

Emission Reduction Monitoring Report

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Chacabuquito Hydroelectric Power Project

Sponsor:
Hidroeléctrica Guardia Vieja S.A.

Monitoring Period:
01 July 2002 to 01 May 2007

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2 Abbreviations

CDEC	Centro de Despacho Económico de Carga (Economic Load Dispatch Center)
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CNE	Comisión Nacional de Energía
CONAF	Corporación Nacional Forestal
CONAMA	Comisión Nacional del Medio Ambiente
DNA	Designated National Authority
ER	Emission Reductions
GWh	Giga Watt hour
HGV	Hidroeléctrica Guardia Vieja S.A., The project sponsor
MVP	Monitoring and Verification Protocol
MW	Mega Watt as measurement of power plants
MWh	Mega Watt hour
PDD	Project Design Document
SIC	Sistema Interconectado Central (Central Interconnected System)
tCO₂	Tons of CO ₂

3 Executive Summary

CDM PROJECT DATA	
Project Name	Chacabuquito Hydroelectric Power Project
Registration N°	Project 1052
Registration date	07 Jul 07
Crediting Period	01 Jul 02 - 30 Jun 09 (Renewable)
Sectoral scope	Scope 1 : Renewable Energy, Run-of-River Hydropower
Activity scale	Large
Methodology used	AM0026 ver. 2 – Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid
Project participants	<ul style="list-style-type: none"> • Hidroeléctrica Guardia Vieja S.A. • Prototype Carbon Fund • Managing company: International Bank for Reconstruction and Development
Ex-ante average annual ER estimation	80,000 tCO ₂ e per year
Project boundary	Chile, central interconnected system (SIC)
PROJECT DESCRIPTION	
Installed Capacity	26 MW
Average annual energy generation	170 GWh
Project Location	Los Andes, V Region, Chile
Project Activity	The Chacabuquito Project consists of a run-of-river power plant of 26 MW installed capacity that utilizes the waters of the Aconcagua river. It produces an average annual generation of 175 GWh. The project connects to the 5th Region's at a 110 KV sub-system within the Central Interconnected System (SIC) and energy is delivered to industrial and residential consumers in the area
Technology used	The Chacabuquito project technology consists of a diversion weir, a system of channels (11 km) and tunnels (3 km), a pressure penstock, water fall of 137 m, a powerhouse, four compact Francis horizontal axis turbines and a high voltage line.
PROJECT STATUS	
Commissioning date	01/07/2007
Energy generation from 01/07/2002 to 31/05/2007	850.161 MWh
Generated ERs from 01/07/2002 to 31/05/2007	400.361 tCO ₂
Average Emission Factor from 01/07/2002 to 31/05/2007	470,9 tCO ₂ e/GWh
SUSTAINABLE DEVELOPMENT PERFORMANCE	
Reforestation Plan	18 hectares of native trees have been planted. Periodic supervision is carried out to ensure high percentage of root taking
Construction	Two bridges have been constructed and made publicly available for the local community
Job Creation	Near 300 jobs created on construction, 12 permanent jobs during operation and three temporary jobs

4 Present Status of the project

4.1 General description

The Chacabucito Project consists of a run-of-river power plant of 26 MW of installed capacity that utilizes the waters of the Aconcagua river. It produces an average annual generation of 175 GWh. The project connects to the 5th Region's at a 110 KV sub-system within the Central Interconnected System (SIC) and energy is delivered to industrial and residential consumers in the area. In addition, it is important to note that the plant does not consider a dam.

This plant is in cascade with two other upstream existent plants, Los Quilos and Aconcagua, which have been successfully operated since 1939 and 1994 respectively. In addition, there is a fourth project of similar characteristics on the same river, being also submitted under carbon bonds financing. The project is being developed by Hidroeléctrica Guardia Vieja (HGV), a subsidiary of Grupo Matte.

The project uses well-proven technologies for run-of-river power generation. The design consists of a diversion weir, a system of channels and tunnels, a penstock and a powerhouse with four turbine-generator kits.

Figure 1. Project Pictures



4.2 Sustainable development

This project contributes to sustainable development in Chile through:

- Use of local renewable energy resources (small hydro) to displace coal and natural gas thermal power generation in the SIC.
- Increased commercial activity through clean and renewable source of power.
- Employment generation in the 5th Region where the project is located.

"Issue" Area	Explanation
Local environmental benefits	The project contributes with clean energy for the Central Interconnected System of Chile, displacing thermal generation 18 hectares of reforestation with locally native trees.
Socio-economic benefits	The project allows the 5 th Region to exploit its significant economic potential. Creation on two new bridges and new access roads for semi-isolated villages in the region. Job creation during the construction period and also during the operation Economic activity during the construction period and also during all of its lifetime
Capacity building	Extensive pre-negotiations consultations have been carried out and a Post-negotiations workshop communicating the lessons learned from the project design and implementation.
Technology transfer	Introduction and demonstration of environmentally friendly power production techniques for the 5 th Region is an explicit objective of the project. The demonstration that ERs from renewable energy can earn additional income and the introduction of CDM know-how is expected to raise environmental awareness and may create interest in low carbon energy technologies.
Environmental Impact Assessment (EIA)	An EIA has been carried out in accordance with Chilean law and Executive. A more detailed impact assessment is available on request from the project operator. World Bank safeguard policies were applied as part of the detailed project design. Typically, small scale run-of-river hydropower projects have very limited environmental impacts.

4.3 Project Location

Los Andes is located 100 km north from Santiago (capital of the country). The hydro power plant is located in a small valley surrounded by mountains (Aconcagua Valley). The Chacabuquito plant is in cascade with two existing upstream hydropower plants (Aconcagua of 81 MW and Los Quilos of 39 MW). The location of the project activity is illustrated in the following figures.

Figure 2:
Geographic position



Figure 3:
Road Map

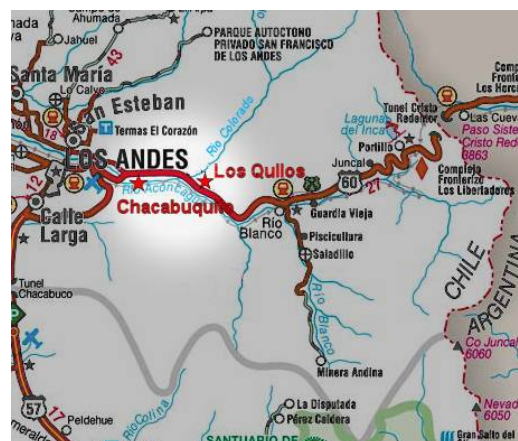


Figure 4:
Satellite Panoramic View



4.4 Project Boundary

The relevant spatial extent of the Chacabquito Project boundary is the SIC, which its generation mix capacity comprises of 60% hydroelectric generation, 30% combine cycle gas turbines (fired with natural gas most of the time, but also diesel recently), and the remainder from coal, diesel, petcoke, and cogeneration. At present there are no electricity imports or exports of the SIC grid to other national or international grid, however future system expansion may include interconnection to the SING grid or Argentina grid.

Figure 5.
Chile Electric Grids

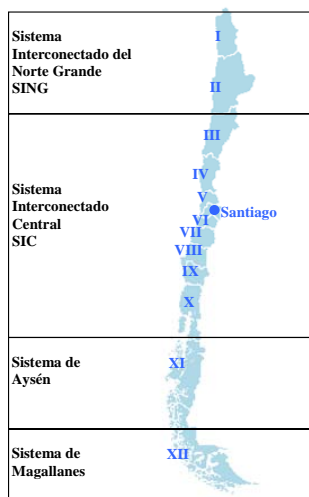
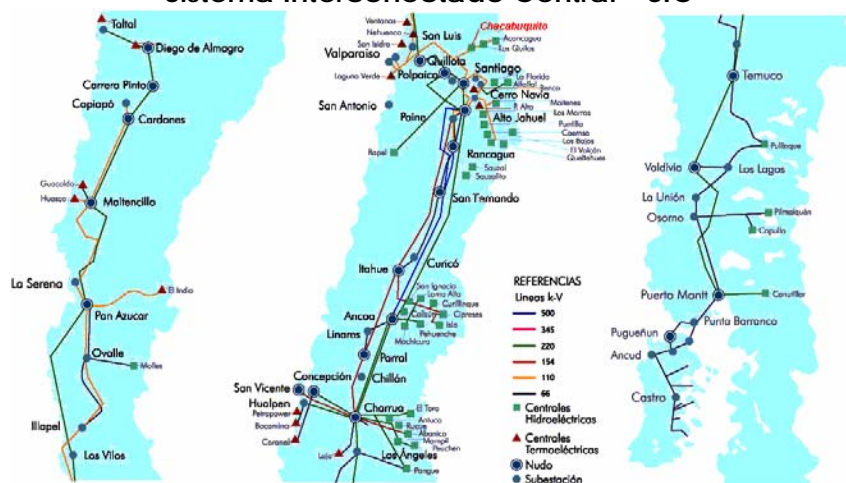


