	DNV finds the response from the PP is reasonable and consistent with the concepts and values presented in the evidences submitted /11/ /12/ /23/and used in the financial analysis /2/. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		The capacity node price is equal to the capacity spot price. The monomic price is equal to the sum of energy and firm capacity incomes, divided by the total energy traded. In case of spot revenues, the energy incomes are valuated using spot prices, and the firm capacity, using capacity node price.	
CL 17 The project proponent shall clarify and present the corresponding evidence on whether the 4 MUSD for the Development Fee were included in the real estimations (The IFC IM Final /11/ mentions on page 28)	B.5.15 B.5.24 B.5.25	The US$4 million were considered in all three scenarios, worst case, base case and best case, for the investment decision. Please see the financial model, worksheet "Database". In cell G62 the amount is considered as a cost category. However, the effect of the development cost on the financial IRR of the project is rather marginal. The project IRR obtained is 7.85% if the US$4 million of development fee would not be considered as part of the total investment cost. Hence, the IRR would still remain under the benchmark value and so additionality would not be affected.	DNV has verified as per the response of the PP that the Development Fee was considered within the financial analysis, and that its effect in the project IRR is rather marginal. Therefore this CL is closed.
CL 18 The project proponent shall present evidence and precise reference that the law in force at the time of the investment decision required a corporate income tax of 17%.	B.5.24 B.5.25	The 17% Revenue Tax Rate (Article 20, Section 1, Law 824 DFL, of Dec 27, 1974, http://www.sii.cl/pagina/jurisprudencia/legislacion/basica/basica.htm) was modifying by the Art 1 (unique), of the Law 19.753, in Sept 28, 2001	DNV finds the response sufficient and reasonable and the evidences provided authentic, to certify that the coporate income tax used in the investment analisys is the same as the one dictated by the law at the time of the decision making.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		(http://www.leychile.cl/Consulta/listaresultadosimple?cadena=19753). In this, the original Tax Rate (15%) was modifying as follow: To 2002; 16.0% To 2003; 16.5% Since Jan 01, 2004 (and permanently); 17.0% The corporate income tax in Chile valid in 2007 can also be found in KPMG's Corporate and Indirect Tax Rate Survey 2009 (attachment on page 15), which includes figures from 1999-2009. Documentation provided: ➢ "CL19_KPMG's Corporate and Indirect Tax Rate Survey 2009.pdf" Downloads available: ➢ KPMG's Corporate and Indirect Tax Rate Survey 2009: http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Pages/KPMG%27s-Corporate-and-Indirect-Tax-Rate-Survey-2009.aspx KPMG's Corporate and Indirect Tax Rate Survey 2007: http://www.kpmg.com/Global/en/IssuesAn	Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		dInsights/ArticlesPublications/Pages/Corporate-and-indirect-tax-rate-survey-2007.aspx	
CL 19 The project proponent is requested to demonstrate and present the corresponding evidence of the price forecast for energy based on the maximum and minimum contract requirements of the PPA. This is in order to validate if the statement in page 14 of SYNEX report stating "This case is more conservative when dry hydro conditions are analyzed", is also conservative from a CDM perspective/consideration.	B.5.24 B.5.25	Synex's statement has to do with portfolio and risk management. In a combined interaction between the spot market and the contract market as it is the SIC of Chile, it is quite important to have a balanced mix among both market. Typically, the more energy volume is committed in the PPA for above what it could be considered "reasonable" (i.e. relative to mean generation) the more risk is taken, especially in presence of a dry hydro conditions as the actual generation could be much less than the energy volume to be delivered in the PPA, reaching a high exposure to spot market as there would be not enough generation for hedging the obligation of delivery of the PPA. Therefore, a conservative approach should always consider the maximum contracted energy to measure the exposure especially in dry hydro conditions. From a CDM perspective, given that the PPA price is generally lower than the spot price, a maximum contract requirement for the PPA would mean a higher amount of energy is sold at a lower price compared to what the spot market offers, which means	DNV finds the response of the PP explanatory of the reasoning behind the need selecting a conservative scenario. However, the PP is requested to justify the fact that the selected case is "more conservative when dry hydro conditions are selected". This CL (CL 19) continues below.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		less revenue for the PP.	
CL 19 (continued) The PP is requested to justify the fact that the selected case is "more conservative when dry hydro conditions are selected".		The Synex report refers on page 14 to the base case and state the following: "In term of the PPA's with Chilectra, the evaluation was done with the maximum contracted energy. This case is more conservative when dry hydro conditions are analyzed." First of all we would like to clarify that the sentence related to dry hydro conditions is linked to the previous sentence about the PPA and both need to be analyzed together. Secondly, the Synex report referring to the base case and other cases, states in page 22 the following: "The expected values for power plants generations, incomes and costs correspond to the average of 32 hydro conditions (1971-2002)." So the results of the base case, as well as all other cases, refer to an analysis of multiple hydro conditions. Hence, the financial model has the same basis. On the other hand, the effect on the project of contracting the minimum or maximum energy from the PPA is not relevant in case of average expected hydrology (Please refer to CL 15). In CL15, variations of the base case scenario have been simulated with the maximum and the minimum allowed energy volume purchased by Chilectra	DNV finds the reponse from the PP reasonable and sufficient to address the issue raised. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		under the PPA. The effect on the IRR is between 0.003 and 0.007 percentage points and therefore not relevant. So the sentence mentioned in the question, refers to a specific hydro condition (dry) where less generation is expected from the power plant, while a larger PPA commitment lowers expected revenues, so it is conservative from a bank's perspective, who wants to know if a project in the worst case scenario will be able to cover the debt payment. But from a CDM perspective we are looking at the conservativeness at investment decision, so the average of multiple hydro conditions is the relevant case, given that different hydro conditions are expectable over the lifetime of the project, and in this case the PPA volume is not relevant as shown in CL 15.	
CL 20 The project proponent is requested to present the corresponding evidence for the Chilean GDP growth in 2008 and the IFC estimation of Chilean growth (both used in the demand forecast).	B.5.24 B.5.25	The Chilean Gross Domestic Product growth in 2008 was 3.7%. Please see: http://www.bcentral.cl/estadisticas-economicas/series-indicadores/index.htm, File: "Producto Interno Bruto. Serie anual. Precios constantes.	The PP is requested to submit the precise link leading to the information requested. This CL (CL 20) continues below.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Attached: ➢ "CL21_GDP_real_annual"	
CL 20 (continued) The PP is requested to submit the precise link leading to the information requested.		The IFC estimation of Chile's economic growth is in line with Chilean government's expectations. As mentioned on page 29 of the IFC IM "in the next few years, real GDP growth is expected to be in line with government estimates of the country's sustainable rate of 5.3%." Additionally, for the demand forecast "the IFC 10-year GDP growth for Chile is at 3.4%, based on the past 10 years' experience." [see page 110 of the IFC IM] Synex used IFC's growth expectation for the demand forecast as stated in the Synex report on page 15: "The demand projection assumes an energy growth rate of 5.6% in the long term. This is online with a GDP annual growth of 3% from 2008 on, in accordance to IFC estimation on Chilean economic growth." The IFC, as part of the World Bank Group, is deemed to be a reliable source. Link to GDP data for 2008: http://www.bcentral.cl/estadisticas-economicas/series-indicadores/xls/PIB_real_anual.xls	DNV has verified that the link provided in the respsnse from the PP does lead to the source of the information requestd. Therefore this CL is closed.
CL 21 The project proponent is requested to present the Power Purchase Agreement for the project activity	B.5.24	The document is included under the list of documents requested for CL48 (doc n°22). The page the PPA is signed is page 32. Signs on page 44 are left blank intentionally	It is DNV's opinion that the response from the PP is sufficient and the evidence presented authentic for the issue raised.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		as it is the form of the Consent Agreement and finally signs on page 82 and 93 of the document are not required since that's the English version which is not the official. The only required, official, needed, must signs are those on page 32. Documentation provided (See CL48): CL48_22_Summary PPA_signed.pdf	Therefore this CL is closed
CL 22 The project proponent is requested to clarify why the prices used in the investment analysis are the monomic prices of power and energy, while the project activity will try to sell the energy and capacity to the higher prices (spot prices at the Tinguiririca substation – delivery node), except for the one committed as per the PPA (in which case uses the pricing of the PPA).	B.5.15 B.5.24 B.5.25	The monomic price is a different to refer to prices, and reflects the average price the projects "sees". It basically corresponds to the quotient between the total spot revenues (energy+firm capacity) and the generation.	The PP's response presents a clear explanation for the monomic price. However, the PP shall explain what will be the difference (other than the uncertainty of the future prices) between the actual (price) sales in real life (spot price) and the estimations based on the monomic prices. This CL (CL 22) continues below.