Figure 6.
Sistema Interconectado Central – SIC



4.5 Technical Details of the Project

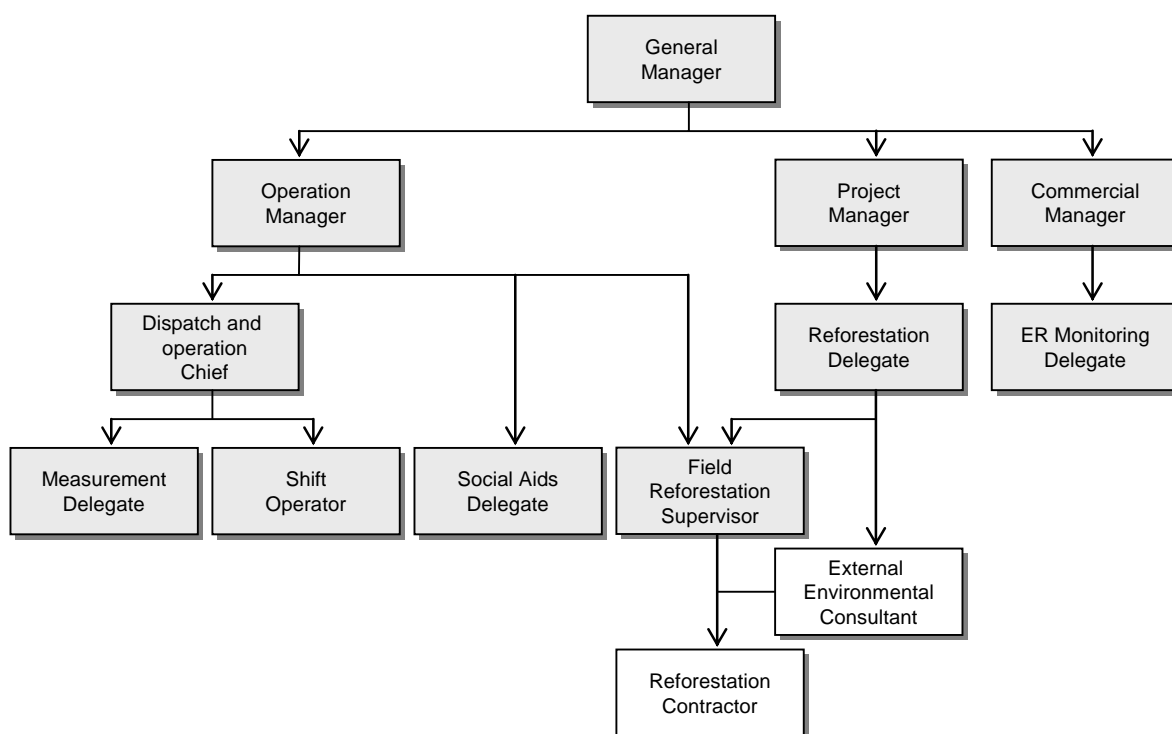
The Chacabuquito project uses a simple layout and well proven technologies in Chile and worldwide and used in other HGV power plants. It consists of a diversion weir, a system of channels (11 km) and tunnels (3 km), a pressure penstock, water fall of 137 m, a powerhouse and a high voltage line, and upgrade of existing transmission system. HGV has demonstrated a successful experience of construction, setting up and operating similar plants. Figure 2 shows the project design.

Canals and tunnels and the penstock will take the 21.5 m³/sec from the Los Quillos plant through a series of canals and tunnels over a distance of approximately 10 km to a 440 m long and 137 meter head penstock to the 26 MW Chacabuquito power house. From the power house, the 21.5 m³/sec will be discharged back to the Rio Aconcagua at Chacabuquito to meet the project's water right requirement to supply 18 m³/sec to a downstream existing hydro plant and to satisfy irrigation users

4.6 Monitoring Organization

HGV has implemented a basic organization with roles and responsibilities to ensure proper monitoring procedures for the Chacabuquito CDM Project. Detail description of the monitoring roles is available at the project documentation book

Figure 8. Monitoring Organization



4.7 Project Documentation

To ensure proper diffusion of all CDM related activities, an operational manual and a project workbook have been put in place, defining procedures, roles, responsibilities and data registry. The project documentation system gathers all relevant information in a central place for easy access and query.

The documentation system has one official version in Santiago's offices and a copy of relevant documents in the project site offices.

5 Monitoring Methodology

Code	AM0026 v 2.0																														
Name	Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid																														
Description	<p>This baseline methodology is based on elements from the NM0076-rev: Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile, whose Baseline study, Monitoring and Verification Plan and Project Design Document were prepared by Prototype Carbon Fund (PCF), World Bank and Hidroeléctrica Guardia Vieja S.A., Chile.</p> <p>This methodology also refers to the "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002) and the "tool for the demonstration and assessment of additionality".</p>																														
Applicability	<p>The proposed methodology has been specifically tailored for the Chile Power sector.</p> <p>The project meets every condition stated in the approved methodology.</p> <ul style="list-style-type: none"> • It is connected to the central grid of Chile; • It is run-off-river hydro power plant with 0 reservoirs • It uses renewable sources to generate electricity; and • It fulfills all the legal obligations for this kind of projects, such as water rights, electric license, and environmental regulations 																														
Emission sources	<table border="1"> <thead> <tr> <th></th><th>Source</th><th>Gas</th><th>Included?</th><th>Justification/ Explanation</th></tr> </thead> <tbody> <tr> <td rowspan="3">Baseline</td><td rowspan="3">SIC thermal dispatch</td><td>CO₂e</td><td>Yes</td><td>Emission due to thermal power plant dispatch</td></tr> <tr> <td>CH₄</td><td>No</td><td></td></tr> <tr> <td>N₂O</td><td>No</td><td></td></tr> <tr> <td rowspan="3">Project Activity</td><td rowspan="3">SIC thermal dispatch</td><td>CO₂e</td><td>No</td><td></td></tr> <tr> <td>CH₄</td><td>No</td><td></td></tr> <tr> <td>N₂O</td><td>No</td><td></td></tr> </tbody> </table>					Source	Gas	Included?	Justification/ Explanation	Baseline	SIC thermal dispatch	CO ₂ e	Yes	Emission due to thermal power plant dispatch	CH ₄	No		N ₂ O	No		Project Activity	SIC thermal dispatch	CO ₂ e	No		CH ₄	No		N ₂ O	No	
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5.1 Calculation of Emission Reductions

The emission reduction from the project result from the electricity from the Chacabuco run-of-river hydro power plant displacing power generated mainly by coal and combined cycle gas or other thermal units on the margin in the Central Interconnected System.

The Central Interconnected System (SIC) is coordinated by an independent entity called Load Economic Dispatch Center (CDEC-SIC). That entity was established

by law (Electric Law, DFL N° 1, 1982) and is ruled by the Electrical Ruling (Supreme Decree N° 327, 1998).

The CDEC-SIC programs the dispatch of the power units by strict economic priority, considering the river flows, the opportunity cost of the water, the operational cost of the thermal units and the filling of the hourly load curve of the demand. The outcome is the hourly generation program for each power unit and the hourly marginal cost of the whole system (that cost represents the highest operational cost of the power units generating in each hour). The CDEC must coordinate in real time the dispatch at minimum cost of the power units according to the weekly and daily programs.

The CDEC-SIC publishes daily and monthly reports of the actual operation of the SIC, including in that report the hourly generation for each power unit and the marginal cost for each hour. The information required is provided by CDEC-SIC and are available publicly through its website at a subscription fee (of US\$ 300 a year).

CNE publishes every six months the Node price report with the indicative expansion plan of the system. The information is publicly available at www.cne.cl

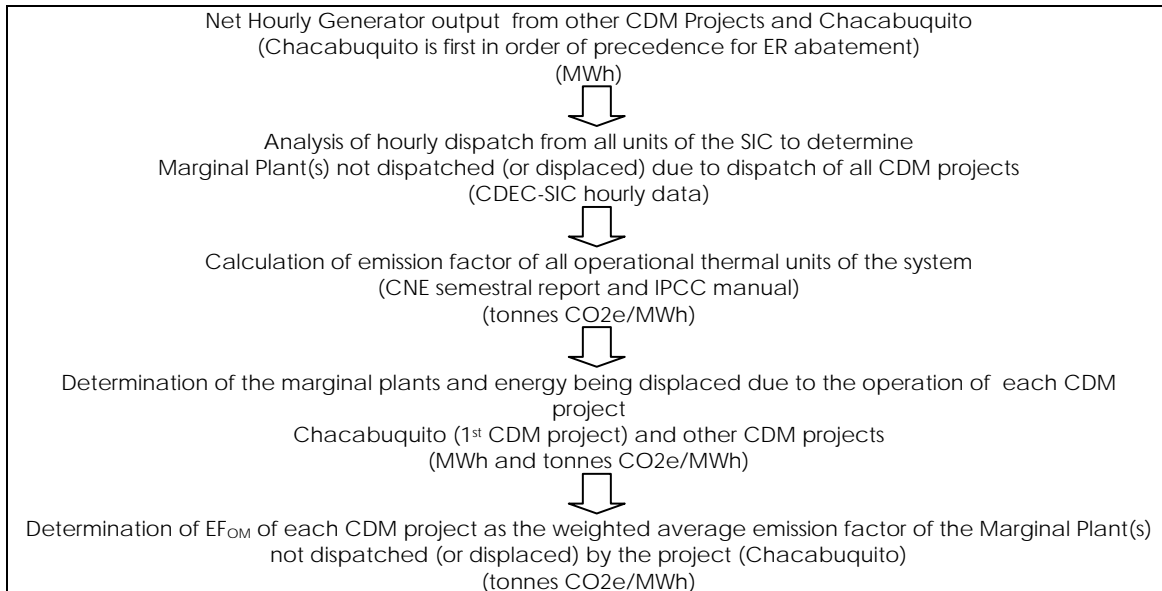
Project emission reductions are calculated as a combined margin emission factor (CM), consisting of the weighted average of an operating margin (OM) and a Build Margin (BM), following AM0026 (v.2) approved methodology.

The OM emission factor from the project activity depends on the actual generation data from the SIC. The dispatch data, obtained from the Economic Dispatch Center (CDEC-SIC), conclusively indicates the type of generation displaced by the addition of Chacabuquito in the generation mix in the SIC. The monitoring and verification plan for the project utilizes the data provided by CDEC-SIC.

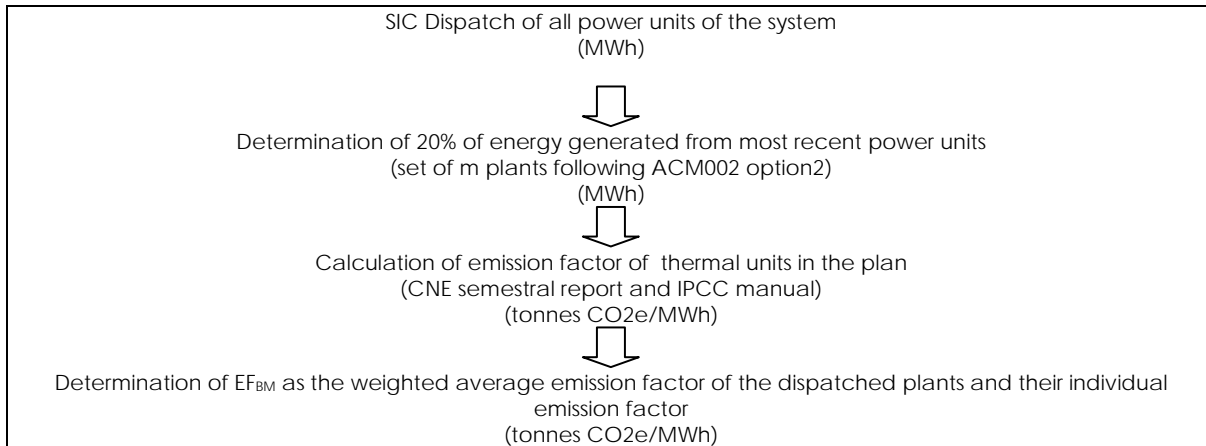
The BM emission factor is determined as option (i) in AM0026, i.e., following the BM emission factor estimation process described in ACM002 (v.6) Option 2, which is calculated on an ex-post basis as the generation-weighted average emission factor (tCO₂/MWh) of the most recent 20% capacity added to the SIC.