CL 22 (continued) The PP shall explain what will be the difference (other than the uncertainty of the future prices) between the actual (price) sales in real life (spot price) and the estimations based on the monomic prices.		The *monomic* price is calculated as the sum of the actual or estimated energy and capacity revenues, divided by the energy production. There is therefore no difference between actual sales prices (energy and capacity) and the actual monomic price; they are rather two ways of expressing the same. The monomic price is *not* used in the financial model. Neither was it used for the calculation of revenues by IFC or Synex. Where the monomic price is presented in various tables, it has been derived from the	The response from the PP is clear and precise, and addresses sufficiently the issue raised. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		other data in those tables to give an easy and frequently used indication of the "all-inclusive" price level.	
CL 23 The project proponent is requested to clarify the differences the values for O&M costs presented in the investment analysis which is the same as in the PDD and the values presented in the tables in the IFC IM Annex 2 (part 4-pp 10 , &, part 2-page 4.). The corresponding evidences for the correct values shall be presented.	B.5.15 B.5.23 B.5.24 B.5.25	a) Values presented in the financial analysis (O&M Costs) are in real basis and the values presented in the IFC IM are in nominal basis. This is the main difference. b) IFC IM O&M values includes a small value related with "Share Assets" (related with Colmito power plant), amount that is not included in the financial analysis file. With reference to the IFC IM Annex 2, the data mentioned all have the same source, and differences are due to inflation adjustments, to bring real values to nominal values: • In fact, all Operations and Maintenance costs are derived at from the "Input" section of the model, i.e. Part 1, page 9 – the "operations" table on that page. • Part 4, page 10 is the O&M Budget (ref. chap 19 in the Table of Contents, Part 1, page 7). It contains a detailing of the Hydro Operations and Hydro Maintenance cost elements. The page also includes a "Reconciliation table", where the data from this page (denominated "Budget") is compared	DNV finds the explanation given by the PP reasonable and justifiable. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		with the equivalent data used in the "Model". • Part 2, page 4 shows the nominal half-year time series of the Operations and Maintenance costs. Inflation is added to the half-year costs via the designated indicators, which are shown in a separate section (Part 1, page 10). Inflation rate assumption is 3% CPI p.a.	
CL 24 The project proponent is requested to substantiate that the utilization of the SDDP and OMSIC models are appropriated for the electricity price forecasting in Chilean electricity system exercise.	B.5.24	Synex has issued a correction note in which is amended the report by replacing Omsic by SDDP. Please refer to the attachment below. The SDDP is a very versatile market model. It is used in several markets and it has also been used in Chile within the context of Transmission Planning Studies as required by the Law and accepted by different stakeholders within this context (generators, transmitters and regulator). Documentation provided: ➢ CL-26-28_SYNEX_correction.pdf	The PP has presented a correction /46/ to the SYNEX report /23/, stating that instead of "OMSIC" it shoud read "SDDP". Furthermore, the explanation given about the SDDP is also shared by the experience of DNV's hydropower sector expert /70/, properly satisfying the issue raised. Therefore this CL is closed.
CL 25 The project proponent is requested to provide the description and specific reference for the Omsic model mentioned in the Synex Report and its interaction with the SDDP model.	B.5.24	Synex has issued a correction note in which is amended the report by replacing Omsic by SDDP. Please refer to the attachment below. Documentation provided: CL26-28_SYNEX_correction.pdf	The PP has presented a correction /46/ to the SYNEX report /23/, stating that instead of "OMSIC" it shoud read "SDDP". IN DNV's opinion this response satisfy the issue raised. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 26 The project proponent is requested to clarify the difference of the maximum values of supply committed via the PPA between those presented in page 26 of the IFC IM and those in the revenue tables for the base case presented in the same document.	B.5.24 B.5.25	The PPA establishes a reference amount of energy of 375 GWh/year. In addition, the PPA entitles Chilectra with the option to increase the offtake of up to 390 GWh. Given that this is an option, i.e. unpredictable, the revenues were calculated using the reference amount.	The response of the PP clearly explains the variations between the base and maximum cases of the PPA. Also in their response of CL 14, the PP shows that the effect of variation between these 2 cases in the project's IRR is minimal and does not raises it above the benchmark Therefore this CL is closed.
CL 27 The project proponent is requested to present evidence of the "monomic price (around 64 US$/MWh) informed in the tender for supplying distribution companies in the SIC", mentioned in the SYNEX report.	B.5.24 B.5.25	The attached table (CL30_Resum_Licit.xls) shows the weighted average the price coming out from the tender for supplying distribution companies, which reaches 65.5 USD/MWh. The correspondent decrees informing the energy and capacity prices (Decreto 147 and Decreto 178 respectively) are attached. Documentation provided: • CL30_Resum_Licit.xls • CL30_Nudo_178_2007_06_14 • CL30_Decreto147_DO_01-06-07.pdf	The PP has presented the required evidence and DNV finds it sufficient and authentic to verify the monomic price used in the tender for suppliying distribution companies in the SIC. Therefore this CL is closed.
CL 28 The project proponent is requested to present the CNE Report for the month of October 2006 mentioning the price for the capacity at the Quillota 220 kV node, as indicated in the SYNEX report.	B.5.24	Attached is the CNE Report of October 2006. In page 41 is indicated the power price at Polpaico (7.54 US$/kW-month). By multiplying this figure times capacity node factor at Quillota (0.9667), page 35, table N° 19, the result is 7.30 US$/kW-month referred to Quillota.	The PP has presented the required evidence and corresponding explanation. DNV finds it sufficient and authentic to verify the price for the capacity at the Quillota 220 kV node, as indicated in the SYNEX report /23/ Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Documentation provided: CL31_PNudo_Oct_2006.pdf	
CL 29 The project proponent is requested to provide the reference to CNE´s approved methodology for calculating the plant's firm capacity in Chile, enacted 1st February 2006, as indicated in the SYNEX report	B.5.24 B.5.25	Attached is the document DS.62/2006, which contains the firm capacity methodology. Documentation provided: CL32_DS62-2006.pdf	DNV finds it sufficient and authentic the evidence that the PP has presented to demonstrate CNE´s approved methodology for calculating the plant's firm capacity in Chile, enacted 1st February 2006. Therefore this CL is closed
CL 30 The project proponent shall demonstrate the correctness of the net revenue calculations and present the calculations of the commercial margin as indicated in the SYNEX report.	B.5.15 B.5.24 B.5.25	Into the IRR file, has been added a tab named "Net_Revenue_Detail", with the calculation of the commercial margin according to Synex format. We may affirm that commercial margin (which consider the items "Energy Revenue", "Firm Capacity", and "PPA" of the database tab) is correct. It must be considering that transmission charges were included into the "O&M" item. Documentation provided: IRR_HLC-Model - May 2010 - v1.6 _(Incl_Net_Revenue_Detail).xlsx	DNV has verified the correctness of the net revenue calculations based on the response of the PP, and it was found that it addresses sufficiently the issue raised. Therefore this CL is closed.
CL 31 The project proponent shall present evidence for the escalation rates shown in the investment analysis.	B.5.15 B.5.24 B.5.25	The financial model of HLC was developed in real basis. On the other hand IFC financial model was developed in nominal terms. The data shown in IFC IM paper are stated in nominal basis, considering an escalation rate of 3% per annum (CPI), which is based on Central Bank of Chile inflation target rate. The data from IFC	In the investment analysis (IRR_HLC-Model - May 2010 - v1.6.xlsm /2/) it is considered within line 12 the tab "FIRR and Sensib", and escalation rate of 0%. The PP is requested to make the necessary corrections to include the 3% per annum, as indicated in the response provided.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		model that was used for the internal model was adjusted accordingly - divided by the escalation factor- in order to adequate the data from nominal to real terms when applicable.	Furthermoer, the PP is requested to provide the precise reference, to paragraph and page number, of the evidence demonstrating that the 3% CPI is based on the Central Bank of Chile inflation rate target. This CL (CL 31) continues below.
CL 31 (continued) In the investment analysis (IRR_HLC-Model - May 2010 - v1.6.xlsm /2/) it is considered within line 12 the tab "FIRR and Sensib", and escalation rate of 0%. The PP is requested to make the necessary corrections to include the 3% per annum, as indicated in the response provided. Furthermore, the PP is requested to provide the precise reference, to paragraph and page number, of the evidence demonstrating that the 3% CPI is based on the Central Bank of Chile inflation rate target.		The whole financial model is in real terms, which is why the escalation factor is 0%. This is consistent with the 10% benchmark, which is also in real terms, as stated in the Electrical Law DFL4 (see DFL_N4.pdf). If the model were to be analyzed in nominal terms, all investment, revenues and costs should be in nominal terms as well. The internal rate of return would thus be expressed in nominal terms, so the benchmark would also need to be expressed in nominal terms (i.e. 13% instead of 10%). Attached is a document from the Chilean Central Bank, from January 2007. In page 15 is a reference to the country inflation goal of 3%: *"3.1. El esquema de metas de inflación* *El BCCh conduce su política monetaria sobre la base de un*	DNV finds the response from the PP sufficient and reasonable. Therefore this CL is closed

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		esquema de metas de inflación y de flotación cambiaria. Este incorpora el compromiso explícito de la autoridad monetaria de utilizar los instrumentos que la ley le otorga y alcanzar la meta de que la inflación anual del IPC se ubique la mayor parte del tiempo en torno a 3% anual, con un rango de tolerancia de más/menos un punto porcentual." *3.1. The inflation goal scheme* *The BCCh (Chilean Central Bank) conduct its monetary policy based on a goals scheme for inflation and exchange flotation. It incorporate the explicit commitment of the monetary authority to make use of the instruments that the law provides and to reach the goal of annual IPC inflation being most of the time around 3% per year, within a tolerance range of more/less one percentage point.* Documentation provided: ➢ CL34_politica_monetaria_metas.pdf	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 32 The project proponent is requested to provide the precise reference to the power plants shown in table 11 of the PDD.	B.3.1 B.5.44	The information and figures are taken from CDEC-SIC "Estadísticas de Operación 1999-2008" Chapter 2, Page 23. The reference has been included in the PDD. An extract of the document is attached. The whole document can be downloaded at the following link: https://www.cdec-sic.cl/contenido_es.php?categoria_id=4&contenido_id=000034 Documentation provided: "Estadísticas de Operacion 1999-2008 CDEC-SIC.pdf"	The PP is requested to revise the corresponding table in the PDD since it does not reflect all of the values listed in the reference given as evidence (e.g. Alfalfal power plant intalled capacity: 160 MW in PDD, against 178 MW in the reference). This CL (CL 32) continues below.
CL 32 (continued) The PP is requested to revise the corresponding table in the PDD since it does not reflect all of the values listed in the reference given as evidence (e.g. Alfalfal power plant intalled capacity: 160 MW in PDD, against 178 MW in the reference).		The numbers in Table 13 (former Table 11) of the PDD have been updated. Documentation provided: ➢ Updated PDD, version 5	The PDD has been updated as per the response from the PP. Therefore this CL is closed.
CL 33 The project proponent is requested to provide the precise reference for the data shown in figure 6 (Installed capacity of the Central Interconnected Grid (SIC) by fuel/generation type, 2008) of the PDD.	B.5.25	The reference is the "Fijacion De Precios De Nudo Abril De 2007 Sistema Interconectado Central (Sic) - Informe Tecnico Definitivo" (CNE, April 2007. *Informe Fijación de Precios de Nudo* - Table N°6, on page 15). The PDD has been updated accordingly. Documentation provided: ➢ "Informe Precio de Nudo SIC Abril 2007 Definitivo.pdf" (Table N°6, on page 15)	The PP has presented enough evidence and a the corresponding reasoning for DNV to validate the figure 6 of the PDD /1/. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 34 The monitoring plan shall include provisions for dealing with emergencies and/or faulty meters, the corresponding corrective actions and how to proceed to replace the erroneous measurements.	B.7.7 B.7.8 B.7.9 B.7.10	The monitoring plan has been updated accordingly. In case of emergencies and/or faulty meters, corresponding corrective actions will take place by restoring and/or replacing erroneous measurements with data not affected, i.e. in the unlikely case meter M5 accounting the net generation will fail data from meters M1-4 could be used to estimate the net electricity fed into the grid. If the restoring of data will not be possible erroneous measurements will not be considered for calculating CERs.	DNV find the reponse form the PP reasonable and justifiable. The PDD /1/ has also been updated accordinlgy. Therefore this CL is closed.
CL 35 The project shall estimate the power density of the pond for hourly regulation, and demonstrtate that the project complies with the CDM requirements in this respect.	A.2.4 B.2.3 B.2.6	As per ACM0002: "The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/ m^2." The power density of the pond is estimated to be about 1 162 W/m^2 Installed capacity 163 220 000 W Max pond surface 140 512 m2 **Power density 1 161.6 W/m2** Hence, the project complies with the CDM requirements. Please, see also CL41.	The PP has demonstrated that the project activity complies with the power density requirements stated by the approved methodology ACM0002 version 12.1. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Provided documents: ➢ Autocad as-build drawing of HLCpond.pdf	
CL 36 The project participant shall present the exact internet address where to obtain each and all the data used in the emissions reduction calculations.	B.6.8	There are two main web sites: 1. National Energy Commission (CNE) www.cne.cl On the CNE web page you can download the CNE Node Price Reports (April and October, each year): http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/octubre2008.html http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/abril2008.html http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/octubre2007.html http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/abril2007.html	DNV has cross-checked the information provided for La Confluencia with the information provided by other project participants having calculated the grid emission factor for the CDEC-SIC grid system. DNV has also compared the data against the information stated in the operation statistics 1999/2008 published by CDEC-SIC. The comparison identified that some power plants appear to be missing in the calculation of the grid emission factor. Also for some power plants the reported annual generation could not be confirmed. The PP are requested to again review the OM and BM calculations and check that all power plants are included. This CL (CL 36) continues below.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/octubre2006.html http://www.cne.cl/cnewww/opencms/07_Tarificacion/01_Electricidad/Otros/Precios_nudo/otros_precios_de_nudo/abril2006.html At each of these links you can download the Final Technical Report "Informe Técnico Final" for the SIC. 2. System Dispatch Center (CDEC) of the Central Interconnected System (SIC) www.cdec-sic.cl a) Go to: Informes y Estudios (stay over the name and a list will be displayed) b) Go to: Acceso usuarios registrados (To access the data a passcode is needed) c) Go to: Operación real diaria d) Set the day you want to search data and download the excel file.	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CL 36 (continued) DNV identified that some power plants appear to be missing in the calculation of the grid emission factor. Also for some power plants the reported annual generation could not be confirmed. The PP are requested to again review the OM and BM calculations and check that all power plants are included.		The data and information were obtained from official sources. Hence, the OM and BM calculation should only be compared with those official source also provided with the GEF calculation. In the attached documents the generation of the power plants that were operating during years 2006 to 2008 can be found. These documents were obtained from official sources of information (CDEC-SIC). Nevertheless, the discrepancy between power plants listed in the calculation and "other projects" was checked: ➢ Ancud, Quellón I, Curanilahue, Lebu, Cañete, Los Sauces, Traiguén, Victoria, Curacautín, Collipulli and the generation units classified as "Pequeños medios de Generación Distribuida" (PMGD – Curauma and Casablanca 1, 2, 3) were not considered for OM and BM calculations in order to be conservative. Even if those units operate with diesel and their inclusion will lead to higher grid EF, they were not included because the CNE states that those units are not considered as part of the SIC's installed capacity. The National Commission of Energy (CNE) published the installed capacity of the country in the following link,	A thorough analysis made by both the PP and DNV finds that there are minor discrenpancies between the official data publicly available for the power plants connected to the SIC grid /3/. DNV is of the opinion that the data used by the PP for the calculation of emission reductions is correct according to the approved methodlogy. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		where the mentioned units are not considered as part of the total installed capacity. (http://www.cne.cl/archivos_bajar/capacidad_instalada_de_generacion.xls - see spreadsheet "SIC-08") ➢ Canela= Eólica Canela, D. de Almagro= Diego de Almagro TG, so they are correctly included in the calculations. ➢ "Generadores Saesa" is not a power plant, and has never been a power plant. It is just a name to identify some power plants (PMGD) owned by Saesa. As you can see in the EF comparison spreadsheet, there is no generation or emissions for this issue. ➢ As you can see in the files attached (CL39_Energy Generation SIC Power Plants (CDEC) 2006-08), Celco didn't deliver any electricity to the grid during years 2006 to 2008 (is even not mentioned or considered in the official balances of energy generation) ➢ Machicura is a hydro power plant. In 2006 and 2007 it was listed as a reservoir power plant, and since 2008, is listed as a run of river power plant. ➢ In the attached Excel file (CL39_Generation 2008_CDEC-SIC.xls) you can find the 2008 generation of all power plants, the file	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		was obtained from the CDEC-SIC web page. In the document it can be checked that the annual generation of each power plant can be confirmed and are corresponding to those that were used for OM and BM calculations. Documentation provided: ➢ CL39_Generation 2008_CDEC-SIC.xls ➢ CL39_Energy Generation SIC Power Plants (CDEC) 2006.xls ➢ CL39_Energy Generation SIC Power Plants (CDEC) 2007.xls ➢ CL39_Energy Generation SIC Power Plants (CDEC) 2008.xls	
CL 37 The PP shall demonstrate that the grid data used for the emission reduction calculations correspond to the 3 most recent years at the time of submitting the PDD for validation.	B.6.8	The submission for validation was on 02 December 2009. The latest available data at that time were data for 2006-2008. Since data are annual figures, 2009 information were not available at the date of submission. As the methodology stated that data for the emission reduction calculations must correspond to the full data of the 3 most recent years, in this case, it corresponds to the data of the years 2006, 2007 and 2008, given that 2009 information was not complete at the date of submission.	It is DNV's opinion that the response from the PP is resonable and sufficiently demonstrated that the the grid data used /37/ for the emission reduction calculations correspond to the 3 most recent years at the time of submitting the PDD for validation. Therefore this CL closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		In the best case, the generation data for 2009 would have been available on 1st January 2010, once the daily generation data for 31st December were available at CDEC web page (Nevertheless daily generation data might suffer corrections in the following days). Additional to the daily generation data, the emission reduction calculation requires the annual generation spreadsheet of the year, which is made available by CDEC in early January of the following year.	
CL 38 The project proponent shall present the specifications of the pond for hourly regulation, and the calculated surface at its lowest and highest level to demonstrate that it is no relevant to monitor this parameter	A.2.4 B.2.3 B.2.6 B.7.3	The pond corresponds to an off – river type and is designed to operate as head pond and daily basis peaking operation, that means that it sizing is optimized and controlled, so the affectation area and it fluctuations are not significant. The live energy storage capacity of the pond for La Confluencia project is: 1 GWh, less than the 0.2% of total year expected production. The pond is expected to operate on a daily hourly regulation basis, with maximum fluctuations of 10 meters. The max total water area of the pond is around 132 597 m^2 (at 1 450 meters above see level). The volume is about 1 200 000 m^3 and changes about 10 meters in height. Hereby the change of water area between 1 440 and 1 450 meters above sea level is estimated to	It is DNV's opinion that the response from the PP is resonable and presents the requested specifications of the pond for hourly regulation, and the calculated surface at its lowest and highest level. Furthermore, given that the live energy storage capacity of the pond is 1 GW, corresponding to less than 0.2% of the expected annual generation, and the expected fluctuations between the minimum and maximum capacities of the pond are even smaller (the most conservative thinkable scenario would be the change from 1 GW in the wet seasson to 0 GW in the dry seasson), it is shows that not even maximum changes will have an effect in the project higher than 0.2%, which can be considere neglectable, and