5.1.1 Key Steps

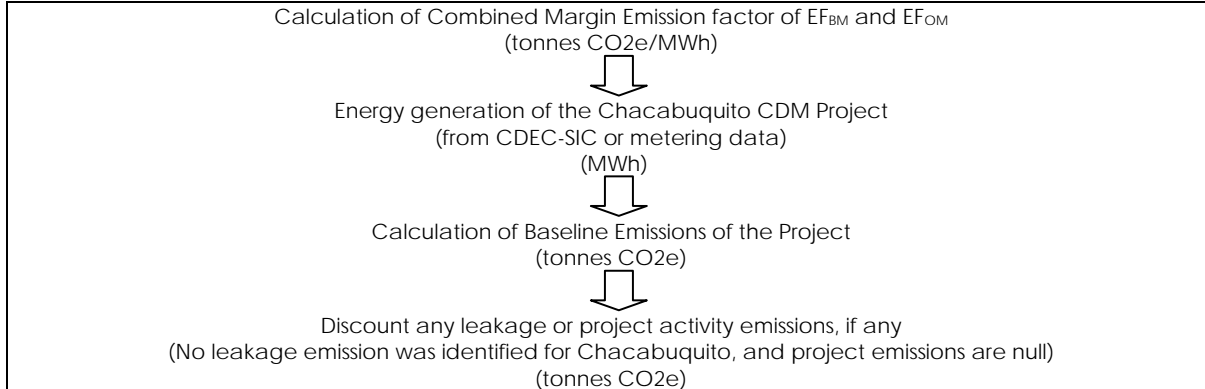
5.1.1.1 Estimating Operating Margin Emission Factor



5.1.1.2 Key Steps for Estimating Build Margin Emission Factor



5.1.1.3 Key Steps for Estimating Chacabucito Project Emissions



5.1.2 Step 1: Operating Margin calculation

AM0026 calculates ex-post the emission factor for the operating margin by observing actual dispatch data, the generation from the power plants and the merit order. The emission factor for the operating margin is determined by the generation that would be dispatched in the absence of this CDM Project.

The Emission Factor of the operating margin is calculated as follows.

$$EF_{OM,y} = \frac{\sum_{h=1}^H EF_{j,h} \times Generation_{j,h}}{\sum_{h=1}^H Generation_{j,h}} \quad (f1)$$

Where,

$EF_{j,h}$	Operating margin Emission factor for proposed CDM project ' j ' for hour ' h ', expressed in tCO ₂ /MWh
$Generation_{j,h}$	Generation of proposed CDM project ' j ' during hour ' h ', expressed in MWh
H	Total number of hours of the year ' y '

The emission factor for the proposed CDM project ' j ', in a system with N CDM projects, for a hour ' h ' is based on identification of the marginal plant(s) that would be operated to meet the electricity supplied by the proposed CDM project ' j '. The identification of marginal plant(s) displaced by proposed CDM project ' j ' is based on the "first-built first served" principle. "Date of built" is defined as the date when the plant begins the dispatch of energy to the grid. In the case of the Chacabucito project, it is the first power plant in operation in the SIC to be commissioned as a CDM project activity.

The emission factor for any hour 'h' for a CDM project 'j' in system is estimated as weighted average of emission factor of the identified marginal plant(s) that would have supplied electricity to the grid in absence of the jth CDM plant. The emission factor is estimated as follows:

$$EF_{j,h} = \sum_{i=1}^M D(j,i) * d_i / \sum D(j,i) \quad (f2)$$

Where,

- $D(j,i)$ Energy displacement of the marginal plant ' i ' due to the proposed CDM project ' j ', expressed in MWh
 d_i Emission factor of the marginal plant ' i ', expressed in tCO₂/MWh.
 M **M** is the total number of marginal plants that would be dispatched if the system is operated without the **N** CDM projects.

Energy displacement of the marginal plant ' i ' due to the proposed CDM project ' j ', is calculated as follows:

$$D(j,i) = MIN \left\{ C_j - \sum_{l=1}^{i-1} D(j,l); (A_i - B_i) - \sum_{k=j+1}^N D(k,i) \right\} \quad (f3)$$

Where,

- $D(j,i)$ Energy displacement of the marginal plant ' i ' due to the proposed CDM project ' j ', expressed in MWh
 A_i Maximum energy generation of the marginal plant ' i ' expressed in MWh/h (equivalent to plant capacity in MW)
 B_i Actual Energy generation of the CDM marginal plant ' i ' expressed in MWh/h
 C_j Energy generation of the CDM project ' j ' expressed in MWh/h
 N Total number of CDM projects in the system
 M Total number of additional marginal plants that should be dispatched if the system is operated without the **N** CDM projects

Where:

$$D(j,0) = 0 \text{ and } D(N+1, i) = 0$$

$$D(j,i) = 0 \text{ for all } i < m, \text{ s.t. } \sum_{l=1}^m (A_l - B_l) > \sum_{k=j+1}^N C_k$$

$$D(j,i) = 0 \text{ for all } i > m, \text{ s.t. } \sum_{l=1}^{m^*} (A_l - B_l) > \sum_{k=j+1}^N C_k + C_j$$

d_i , the emission factor for displaced marginal plant, is estimated as follows:

$$d_i = SFC_i * CEF_{OM,i} * Oxid_i \quad (f4)$$

Where,

- SFC_i Is the specific fuel consumption of i^{th} marginal power plant, expressed as (ton of fuel or TJ)/MWh.
- $CEF_{OM,i}$ is the CO_2 emission factor of fuel used in i^{th} marginal power plant, expressed as $tCO_2/$ (ton of fuel or TJ)
- $Oxid_i$ is fraction of carbon in fuel, used in i^{th} marginal plant, oxidized during combustion.

The marginal plant(s) are those power plant listed in the top of the grid system dispatch order during hour 'h' needed to meet the electricity demand at the hour "h" without the generation of CDM project(s). If no thermal power plants are needed to meet the demand without the CDM projects, then the emission factor of the marginal plant is zero

The generation of Chacabucito is obtained from the metering system which follows a national standard of 0.2% error allowance on a KWh base. Hourly energy data obtained from the metering system is submitted to CDEC-SIC every two hours as for all other generating units of the system.

The Semi-annual Node Price Report and the IPCC Good Practice Guidance provide all the information to calculate the emission factors for all the power plants within the Chilean grids, including future plants projected in the expansion plan. Node Price Reports inform about the specific fuel consumption for every power plant, which are used together with the carbon content of the different fuels as reported by the IPCC.

5.1.3 Step 2: Build Margin calculation

As described in AM0026, the emission factor for the build margin for each crediting period can be calculated based on the most recent 20% of capacity added to the grid (Option 2 for Build Margin Calculation of ACM002).

$$EF_{BM} = \frac{\sum_{i=1}^L EF_{BM,i} * Gen_{BM,i}}{\sum_{i=1}^L Gen_{BM,i}} \quad (f5)$$

Where

- L Group of electricity generation plants that compromise 20% of the system generation (in MWh) and that have been built most recently. Power plant capacity additions registered as CDM project activities should be excluded from the sample group L.

$EF_{BM,i}$	Emission factor of i^{th} electricity generation plant in the build margin, expressed in tCO_2/MWh .
$Gen_{BM,i}$	Projected generation for the i^{th} electricity generation plant included in the build margin, expressed in MWh.

$$EF_{BM,i} = SFC_{BM,i} * CEF_{BM,i} * Oxid_i \quad (f6)$$

Where

$SFC_{BM,i}$	Specific fuel consumption of the i^{th} electricity generation plant, expressed in ton of fuel /MWh or TJ of fuel /MWh. The data shall be taken from published data of electricity regulatory authority.
$CEF_{BM,i}$	CO_2 content of fuel used in i^{th} electricity generation plant, expressed as $tCO_2/(ton\ of\ fuel\ or\ TJ\ of\ fuel)$.
$Oxid_i$	Fuel oxidation factor, expressed as fraction.

For the first crediting period, the EF_{BM} is updated annually *ex-post* for the year in which actual project generation and associated emissions reductions occur (option 2 of ACM002). For subsequent crediting periods, EF_{BM} should be calculated ex-ante, as described in Option 1 for the Build Margin Calculation of ACM0002.

5.1.4 Step 3: Project Emission Reductions

The combined emission factor for the proposed Chacabuquito project, according to AM0026 v2.0, is calculated with the weighted average for both the Operating Margin (OM) and the Build Margin (BM) as follows:

$$EF_y = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM} \quad (f7)$$

Where,

$EF_{OM,y}$	Emission factor for operating margin power generation sources, in tCO_2/MWh
$w_{OM}=0.5$	Weight for operating margin emission factor.
EF_{BM}	Emission factor for build margin power generation sources, in tCO_2/MWh
$w_{BM}=0.5$	Weight for build margin emission factor.

The baseline emissions for the project are calculated as follows:

$$BE_y = EF_y * Generation_y \quad (f8)$$

Where,

EF_y	Baseline emission factor, in tCO_2/MWh
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Generation_y Electricity generated by the proposed CDM Project in year y (in MWh).