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		be around 12 900 m^2. Additionally as has been predicted on optimization calculations, in melting period (November to February) of a normal year the daily variations of the pond level are expected to be not greater than 3m, and 4m at the dry season (March to October), the results of the simulations are shown in attached document "CL41_DEV-TEN-SUS-POND" Provided documents: ➢ CL41_DEV-TEN-SUS-POND.doc	therefore justifying the position of not needing to monitor the level of the water in the pond. Therefore this CL is closed.
CL 39 The project proponent shall include in the PDD that all the monitored data will be stored for at least 2 years after the end of the crediting period (in case the useful life is shorter than expected).	B.7.8	All data collected as part of the monitoring will be archived electronically and be kept at least for 2 years after the end of the crediting period. The PDD has been updated accordingly.	The PP has updated the section B.7.2 of the PDD /1/ to include the reference text. Therefore this CL is closed
CL 40 The PDD shall make reference to the maintenance and calibration procedures of the monitoring equipment	B.7.5	Proven and qualified monitoring equipment (electricity meter) will be installed meeting relevant local standards at the time of installation. The meter will be installed in accordance with Chilean standards. Records of the meter (type, make, model and calibration documentation) will be retained for documentation.	The PP has updated the section B.7.2 of the PDD /1/ to include the reference text. Therefore this CL is closed.
CL 41 The project proponent shall present the evidence of the national standard for the accuracy of the	B.7.4	Please see /39/: Procedure manual from CDEC-SIC for the metering system included (CL48_39 -	The reference provided establishes that the precision class required for metering devices for active and reactive energy shall

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
electricity meters.		Manual_Medicion_Supervision.pdf) attached on page 2 (Título IV Requerimientos técnicos generales de los componentes del sistema; Artículo 6)	be 0,2s (according to the norm: IEC 687) Therefore this CL is closed.
CL 42 The monitoring plan shall also include provision to keep the receipts from the sell of energy and firm capacity, and prepare a monitoring report at the end of each year, including electricity quantity monitoring files, receipts files, repairs record files and emergency situation files.	B.7.10	The monitoring plan has been updated and now includes additionally the following: a) Receipts of electricity and firm capacity sales will be obtained and used for cross checking b) A monitoring report will be prepared at least once a year, including electricity quantity monitoring files, receipts files and, if applicable, repairs record files and emergency situation files as well as corrective actions performed in case of faulty meters.	The PDD /1/ has been updated to include the reference text of the response of the PP, which sufficiently addresses the corresponding issuea raised by DNV. Therefore this CL is closed.
CL 43 The PDD shall present provision for training and other QA/QC procedures to ensure the proper management and operation of the project.	B.7.7 B.7.8 B.7.9 B.7.10	The Plant Operator, La Confluencia Operations Manager and other persons in charges will be trained by HLC CDM team. Furthermore, SN Power will hold an internal training workshop for its Global CDM Team with participation from Chile. Enclosed is the agenda for the monitoring and verification course which the Global SN Power CDM Team will go through on May 18th in Oslo. It will be held by Mari Groos Viddal, who currently works in the carbon team at Statkraft, and who previously worked in the climate change team at DNV (with validation and verification of CDM/JI projects).	The PP is requested to include in the O&M manuals and/or QA/QC procedures, the necessary specification(s) to ensure at least: 1) that all new personnel the corresponding training in the project activity and relevant CDM requirements, and, 2) any changes to the equipment or procedures within the project activity, will be followed by the corresponding training of the personnel involved. This CL (CL 43) continues below.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Additionally, CDM related presentations will be provided to involved staff including the details and importance of the monitoring for the CDM and the project. People in charge for monitoring, metering and billing will be instructed and trained by HLC CDM team about the CDM and its importance for the validity of the project. Documentation provided: CL46_SN Power CDM monitoring and verification training_May 2010	
CL 43 (continued) The PP is requested to include in the O&M manuals and/or QA/QC procedures, the necessary specification(s) to ensure at least: 1) that all new personnel the corresponding training in the project activity and relevant CDM requirements, and, 2) any changes to the equipment or procedures within the project activity, will be followed by the corresponding training of the personnel involved.		The O&M manuals and QA/QC manuals for HLC are not finalised, but under development. The PP will ensure and include in the O&M manuals and QA/QC procedures, the necessary specifications that describe 1) that all new personnel will receive the corresponding training in the project activity and relevant CDM requirements, and, 2) any changes to the equipment or procedures within the project activity will be followed by the corresponding training of the personnel involved. The PDD has been updated accordingly.	DNV finds that the response addresses sufficiently to the issue raised. Therefore this CL is closed.
CL 44 The project proponent shall present evidence of the compliance with the EIA mitigating mesures.	D.1.3 E.1.5	The IFC, Environmental and Social Audits Reports report about the EIA mitigating measures. The reports are available every 3 months since start of construction. Enclosed is the most recent report dated April 2010.	The evidence presented by the PP demonstrates in the conlcusions and recommendions section, that the PP is complying with all 7 applicable norms required, or in the process of implementing