Finally, the project mainly reduces CO₂ emissions through substitution of power generation supplied by the existing generation sources connected to the grid and likely future additions to the grid. The emission reduction (ER_y) by the project activity during year y is equal to the Baseline Emissions. Since the Chacabuquito project consists of a hydro power plant, there are no Project Emissions (PE_y). Additionally, as per AM0026, no leakage was identified for this project activity. The emission reduction can be expressed as follows:

$$ER_y = BE_y - PE_y - L_y = BE_y \quad (f9)$$

5.2 Monitored Data

The data required for the ER monitoring is in line with the kind of information collected by an electricity utility. The data used is collected by HGV and comes from the following sources:

- The hourly generation of the project is obtained from the metering system of the plant, which is submitted every 2 hours to CDEC-SIC.
- The actual dispatch of all units in the system and dispatch priority list of the power units is collected from the CDEC-SIC website (www.cdec-sic.cl)
- The expansion plan and the CO_{2e} Conversion Factor for thermal plants is obtained from the Node Price Fixation Report issued by the CNE (Comisión Nacional de Energía, the government agency for the energy) complemented with the IPCC manual.

All project emission data is gathered from CDEC-SIC into a local database where all calculations are then performed through an automated worksheet MVP.xls, available at the project workbook.

6 Monitoring Plan Results

6.1 Monitoring of Emission Reductions

6.1.1 Operating Margin Emission Factor EFOMy

From	to	Chacabucito Generation (MWh)	OM Emission Displacement (tCO ₂ e)	EFOMy (tCO ₂ e/GWh) (f1)
Jul-02	May-03	174.380	75.133	430,9
Jun-03	May-04	172.570	68.723	398,2
Jun-04	May-05	144.703	102.334	707,2
Jun-05	May-06	183.220	100.698	549,6
Jun-06	May-07	175.288	148.512	847,2

6.1.2 Build Margin Emission Factor EFBMy

From	to	SIC Generation of the latest 20% cap additions (GWh)	SIC Emissions of the latest 20% cap. additions (tCO ₂ e)	EFBMy (tCO ₂ e/GWh) (f5)
Jul-02	May-03	6.619	2.277.442	344,1
Jun-03	May-04	7.822	3.370.502	430,9
Jun-04	May-05	7.973	3.115.935	390,8
Jun-05	May-06	8.488	2.445.257	288,1
Jun-06	May-07	8.710	3.062.384	351,6

6.1.3 Combined Margin Emission Factor EFy

From	To	EFOMy (tCO ₂ e/GWh)	EFBMy (tCO ₂ e/GWh)	EFy (tCO ₂ e/GWh) (f7)
Jul-02	May-03	430,9	344,1	387,5
Jun-03	May-04	398,2	430,9	414,6
Jun-04	May-05	707,2	390,8	549,0
Jun-05	May-06	549,6	288,1	418,8
Jun-06	May-07	847,2	351,6	599,4

6.1.4 Project Emission Reductions ERY

From	To	Chacabucito Generation (MWh)	EFy (tCO ₂ e/GWh) (f7)	Bey (tCO ₂ e) (f8)	Ly (tCO ₂ e)	ERY (tCO ₂ e) (f9)
Jul-02	May-03	174.380	387,5	67.565	0	67.565
Jun-03	May-04	172.570	414,6	71.541	0	71.541
Jun-04	May-05	144.703	549,0	79.442	0	79.442
Jun-05	May-06	183.220	418,8	76.740	0	76.740
Jun-06	May-07	175.288	617,9	105.072	0	105.072
	TOTAL	850.161	473,9	400.361	0	400.361

6.2 Social and Environmental Monitoring

6.2.1 Forestation Plan

A Management Plan for Clearing of Vegetation and Reforestation for the Chacabuquito Project (*Plan de Manejo de Corta de Reforestacion en Obras Civiles, Proyecto Chacabuquito, January 2001*) was approved by CONAF in February 2001 (the Plan and the Official resolution are in project files). The Plan requires the reforestation of 18 hectares in an area proposed by the project sponsor, but approved by CONAF within the Los Andes municipality. The Plan established the protection of riverine vegetation along two streams that cannot be cleared during construction activities.

The Forestation Plan was approved by CONAF within Resolution N°657/R/V by CONAF's regional director the 27/02/2001. The forestation works started after the project construction in August 2003. In March 2004, the forestation reached 75% of root taking, as required by CONAF. However, severe climate conditions of the preceding summer and the following winter, plus the action of native predators practically vanished all forestation efforts.

After analyzing the facts of the forestation attempts together with CONAF, HGV proposed a new plantation site with better conditions for the forestation plan. To ensure success in this new attempt, an environmental consultant was hired to study and select the new forestation site, together with the development of the new forestation plan. In August 2005 the new forestation plan was approved by CONAF (Resolución N°1415/R/V).

The selected site for the forestation plan was Fundo El Tártaro as indicated below:

Site name : Fundo El Tártaro, sector Las Minillas.

Site owner : Ganadera de Tongoy Ltda.

Fiscal Appraisal number: 276 – 205

Total site surface: 44,529.- hectares

Commune: Putaendo

Province: San Felipe

Region: Fifth Region of Valparaiso

Site coordinates: North 6.389.139, East 339.075 (PSAD 56)

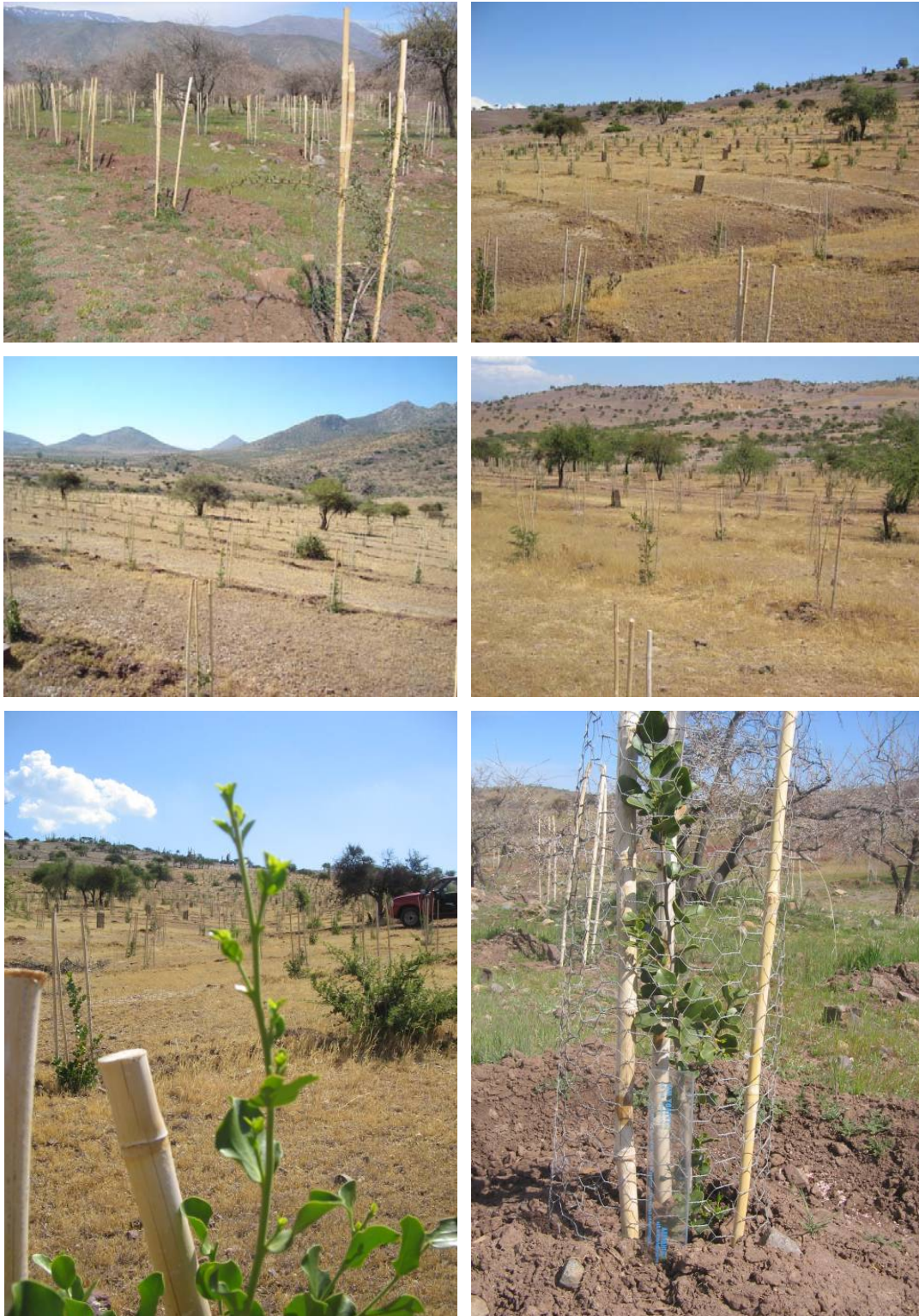
Forestation commitments are summarized in the table below

Site	Surface (hectares)	Previous site condition	Reforestation Species	Density (pl/ha)
R2	11,0	Degradated Xerophilous Scrubland	<i>Quillaja saponaria</i> (quillay)	850
			<i>Schinus polygamus</i> (huingán)	110
			<i>Kageneckia oblonga</i> (bollén)	110
			<i>Prosopis chilensis</i> (algarrobo)	70
			<i>Porlieria chilensis</i> (guayacán)	110
R1, R3	7,0	Degradated Xerophilous Scrubland	<i>Quillaja saponaria</i> (quillay)	850
			<i>Schinus polygamus</i> (huingán)	110
			<i>Kageneckia oblonga</i> (bollén)	110
			<i>Prosopis chilensis</i> (algarrobo)	70
			<i>Porlieria chilensis</i> (guayacán)	110

In January 2006 HGV hired forestation services among six expert companies who had interest in the forestation plan. Plantation works started on May 2006 with the soil preparation and enclosure with fences.

Today the forestation plan has succeeded with near 90% root taking. A local consultant has been contracted to follow up all forestation activities and report periodically to HGV about the progress and status.

Figure 1. Project Forestation Activities (Sept 2007)



6.2.2 Local Socio-economic Activities

Besides several local socio-economic aids carried out directly by Hidroeléctrica Guardia Vieja S.A., main social and economic activities are carried out through the Corporación de Desarrollo Pro Aconcagua (www.proaconcagua.cl), sponsored by HGV among other private companies.