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Additional reports could be provided if requested. Documentation provided: ➢ CL47_Audit HLC REV0 Mar 2010	and/or mitigating further the corresponding measures related to environmental impact by the project activity. Therefore this CL is closed.
CL 45 The project proponent shall present the evidence and corresponding precise references as listed in section 3.1.1 "Documents provided by project participants". /7/, /15/, /16/, /17/, /18/, /19/, /20/, /22/, /24/, /26/, /27/, /28/, /29/, /31/, /34/, /35/, /36/, /37/, /38/	A.2.4 A.2.6 B.5.24 B.7.11	➢ /7/ Hidroelectrica La Confluencia. *CONSULTAS DE LOS ASISTENTES A PRESENTACIÓN.DOC Issues from Stakeholders la Confluencia*, September 7, 2007. ➢ /15/: Hidroelectrica La Confluencia S.A. : *EPC Contract Volumes I, II, III and IV*, October 18, 2007 ➢ /16/ Hidroelectrica La Confluencia: *Notice to proceed given to the EPC contractor*, HLC/LH/CHT/00064, December 21, 2007. (Letter attached) ➢ */17/: MOU with Transelec included* ➢ */18/ "Evidence and definition of the SIC Grid", please see the System Operator Annual Report (last version available from 2008) which can be downloaded at: http://www.cdec-sic.cl/datos/anuario2009/cdecing/index_ing.htm* ➢ */19/ International Finance Corporation: Loan agreement signed on 23- Oct-2007 between HLC and the IFC, Investment Number 25472, Executive Version, October 23, 2007.* (the whole document would be available for DNV's review during an	The evidences presented have been verified and found to be correct and sufficient. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		onsite visit) ➢ */20/: Order* sent to TUV included ➢ */22/: PPA summary included (*the whole document would be available for DNV's review during an onsite visit) ➢ /24/ Junta de Gobierno: Corporate Income Tax Law, Published in the Official Journal of 31 December 1974 and updated on 13 February 2010. (Law attached)- ➢ /26/ Ministerio de Obras Publicas, Direccion General de Aguas, *Construction permit - Construction of structures in watercourses*, Resolucion 2313, September 27, 2007 ➢ /27/ COREMA: Environmental Permit - Environmental Assessment Resolution "RCA", Resolucion Exenta No282/2007, August 1st, 2007 (Please, see CAR 1) ➢ /28/ Author: Municipal License, Version, Date. NOT APPLICABLE AT THIS STAGE OF THE PROJECT ONLY FOR COMERCIAL OPERATION. ➢ /29/ Secretaria Regional Ministerial de Agricultura: *Land use change – Power House*, Resolution 323. May 2, 2008.(Resolution attached) ➢ /31/ Author: *Dispatch model*, Version, Date. NOT APPLICABLE, SINCE THE GEF IS CALCULATED EX-	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		ANTE BASED ON THE SIMPLE ADJUSTED METHOD. ➢ /33/ Author: *OMSIC Model*, Version, Date. NOT APPLICABLE, please see CL26 ans CL28. ➢ /35/ SIC: *Monomic price of 64 US$/MWh*, Version, Date. PLEASE SEE CL30 FOR DOCUMENTATION. ➢ /36/ CNE: *Report for the month of October 2006(?) mentioning the price for the capacity at the Quillota 220 kV node*. PLEASE SEE CL31 ➢ /37/ CNE: Approved Methodology for the calculation of the firm capacity in Chile: SEE "CL32_DS62-2006" AND CL32. ➢ /38/ Author: *Official data used in the emission reductions calculations, for each and all of the power plant connected to the SIC*, Version, Date. PLEASE SEE CL1 and "GRID EF LaConfluencia_HydroPP_(2006-2008)_18-05-2010.xls", tab: "NCVs EFs Conversions", cells: "G4-G10 & G34" ➢ /39/: Procedure manual from CDEC-SIC for the metering system included Documentation provided: ➢ /7/ CL48_7_CONSULTAS DE LOS	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		ASISTENTES A PRESENTACIÓN.pdf ➢ /15/ CL48_15_EPC-Contract_Volumen 1.pdf; CL48_15_EPC-Contract_Volumen 2.pdf; CL48_15_EPC-Contract_Volumen 3.pdf; CL48_15_EPC-Contract_Volumen 4_1.pdf; CL48_15_EPC-Contract_Volumen 4_2.pdf ➢ /16/ CL48_16_HLC-LH-CHT-00064.pdf ➢ /17/ CL48_17 - MOU Transelec.pdf ➢ /19/ CL48_19_Summary Loan Agreement.pdf ➢ /20/ CL48_20 - TUV Order.pdf ➢ /22/ CL48_22_Summary PPA_signed ➢ /24/ CL48_24_Impuesto a la renta Ley No 824.pdf ➢ /26/ CL48_26_HLC-LH-CHT-00007 Hydraulic Works Authorization DGA 2313.pdf ➢ /27/ RCA 282/07 available in the Environmental Impact Assessment (EIA) on https://www.e-seia.cl/documentos/documento.php?idDocumento=2292756 ➢ /29/ CL48_29_Resolucion 323 cambio uso suelo HLC.pdf ➢ /36/ CL31_PNudo_Oct_2006.pdf ➢ /37/ CL32_DS62-2006.pdf	

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		➢ /39/ CL48_39 - Manual_Medicion_Supervision.pdf	
CL 46 The project proponent shall demonstrate why the Base Case scenario was the most appropriate as the basis of for the price forecast.	B.5.15 B.5.24 B.5.25	IFC engaged Synex as Independent Market Advisor to review HLC financing. Within this context Synex submitted the Revenue Assessment Report to IFC based using the assumptions that were acceptable to the lenders. The Base Case scenario considers the term of references established by the financial organism, in order to value the project from a realistic stand point. The case considered realistic long term load growth rates, and moderate prices for fuels, which induced moderates electricity prices for the system at the moment the analysis was carried out. Given the complexity of the modelling of the Chilean Market sector and Synex proved track record the PP and parent companies SNP and PH –new market players at that time -decided to use Synex revenue assessment for their own financial analysis. In the base case scenario was considered the most appropriate price forecast for energy and capacity revnues, as well as transmission costs. (*) NOTE: Synex is a well renowned Consulting Co. in Chile and the region.	Given that: • building a scenario for price forecast within an open electricity market such as the one in Chile, it is an extremely complex tasks, and, • that serious and very professionals institutions with a high level of expertise each on their field, such as the IFC for project financing and the project developers SN Power and Pacific Hydro, as hydropower project developers and operators, ahs approved an accepte the SYNEX report showing the Base Case and corresponding considerations, and finally, • considering that the report was prepared by a professional and experienced company such as SYNEX, it is DNV's opinion that the response from the PP is reasonable and sufficiently justifies the issue of how appropriate is the Base Case scenario used for the price forecast. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Sebastian Berstein, partner of the advisory firm, used to be Executive Secretary at of the Chilean National Energy Commission (1984-1990) and it is worldwide recognized as one of the promoters to reform and liberalize the Electrical Market in the early 80s, being Chile one of the first countries together with the UK to follow this revolutionary path that was followed by many other countries in the following decades.	
CL 47 The PP shall present a list of the actions taken to demosntrate continuous efforts to secure CDM status after the project starting date (21 December 2007).	B.5.7	• 21/12/07 (starting date of the project activity) - "EPC Contract Full Force and Effect" and "EPC Notice to Proceed" - Contractor and HLC agree that the conditions are met and the contract enters into force. - Documents: "EPC Contract Full Force and Effect" and "EPC Notice to Proceed" • 16/01/08 TUV Sud contracted for first validation - Pacific Hydro contracted TÜV SÜD Industrie Service GmbH for the validation of the "La Confluencia Hydroelectric Project, Chile" - Documents: TUV Order Complete.pdf • 31/01/08 Start of first validation - The first version of the PDD for the project was published for comments by Parties, stakeholders and NGOs - Documents: http://cdm.unfccc.int/Projects/Validation/	Based on the evidence presented by the PP, DNV has been able to verify that reasonable efforts were made by the PP to secure the CDM status of the proposed CDM project activity until the start ing of this validation process. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		DB/7OVKEW1CZ27EYHA3DD33TEX W5ZXBXO/view.html • 23/10/09 Termination of first validation - The validation contract with TÜV SÜD Industrie Service GmbH was terminated and the project withdrawn. - Documents: 20091023 Withdrawal letter.pdf • 21/12/09 DNV contracted for second validation - SN Power contracted DNV for the validation of La Confluencia Hydroelectric Project - Documents: DNV validation contract Signed.pdf • 22/12/09 Start of second validation - The second version of the PDD for the project was published for comments by Parties, stakeholders and NGOs - Documents: http://cdm.unfccc.int/Projects/Validation/DB/T5XNU23PS148GMPPMSI7O8JG3R2VCD/view.html	