Main activities of ProAconcagua are:

- Education and cultural improvements
- Productive and touristic aids
- Social development
- Entrepreneurship aids
- Environmental awareness and education
- Analysis on public policies with local effects
- Complementary developments from private companies, beyond public policies

Further details of all activities carried out by HGV can be consulted in the Project Documentation Workbook

Annex 1: Monthly System Operating Data from CDEC-SIC (MWh)

year	2002							
Suma de sum_gener		month						
type	name	7	8	9	10	11	12	
embalse	Canutillar	115.159	112.454	79.475	105.242	86.126	62.549	
	Cipreses	37.809	25.698	17.683	51.972	60.276	68.197	
	Colbún	262.800	298.984	309.111	297.766	288.946	276.317	
	El Toro	99.074	6.380	718	2.303	1.406	9.185	
	Machicura	56.540	63.017	62.580	60.266	57.177	53.247	
	Pangue	156.586	221.266	268.093	298.303	243.975	248.280	
	Pehuenche	258.151	316.376	326.450	334.779	320.779	379.103	
	Rapel	152.016	262.624	194.096	132.096	114.017	173.471	
	pasada	Chacabucito	11.779	16.607	15.655	17.237	16.858	18.040
Abanico		30.960	34.298	33.050	39.512	40.659	42.733	
Aconcagua		19.273	24.366	23.906	40.332	49.855	58.874	
Alfalfal		40.542	40.679	42.104	68.195	102.905	125.033	
Antuco		142.201	141.980	138.322	133.970	147.496	141.215	
Capullo		8.326	8.569	8.453	8.131	7.467	7.543	
Curillínque		53.294	50.831	50.171	54.473	58.325	60.835	
Florida		10.446	15.985	17.540	17.635	17.175	18.052	
Isla		39.268	38.127	40.961	45.362	45.949	48.369	
Loma Alta		22.775	21.563	21.005	23.441	24.914	26.162	
Los Molles		5.761	7.646	8.738	13.374	12.960	13.497	
Los Morros		1.803	1.689	1.602	1.719	1.730	1.849	
Los Quilos		22.449	26.610	25.731	28.594	27.841	28.837	
Maitenes		11.315	11.158	10.752	12.291	12.688	13.227	
Mampil		16.132	25.317	24.827	32.004	27.726	23.448	
Peuchén		22.872	37.529	34.838	48.716	44.290	38.344	
Pilmaiquén		28.707	28.602	27.940	27.130	25.575	26.500	
Pullínque		22.922	25.799	27.278	31.899	30.558	27.148	
Puntilla		10.458	7.944	10.217	10.527	10.191	10.537	
Queltehues		31.501	32.042	31.500	32.722	31.332	32.778	
Rucue		111.758	109.861	105.611	121.389	114.711	95.683	
San Ignacio		25.749	26.180	25.709	26.098	23.725	22.514	
Sauce Andes		809	773	624	523	554	521	
Sauzal 50		37.692	53.061	52.217	55.109	52.499	54.506	
Sauzal 60		-	-	-	-	-	-	
Sauzalito		7.134	8.514	8.339	8.621	8.373	8.680	
Volcán		8.424	9.168	9.177	9.729	9.448	9.813	
térmica		Antilhue 25	-	-	-	-	-	-
		Antilhue 50	-	-	-	-	-	-
		Arauco	13.633	11.867	11.110	13.138	14.993	15.383
		Bocamina TG	-	-	-	-	-	-
		Bocamina TV	-	-	-	-	-	-
	Cabrero 120	-	-	-	-	-	-	
	Cabrero 50	-	-	-	-	-	-	
	Cabrero 90	-	-	-	-	-	-	
	CMPC Puente Alto	-	-	-	-	-	-	
	Constitución Arauco	10.701	9.405	9.684	10.864	8.165	11.014	
	Constitución Gener	4.655	4.593	4.638	1.197	3.360	5.214	
	Diego de Almagro	-	7	23	-	3	-	
	Guacolda 1	101.355	84.952	78.170	77.250	71.892	75.305	
	Guacolda 2	100.360	84.780	79.363	77.822	47.121	87.022	
	Huasco Grupo Elect	-	-	-	-	-	-	
	Huasco TG	74	-	48	-	4	-	
	Huasco TV	-	-	-	-	-	-	
	Indio	-	-	-	-	-	5	
	Laguna Verde	-	-	-	-	-	-	
	Laja	2.133	1.891	1.558	2.338	3.158	3.464	
	Los Robles	-	-	-	-	-	-	
	Los Robles 21	-	-	-	-	-	-	
	Nehuenco 1 gas	206.505	176.307	11.648	119.236	187.127	59.663	
	Nehuenco 9B gas	1.335	-	692	-	1.052	710	
	Nueva Renca gas	228.572	160.873	114.051	136.487	107.214	129.528	
	Petropower	48.715	45.230	27.503	36.192	35.415	38.772	
	Rapel Grupo Elect	-	-	-	-	-	-	
	Renca	-	-	-	-	-	-	
	San Antonio	-	-	-	-	-	-	
	San Francisco de Mostazal	-	-	-	-	-	-	
	San Isidro gas	144.957	22.532	109.425	54.691	7.247	128.504	
	Taltal I	743	250	550	118	1.988	1.416	
	Taltal II gas	6.624	8.234	4.523	4.609	26.460	18.085	
	Ventanas 1	-	-	-	-	-	-	
	Ventanas 2	-	-	-	-	-	-	

Source: CDEC-SIC

year		2003											
Suma de sum gener		month											
type	name	1	2	3	4	5	6	7	8	9	10	11	12
embalse	Canutillar	63.796	78.474	107.378	104.377	99.149	68.240	70.603	97.666	90.452	106.902	76.461	99.793
	Cipreses	72.460	66.385	64.382	50.751	44.593	33.529	47.448	61.004	37.259	35.450	35.999	66.484
	Colbún	348.800	189.105	208.664	213.420	193.756	177.007	319.283	246.913	140.582	136.914	136.143	168.886
	El Toro	114.939	240.929	301.189	310.955	316.277	115.818	83.034	153.787	128.700	132.935	158.803	248.841
	Machicura	68.985	38.376	43.903	46.677	45.660	39.461	69.386	55.174	31.000	29.266	28.470	35.659
	Pangue	125.183	58.038	46.346	29.278	28.459	202.427	288.897	156.453	207.629	228.739	188.097	121.791
	Pehuenche	376.254	215.602	155.436	134.812	137.277	254.300	273.447	196.567	224.724	258.458	267.752	195.960
	Rapel	154.033	63.973	71.211	54.040	35.202	185.302	138.536	46.019	67.927	62.572	40.083	27.601
	Chacabuito	17.921	16.457	17.378	14.590	11.858	12.210	12.067	10.963	12.006	17.368	18.627	19.221
	Abanico	41.333	35.008	36.471	31.986	31.443	31.846	34.131	34.209	32.423	32.828	31.353	30.563
	Aconcagua	60.388	53.980	59.373	32.327	19.860	18.716	17.458	16.500	19.389	25.236	57.285	58.195
pasada	Alfalfal	126.512	114.231	126.520	24.001	14.818	15.870	13.553	29.662	45.032	69.693	95.777	115.934
	Antuco	130.651	146.617	167.171	164.023	163.919	167.383	167.442	152.007	152.356	163.122	151.860	160.276
	Capullo	6.245	5.169	3.605	3.722	4.151	7.542	8.414	7.925	7.791	7.494	7.721	7.656
	Curillínque	62.072	56.120	58.805	53.105	51.869	50.415	49.818	60.380	60.960	62.899	61.556	62.770
	Florida	7.352	585	10.792	13.791	5.013	14.594	14.145	12.164	9.887	14.634	17.686	18.920
	Isla	49.492	43.925	46.178	40.757	41.209	39.750	46.395	42.848	46.342	48.439	47.511	46.335
	Loma Alta	26.860	24.019	25.099	22.820	22.220	17.847	24.889	26.166	26.428	27.288	26.604	27.170
	Los Molles	13.614	12.305	11.224	8.039	6.736	6.836	6.623	5.850	5.405	5.870	5.521	5.505
	Los Morros	1.934	1.793	2.006	1.400	1.478	1.654	1.866	1.332	796	1.361	1.857	1.941
	Los Quilos	28.780	26.200	29.006	23.553	19.610	19.998	19.780	17.899	19.628	26.897	28.041	28.654
	Maitenes	12.772	10.859	11.305	10.763	10.844	10.919	11.559	11.481	10.996	11.755	11.850	12.087
	Mampil	15.069	6.819	3.885	2.941	3.373	21.475	23.331	14.726	18.932	18.409	15.417	11.660
	Peuchén	25.490	11.390	9.539	3.137	5.233	32.810	34.315	20.908	27.302	26.830	23.084	16.658
	Pilmaiquén	20.298	16.657	16.359	14.356	11.972	21.280	28.870	27.700	27.180	25.570	24.704	28.097
	Pullínque	20.684	14.169	11.838	9.524	9.152	20.631	35.692	28.165	25.572	24.576	21.647	21.003
	Puntilla	10.486	9.577	10.614	10.206	10.493	10.254	10.594	7.045	9.918	10.222	9.910	10.229
	Quelthues	32.520	29.593	32.757	30.982	32.348	31.028	31.350	28.294	30.396	32.633	31.690	32.841
	Rucue	73.257	77.493	55.486	90.397	106.737	111.351	119.559	114.872	118.194	117.391	95.944	94.976
	San Ignacio	26.428	13.275	17.520	14.196	22.367	18.917	26.684	25.167	15.882	10.498	8.913	10.455
	Sauce Andes	571	658	792	729	775	761	710	622	557	693	770	778
	Sauzal 50	54.552	48.092	51.658	35.959	24.378	34.445	31.357	26.679	31.845	48.064	51.932	53.194
	Sauzal 60	-	-	-	-	-	-	-	-	-	-	-	-
	Sauzalito	8.709	7.822	8.575	6.736	4.748	5.846	6.496	5.569	6.109	8.092	8.208	8.478
	Volcán	9.654	8.717	9.820	9.497	9.765	9.204	8.881	8.493	8.448	9.411	9.363	9.823
térmica	Antihue 25	-	-	-	-	-	-	-	-	-	-	-	-
	Antihue 50	-	-	-	-	-	-	-	-	-	-	-	-
	Arauco	15.032	13.385	14.526	12.456	13.682	12.649	10.529	11.896	10.517	9.686	9.377	12.469
	Bocamina TG	-	-	-	-	-	-	-	-	-	-	-	-
	Bocamina TV	-	-	1.094	81.165	89.658	38.711	-	-	-	-	-	-
	Cabrero 120	-	-	-	-	-	-	-	-	-	-	-	-
	Cabrero 50	-	-	-	-	-	-	-	-	-	-	-	-
	Cabrero 90	-	-	-	-	-	-	-	-	-	-	-	-
	CMPC Puente Alto	-	-	-	-	-	-	-	-	-	-	-	-
	Constitución Arauco	11.376	10.076	10.689	10.854	10.661	9.774	10.393	10.567	10.082	7.953	8.789	12.055
	Constitución Gener	4.845	5.145	5.029	5.248	5.049	4.881	4.963	4.969	4.696	4.532	4.065	3.022
	Diego de Almagro	324	-	-	-	-	21	106	5	-	2	102	-
	Guacolda 1	84.235	87.250	113.073	109.751	106.232	103.585	110.982	111.866	109.971	55.416	107.797	113.154
	Guacolda 2	84.822	88.051	112.305	109.656	109.970	101.676	110.953	113.551	109.495	76.687	98.259	111.080
	Huasco Grupo Elect	-	-	-	-	-	-	-	-	-	-	-	-
	Huasco TG	360	-	1	-	-	-	-	-	-	12	147	11
	Huasco TV	-	-	-	-	-	-	-	-	-	-	-	-
	Indio	72	-	4	32	-	-	20	-	6	-	-	-
	Laguna Verde	-	-	-	-	-	-	-	-	-	-	-	-
	Laja	2.477	3.946	3.662	2.746	3.576	2.885	2.978	3.254	3.083	2.754	2.266	3.437
	Los Robles	-	-	-	-	-	-	-	-	-	-	-	-
	Los Robles 21	-	-	-	-	-	-	-	-	-	-	-	-
	Nehuenco 1 gas	181.504	185.807	218.975	157.122	231.414	183.353	229.601	243.929	243.613	244.039	207.860	146.689
	Nehuenco 9B gas	1.877	390	114	9.046	2.393	704	228	-	-	1.202	89	-
	Nueva Renca gas	71.918	222.089	251.013	226.559	252.335	235.473	241.522	236.529	54.631	240.470	241.751	254.646
	Petropower	37.048	25.808	44.678	40.927	44.028	37.174	39.840	44.825	43.510	45.648	41.612	37.736
	Rapel Grupo Elect	-	-	-	-	-	-	-	-	-	-	-	-
	Renca	-	-	-	-	-	-	-	-	-	-	-	-
	San Antonio	-	-	-	-	-	-	-	-	-	-	-	-
	San Francisco de M	171	-	24	-	-	11	28	11	-	28	40	20
	San Isidro gas	89.457	187.436	252.325	225.661	247.647	157.896	31.927	229.672	240.956	244.728	115.609	239.669
	Taital I	3.785	3.994	28.340	58.348	72.989	41.832	4.231	30.331	43.044	71.844	51.925	17.599
	Taital II gas	11.717	5.201	1.414	9.886	2.488	299	19.790	2.900	2.698	5.048	4.537	35.095
	Ventanas 1	-	-	4.068	17.990	5.459	-	-	-	-	-	3.651	-
	Ventanas 2	7.825	-	28.545	91.700	60.375	-	-	8.960	65.110	-	63.980	66.735
	Cholguán	-	-	-	-	-	5.934	5.419	7.262	8.693	8.215	9.138	9.111
	Licantén	-	-	-	-	-	-	-	-	-	-	-	-
	Nehuenco 2 gas	-	-	-	8.443	11.920	5.704	3.162	7.178	858	379	275	1.395