Table 4 Forward action requests

Forward action request
FAR 1
The actual transmission losses shall be clearly and precisely determined for La Confluencia hydropower project, given the sharing of some components/equipment with La Higuera hydropower station prior to delivering to the energy to the grid from the Tiguiririca substation. Given that the determination of the losses will be done based on actual measurements it shall be done for the each verification, and also prior and after at the moment when the transmission voltage level is increased from 154 kV to 220 kV.

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APPENDIX B

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Felipe Antunes:

Holds a Master's Degree in Production Engineering (Quality) and a Post Graduate Diploma in Environmental Management and Industrial Waste Management and Treatment. Possesses an International experience of more than 10 years in the field of quality and environmental auditing, working two years as the responsible of the QMS of Rede Metrológica RS and since 1999 as a QMS and EMS auditor in DNV.

He has experience of more than 3 years in validation and verification of numerous CDM projects in DNV, both in South America & abroad. He has also been actively involved in Management System Audits such as ISO 9001, ISO 140001 and OHSAS 18001 standards in various industrial sectors for more than 10 years in DNV.

His qualification and experience in CDM demonstrate him sufficient sectoral competence in energy generation from renewable energy sources, waste handling and disposal, and animal waste management.

Michael Lehmann

Michael Lehmann holds a Master Degree in Environmental Sciences with a specialisation in environmental chemistry. He has an overall working experience of around 13 years.

Since 1999 he has worked in the climate change field and has closely followed the international response to the climate change challenge (UNFCCC, Kyoto Protocol) and the responses by national governments (EU ETS, UK ETS) and business. He has managed the validation and verification of many CDM and JI projects and thas carried out the technical review of numerous climate change project validations and verifications. Through his extensive work with validation and verification of CDM and JI projects, he has aquired sectoral competence within energy generation from renewable energy sources, electricity distribution, waste handling and disposal and animal waste management.

He has also experience with verifying corporate greenhouse gas emissions and emission reductions from verifying the emissions of the Norwegian process, paper & pulp and oil & gas industry.Earlier, he has managed DNV Research's R&D activities with the objective to build and to enhance DNV's knowledge in the field of CO2 capture and storage. He also conducted R&D to conclude on measuring systems and reporting formats necessary to accurately and trustworthy report greenhouse gas emission reductions, especially addressing uncertainties. He also provided technical environmental advisory services to clients within the process industry, above all in the field of air emissions. Among others, he developed a methodology for Environmental Risk Assessment for accidental releases of chemicals.

Francisco Chávez V.

Francisco Chavez V. holds a Technical Degree in Electricity, a Bachelor Degree in Engineering Physics with specialization in Thermodynamics and IT systems, and a Master Degree in Business Administration with special focus in Strategy, Leadership, Marketing and Project Management. He has an overall working experience of around 27 years. Prior to joining DNV having 10 years experience in hydropower and renewable energy projects, electricity systems (transmission, distribution, supply, demand, generation and rural electrification) and electricity markets, electrical equipment and installations, and 10 years of experience within the oil and gas industry, and around 5 years of business experience in several areas. During these years he has covered the areas of: Project Management, Manufacturing, Supervision, Consultancy and Advisory services, Research and Testing of prototype equipment, and Field, Maintenance and Repair work, among other.

He has experience of around 2 years in validation and verification of CDM projects/JI and other 3rd party validation/verification services. His qualification, industrial experience and experience in CDM demonstrate him sufficient sectoral competence in: Energy generation from renewable energy sources, electricity distribution, Energy demand, Manufacturing of electrical equipment, and Oil and Gas industry.