Source: CDEC-SIC

year	2004
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Suma de sum gener		month											
type	name	1	2	3	4	5	6	7	8	9	10	11	12
embalse	Canutillar	98.685	91.367	109.504	107.856	110.800	102.344	97.202	106.549	59.828	75.414	41.525	93.600
	Cipreses	61.969	65.878	59.209	37.735	47.327	22.208	20.238	34.474	30.875	3.766	889	52.105
	Colbún	145.108	108.290	92.858	229.507	275.154	172.004	163.682	191.998	130.537	214.221	134.335	163.328
	El Toro	214.653	257.219	286.560	217.272	286.246	124.898	55.006	163.323	3.080	10.724	913	74.080
	Machicura	31.286	23.893	20.679	50.721	64.578	42.680	39.741	45.068	28.655	45.660	27.753	32.816
	Pangue	63.993	40.913	37.150	73.066	45.508	95.951	280.087	128.236	242.454	233.950	258.163	175.872
	Pehuenche	185.846	131.611	130.588	204.725	151.569	197.729	226.251	219.983	283.123	251.743	305.478	278.588
	Rapel	30.048	21.880	48.816	96.403	52.399	63.999	97.097	141.578	107.911	54.255	53.884	27.357
	Ralco								5.834	229.693	398.573	400.085	298.074
pasada	Chacabuco	19.273	16.837	16.186	10.579	7.232	6.910	6.960	8.538	12.755	12.979	16.098	17.892
	Abanico	31.022	29.087	28.866	28.667	27.326	28.761	30.051	28.744	28.770	30.733	31.778	31.371
	Aconcagua	60.482	53.725	41.248	21.811	14.681	11.576	10.853	12.866	20.152	21.385	38.050	63.171
	Alfalfal	128.934	118.992	111.783	64.345	50.506	41.741	38.877	37.211	41.554	45.806	55.517	105.593
	Antuco	134.872	138.090	149.123	149.098	162.593	164.151	157.456	149.391	117.703	115.300	116.757	107.547
	Capullo	4.557	2.707	3.042	7.603	5.164	7.494	8.321	6.734	8.075	7.997	6.790	5.753
	Curillínque	61.753	57.686	58.138	51.074	46.619	47.129	50.419	54.195	52.839	40.183	47.155	60.712
	Florida	19.558	16.280	12.415	8.908	3.785	8.011	8.047	9.020	11.119	9.814	12.701	18.656
	Isla	48.934	45.592	45.995	41.383	42.611	38.216	40.315	41.703	40.076	24.622	24.365	45.521
	Loma Alta	26.320	25.446	25.478	22.141	23.379	20.318	21.858	23.277	20.126	20.274	21.517	26.754
	Los Molles	5.167	4.402	4.362	4.026	3.953	3.512	3.390	3.703	4.125	3.473	2.960	2.701
	Los Morros	2.206	1.660	1.288	1.248	1.607	1.400	1.485	1.470	1.155	1.004	1.399	1.895
	Los Quilos	29.008	26.475	25.112	18.074	13.340	11.517	11.369	13.706	19.849	20.897	25.430	29.000
	Maitenes	11.510	10.060	10.747	10.544	10.993	10.679	10.907	11.018	11.117	11.214	11.216	12.351
	Mampil	8.680	5.940	4.600	12.562	6.744	22.348	26.438	14.855	20.551	18.561	20.140	12.480
	Peuchén	14.190	10.092	7.560	19.411	10.184	34.186	37.904	20.630	30.046	27.646	30.357	19.625
	Pilmaiquén	19.143	11.864	12.559	25.702	20.806	20.477	27.997	27.750	27.473	26.863	24.710	20.201
	Pullínque	15.588	10.483	10.066	13.918	14.001	15.599	35.523	25.931	26.176	22.249	23.520	18.170
	Puntilla	10.388	9.647	10.152	9.876	10.149	9.517	10.068	7.337	10.105	10.466	10.140	10.493
	Queltehues	32.765	30.465	32.567	31.198	29.795	26.135	25.371	25.297	29.240	31.419	31.107	32.338
	Rucue	72.459	68.310	75.501	101.016	116.592	115.143	121.788	115.108	92.665	76.333	79.796	56.416
	San Ignacio	7.512	4.804	5.396	20.370	26.275	21.647	21.992	24.466	14.912	18.592	6.681	9.697
	Sauce Andes	744	710	751	734	684	730	766	749	725	702	610	694
	Sauzal 50	52.742	49.097	46.067	35.455	22.317	26.166	27.301	32.190	42.121	40.817	46.669	51.089
	Sauzal 60	-	-	-	-	2.512	1.060	-	-	-	-	-	10
	Sauzalito	8.518	7.885	8.026	6.496	4.489	4.693	5.346	6.420	7.491	7.494	7.844	8.412
	Volcán	9.820	9.051	9.812	8.982	7.910	5.915	6.629	6.560	7.634	5.147	7.835	9.779
térmica	Antihue 25	-	-	-	-	-	-	-	-	-	-	-	-
	Antihue 50	-	-	-	-	-	-	-	-	-	-	-	-
	Arauco	11.626	11.349	14.101	12.203	16.432	16.468	10.798	9.439	9.724	16.703	15.413	11.786
	Bocamina TG	-	-	-	-	-	-	-	-	-	-	-	-
	Bocamina TV	34.609	35.514	77.566	19.679	11.774	88.005	20.588	12.316	-	-	-	-
	Cabrero 120	-	-	-	-	-	-	-	-	-	-	-	-
	Cabrero 50	-	-	-	-	-	-	-	-	-	-	-	-
	Cabrero 90	-	-	-	-	-	-	-	-	-	-	-	-
	CMPC Puente Alto	-	-	-	-	-	-	-	-	-	-	-	-
	Constitución Arauco	12.012	11.235	12.400	10.660	11.944	11.688	10.583	10.339	10.095	7.934	11.341	12.158
	Constitución Gener	4.394	4.237	4.716	4.221	4.206	4.325	4.330	4.233	4.013	4.285	4.103	3.201
	Diego de Almagro	88	19	1.616	275	1.814	2.240	104	-	-	2	70	8
	Guacolda 1	112.276	104.203	108.573	99.318	113.373	108.176	108.735	105.962	106.246	107.491	54.624	104.917
	Guacolda 2	111.959	104.040	107.755	103.554	112.709	108.333	92.092	112.055	106.134	109.354	71.179	95.912
	Huasco Grupo Electro	-	-	-	-	-	-	-	-	-	-	-	-
	Huasco TG	142	57	2.699	316	2.328	2.437	151	-	5	175	550	20.204
	Huasco TV	-	-	-	-	-	2.433	-	-	-	-	-	1.673
	Indio	-	60	65	-	-	-	-	-	-	-	-	-
	Laguna Verde	-	-	6.918	7.863	11.610	12.135	-	-	-	-	-	-
	Laja	3.739	3.327	3.333	3.034	3.124	2.713	2.842	3.312	3.108	3.469	3.552	3.931
	Los Robles	-	-	-	-	-	-	-	-	-	-	-	-
	Los Robles 21	-	-	-	-	-	-	-	-	-	-	-	-
	Nehuenco 1 gas	246.423	239.807	256.212	190.175	54.994	18.336	38.002	223.589	219.963	253.685	97.656	8.662
	Nehuenco 9B gas	4.094	3.594	28.085	7.762	16.143	21.911	16.303	3.107	-	2.402	-	2.994
	Nueva Renca gas	248.339	233.169	253.945	244.015	157.707	207.964	212.310	218.587	-	726	234.951	263.873
	Petropower	48.236	43.273	35.902	45.598	48.883	48.088	48.135	47.362	42.142	33.743	46.078	38.595
	Rapel Grupo Electro	-	-	-	-	-	-	-	-	-	-	-	-
	Renca	657	-	2.294	353	22	2.387	-	-	-	-	-	-
	San Antonio	-	-	-	-	-	-	-	-	-	-	-	-
	San Francisco de M	289	26	3.231	880	1.897	2.947	-	53	14	20	25	-
	San Isidro gas	217.177	235.376	256.925	197.961	224.852	224.407	256.301	259.490	239.451	104.952	233.467	255.259
	Taltal I	28.717	48.905	70.903	32.216	50.890	37.625	51.600	56.510	9.292	77.574	77.465	82.706
	Taltal II gas	47.839	58.520	69.929	24.242	22.130	35.079	35.033	29.713	34.729	5.173	243	1.578
	Ventanas 1	15.463	47.040	66.774	55.894	73.142	78.886	66.044	4.008	-	6.216	-	-
	Ventanas 2	118.355	121.890	140.480	96.490	150.685	155.590	133.205	51.730	1.315	79.195	-	1.575
	Cholguán	8.946	7.473	6.780	8.030	8.852	8.716	7.046	6.729	7.862	7.823	7.724	7.366
	Licantén	-	1.618	1.961	1.337	2.721	1.115	2.663	2.220	1.285	2.246	1.810	2.435
	Antihue TG	-	-	-	-	-	-	-	-	-	11	148	710
	Coronel TG	-	-	-	-	-	-	-	-	-	-	-	-
	Horcones TG gas	-	-	-	-	-	-	-	-	-	7.669	4.354	56
	Laguna Verde TG	-	-	2.270	918	2.771	2.477	-	21	-	17	56	-
	Nueva Aldea I (ex Itata)	-	-	-	-	-	-	-	-	-	-	-	319
	Pedro de Valdivia	-	-	7.132	13.566	17.337	21.058	7.298	13.609	17.463	17.245	19.741	18.755
	Nehuenco 2 gas	33.343	28.771	50.753	36.749	188.815	238.831	259.803	156.535	268.516	273.590	195.448	265.178

Source: CDEC-SIC

year		2005											
Suma de sum. gener		month											
type	name	1	2	3	4	5	6	7	8	9	10	11	12
embalse	Canutillar	92.285	95.341	112.354	107.757	107.699	65.949	66.846	39.235	60.134	55.372	44.323	55.181
	Cipreses	67.441	62.850	63.908	31.977	21.416	124	14.837	4.816	41.526	49.771	47.998	49.698
	Colbún	136.308	136.032	177.382	210.343	184.828	241.506	314.092	331.660	315.221	340.989	325.905	338.175
	El Toro	276.095	251.524	207.954	191.146	130.001	7.065	12.093	416	359	1.477	318	1.819
	Machicura	28.562	28.671	38.883	49.949	46.795	55.699	64.302	67.223	63.808	70.423	66.626	67.106
	Pangue	62.051	81.492	83.873	60.221	82.852	254.681	311.515	287.435	292.713	265.235	241.126	223.415
	Pehuenche	182.006	136.803	136.698	104.688	207.490	322.910	292.353	361.462	317.374	372.896	351.768	356.413
	Rapel	16.983	24.411	41.021	25.581	84.890	203.683	196.912	199.824	172.401	79.315	141.606	158.694
	Ralco	90.425	132.194	130.484	79.321	73.688	344.056	492.197	437.961	477.780	433.227	409.882	394.479
pasada	Chacabuco	17.458	14.255	13.882	8.927	8.050	12.327	12.845	13.690	16.657	18.222	17.774	17.812
	Abanico	30.544	25.925	26.521	24.095	25.328	29.076	29.762	33.548	31.305	32.383	33.282	34.592
	Aconcagua	60.298	48.614	35.064	16.382	14.221	19.940	19.502	20.793	26.334	47.249	59.394	63.371
	Alfalfal	126.279	108.728	84.751	51.599	44.903	40.331	39.112	37.696	40.409	70.110	108.990	125.627
	Antuco	155.196	132.935	117.064	106.698	121.014	145.993	148.647	185.415	118.999	111.403	121.096	109.538
	Capullo	5.722	3.071	4.412	5.053	8.375	8.351	8.100	7.999	6.201	5.071	6.349	6.223
	Curililque	64.029	58.396	60.614	49.863	48.818	35.145	43.359	44.826	52.980	65.666	61.741	62.119
	Florida	17.357	12.071	9.131	6.063	3.371	12.441	17.389	15.453	15.772	19.070	18.751	19.795
	Isla	49.482	44.146	46.954	39.870	39.162	29.001	36.202	40.380	29.008	45.470	47.854	48.721
	Loma Alta	27.655	25.716	26.674	21.605	20.925	12.405	18.430	19.978	23.135	28.744	26.859	27.134
	Los Molles	2.415	2.093	2.456	2.438	3.068	3.915	3.603	3.309	6.079	8.778	11.226	12.633
	Los Morros	1.857	1.271	1.113	704	1.421	1.759	1.850	1.773	1.917	1.955	1.898	1.982
	Los Quilos	27.770	22.770	22.646	14.476	13.657	19.946	20.909	22.381	27.203	28.660	27.614	28.584
	Maitenes	11.505	9.529	10.411	10.306	10.737	10.629	11.242	10.895	11.046	12.565	11.409	12.362
	Mampil	7.598	5.271	3.599	2.388	13.586	28.083	23.991	32.518	19.420	16.364	21.268	18.614
	Peuchén	12.787	9.549	6.221	3.668	20.230	41.873	34.247	48.123	26.931	25.338	34.899	30.971
	Pilmaiquén	16.921	11.906	13.743	16.916	23.351	27.496	28.123	25.288	22.697	20.256	20.277	26.165
	Pullinque	12.961	9.059	9.300	8.715	14.877	34.292	34.240	31.401	28.968	20.427	17.812	26.553
	Puntilla	10.476	9.478	10.414	9.982	10.102	9.757	10.326	5.998	9.958	10.300	9.888	7.196
	Queltehues	32.309	29.258	32.407	30.280	29.490	29.974	31.413	23.756	31.046	32.810	31.621	32.436
	Rucue	79.710	66.311	57.907	58.331	83.405	105.433	99.923	124.014	94.276	81.276	62.544	56.491
	San Ignacio	6.262	7.708	17.178	24.568	25.039	24.021	26.041	26.778	25.421	26.488	25.807	26.579
	Sauce Andes	710	710	779	706	535	509	516	682	721	727	758	792
	Sauzal 50	50.835	46.887	39.922	20.189	29.417	47.500	35.688	48.946	52.640	52.962	53.361	55.249
	Sauzal 60	-	-	-	-	150	-	-	-	-	-	-	-
	Sauzalito	8.572	7.680	7.191	4.299	5.781	6.833	7.104	8.127	8.360	8.504	8.384	8.777
	Volcán	9.776	8.921	9.747	8.673	8.103	8.416	8.671	8.774	8.951	9.791	9.599	9.680
térmica	Antihue 25	-	-	-	-	-	-	-	-	-	-	-	-
	Antihue 50	-	-	-	-	-	-	-	-	-	-	-	-
	Arauco	1.067	3.983	4.263	2.638	1.887	542	366	400	525	108	209	106
	Bocamina TG	-	-	-	-	-	-	-	-	-	-	-	-
	Bocamina TV	67.720	83.211	92.731	90.259	89.780	-	-	-	-	-	-	-
	CMPC Puente Alto	-	-	-	-	-	-	-	-	-	-	-	-
	Constitución Arauco	7.229	6.904	6.792	6.772	7.700	6.027	5.716	4.674	4.922	5.791	5.375	5.941
	Constitución Gener	4.773	4.833	5.511	4.422	4.580	4.461	4.893	4.704	4.601	4.897	4.571	3.614
	Diego de Almagro	116	36	137	-	-	5	-	-	-	67	-	-
	Guacolda 1	111.211	101.129	110.827	108.261	110.832	97.702	83.421	68.948	71.676	85.160	75.842	84.439
	Guacolda 2	109.488	99.406	110.895	108.294	111.127	94.998	93.770	69.272	67.847	89.434	53.561	102.665
	Huasco TG	224	-	17.918	30.415	7.666	3	1	-	-	36	-	-
	Huasco TV	-	-	2.003	7.648	1.485	-	-	-	-	-	-	-
	Laguna Verde	-	2.083	22.142	29.393	26.663	-	-	-	-	-	-	-
	Laja	3.005	3.406	3.850	3.329	3.400	2.802	2.693	2.822	3.286	3.239	3.368	3.361
	Nehuenco 1 gas	160.449	116.110	195.330	222.029	205.577	594	23.167	-	18.153	-	2.946	1.291
	Nehuenco 9B gas	3.515	5.133	13.290	59.829	14.340	1.107	1.259	619	604	141	1.610	1.680
	Nueva Renca gas	126.777	193.061	190.703	176.804	200.278	138.160	119.135	126.320	58.623	150.634	161.376	214.651
	Petropower	40.079	42.604	43.882	33.393	45.530	-	1.735	25.822	38.795	31.717	40.303	22.093
	Renca	-	-	22.483	1.562	-	-	-	-	-	-	-	-
	San Antonio	-	-	-	-	-	-	-	-	-	-	-	-
	San Francisco de M	-	-	2.089	14.685	2.071	-	-	-	-	-	-	23
	San Isidro gas	252.904	180.228	182.435	144.276	80.678	169.288	74.438	38.855	37.668	11.713	-	41.915
	Taltal I	81.353	75.497	65.690	66.810	71.726	5.366	31.419	50.085	61.337	41.791	15.930	6.418
	Taltal II gas	62	686	35.987	59.095	69.444	66.868	40.679	7.046	5.628	13.970	50.238	50.665
	Ventanas 1	-	43.893	72.878	80.211	84.010	11.497	10.216	-	-	-	21.354	-
	Ventanas 2	132.615	141.975	146.280	154.870	158.182	42.075	53.850	5.500	-	-	-	5.515
	Cholguán	7.972	7.503	8.972	4.704	8.724	7.890	6.058	5.004	5.501	6.122	5.400	5.350
	Licantén	2.517	2.343	2.459	2.222	1.722	1.672	1.456	1.510	1.603	1.790	1.364	994
	Antihue TG	2.170	5.345	10.485	21.944	6.371	-	-	-	-	-	-	139
	Coronel TG	-	-	1.362	16.137	10.568	15.346	13.030	1.861	440	1.064	1.041	216
	Horcones TG gas	120	1.000	-	41	740	50	103	-	-	-	-	13
	Laguna Verde TG	9	53	5.423	10.606	1.088	-	4	-	-	-	-	14
	Nueva Aldea I (ex It	4.468	1.963	4.971	8.334	9.590	9.475	8.020	5.006	6.129	6.020	1.801	7.260
	Pedro de Valdivia	17.866	2.500	29.444	29.712	23.232	5.654	-	4.572	9.701	4.863	12.788	17.220
	Ancud	-	-	-	1.130	374	-	-	-	-	-	-	-
	Candelaria 1 gas	-	-	-	4.573	1.150	1.128	-	-	-	278	-	-
	Candelaria 2 gas	-	-	-	10.590	7.012	570	-	-	-	267	-	-
	Cañete	-	-	-	717	-	-	-	-	-	-	-	-
	Colipulli	-	-	-	424	-	-	-	-	-	-	-	-
	Coronel TG diesel	-	-	-	-	8.042	-	-	-	-	-	-	-
	Curacautín	-	-	-	530	-	-	-	-	-	-	-	-
	Curanilahue	-	-	-	563	-	-	-	-	-	-	-	-
	Lebu	-	-	-	592	-	-	-	-	-	-	-	-
	Los Sauces	-	-	-	514	-	-	-	-	-	-	-	-
	Nehuenco 1 diesel	-	-	3.403	-	-	-	-	-	-	-	-	-
	Nehuenco 9B diesel	-	-	-	-	-	-	-	-	-	-	-	-
	Quellón	-	-	-	1.256	445	-	-	-	-	-	-	-
	Traiguén	-	-	-	404	-	-	-	-	-	-	-	-
	Victoria	-	-	-	376	-	-	-	-	-	-	-	-
	Nehuenco 2 gas	183.734	125.789	189.949	217.919	247.073	204.375	135.446	199.127	161.568	246.813	232.090	239.920

Source: CDEC-SIC

year	2006													
Suma de sum gener		month												
type	name	1	2	3	4	5	6	7	8	9	10	11	12	
embalse	Canutillar	76.867	89.752	120.546	113.656	119.244	94.832	82.644	105.245	84.795	73.020	74.490	89.053	
	Cipreses	50.226	45.478	50.162	69.869	71.032	29.953	24.492	51.954	53.356	51.484	68.077	73.400	
	Colbún	332.268	136.479	217.294	240.574	280.690	274.607	280.845	335.179	324.947	338.770	340.120	350.293	
	El Toro	69.897	173.299	285.907	218.495	299.062	66.134	1.816	12.441	2.415	1.826	8.780	53.164	
	Machicura	65.570	27.300	45.880	53.646	66.889	63.789	58.631	69.394	66.564	68.655	67.785	70.932	
	Pangue	120.643	70.912	110.512	142.228	117.712	267.842	312.881	295.341	299.946	295.513	260.269	149.974	
	Pehuenche	346.921	209.146	144.849	169.841	202.092	335.812	345.690	314.767	314.053	376.681	394.221	394.396	
	Rapel	151.939	96.787	51.594	50.500	50.483	139.226	187.997	192.634	114.519	123.208	109.457	110.650	
	Ralco	185.426	100.416	178.208	210.418	160.730	360.543	496.587	489.216	479.895	496.821	447.906	249.436	
	pasada	Chacabucoito	17.090	12.991	17.900	14.598	11.314	10.190	12.916	14.471	15.147	17.279	16.423	17.392
Abanico		33.180	30.943	32.437	29.363	28.618	32.602	32.752	34.151	34.544	36.285	35.859	37.303	
Aconcagua		62.484	56.562	53.805	31.006	21.677	17.618	22.610	22.215	26.750	49.458	54.305	62.763	
Alfalfal		127.159	118.112	118.871	89.415	70.507	55.323	50.134	46.349	49.087	73.014	106.562	129.405	
Antuco		111.138	118.272	153.484	132.510	171.413	185.338	164.898	145.721	137.798	142.583	122.838	120.931	
Capullo		6.464	3.368	5.848	5.533	6.689	8.160	8.283	8.053	7.440	8.462	7.214	5.671	
Curililnque		64.775	51.956	55.347	62.589	65.198	54.626	56.170	57.560	72	-	29.422	61.818	
Florida		19.803	17.644	19.759	17.809	5.504	11.911	14.000	17.523	15.344	18.954	19.045	19.782	
Isia		50.665	44.160	40.088	47.684	49.077	37.534	43.887	44.941	44.428	48.677	48.985	50.242	
Loma Alta		27.985	22.228	23.035	27.046	28.022	22.782	23.497	24.451	24.051	15.247	11.856	27.055	
Los Molles		9.942	7.071	6.240	5.052	4.638	4.155	4.491	4.629	4.728	5.100	5.023	4.878	
Los Morros		2.004	1.812	1.975	1.587	1.753	1.566	1.636	1.428	1.618	1.872	1.891	1.983	
Los Quilos		28.654	25.810	28.521	24.046	18.985	16.364	22.562	24.235	24.860	27.670	26.495	28.262	
Maitenes		12.202	10.469	10.814	10.351	10.820	10.558	10.987	11.328	11.306	11.838	11.970	12.388	
Mampil		12.404	7.664	2.350	6.040	9.264	29.696	29.425	25.297	22.846	21.767	16.871	17.076	
Peuchén		20.081	12.274	3.084	9.516	14.365	42.377	43.717	35.266	33.133	34.477	28.546	27.762	
Pillmaiquén		25.379	11.626	14.283	17.030	21.950	26.114	26.537	27.776	25.544	27.084	26.810	22.498	
Pullinque		21.020	13.273	12.600	13.194	15.241	31.140	36.224	36.942	31.322	25.376	21.933	17.520	
Puntilla		10.089	9.415	10.272	10.098	10.430	9.148	9.340	7.454	10.277	11.406	12.186	12.205	
Queltehues		32.596	29.431	32.827	31.692	32.731	30.908	30.477	25.495	26.606	32.577	31.217	32.225	
Rucue		57.385	59.081	80.162	77.842	115.706	120.889	115.812	116.999	107.563	69.366	65.001	75.436	
San Ignacio		25.347	7.081	19.664	24.148	26.217	25.477	23.933	26.767	25.881	26.748	25.733	26.700	
Sauce Andes		774	698	692	697	701	691	706	730	720	741	720	744	
Sauzal 50		53.778	47.381	51.693	37.888	28.710	38.888	35.390	46.186	45.232	53.214	53.531	54.516	
Sauzal 60		-	-	-	-	-	-	-	-	-	-	-	-	
Sauzalito		8.577	7.776	8.271	7.058	5.487	5.822	7.071	8.030	7.711	8.468	8.350	8.537	
Volcán		9.891	8.826	9.896	9.385	9.778	9.337	9.258	9.081	9.092	9.858	9.500	9.729	
térmica		Arauco	275	4.009	3.674	1.656	225	565	591	458	543	216	248	402
		Bocamina TV	12.217	82.756	93.051	89.756	93.330	23.864	1.208	40.091	53.978	39.919	43.872	87.126
		Constitución Arauco	7.476	7.035	8.048	5.581	6.117	5.661	4.020	3.860	3.346	4.662	2.553	1.502
		Constitución Gener	4.840	4.201	4.161	4.459	4.336	4.439	4.061	4.278	3.816	4.579	4.093	3.274
		Diego de Almagro	119	-	-	5.553	5.613	11.628	6.194	9.304	-	-	-	1.735
		Guacolda 1	103.665	100.757	111.068	108.005	111.379	103.984	92.558	109.625	91.380	76.813	99.467	108.218
		Guacolda 2	103.539	101.595	111.672	109.326	112.256	104.226	102.626	110.682	96.358	98.510	96.944	107.873
		Huasco TG	11	1	-	3.842	4.100	7.899	4.670	6.158	42	18	2.175	3.514
		Huasco TV	-	-	-	-	-	-	-	-	-	-	-	-
	Laguna Verde	-	-	-	-	22.415	8.052	-	-	-	-	866	589	
	Laja	3.162	3.724	4.075	3.628	4.033	3.420	2.808	2.352	2.473	2.496	1.387	3.334	
	Nehuenco 1 gas	201.546	159.433	149.734	14.337	112.763	11.950	4.600	9.238	28.934	119.006	53.499	6.195	
	Nehuenco 9B gas	1.665	-	-	122	712	3.345	4.022	1.915	891	2.843	8.101	4.378	
	Nueva Renca gas	209.866	209.017	234.986	202.694	102.050	59.981	88.031	78.252	11.216	-	80.334	177.572	
	Petropower	44.912	40.207	43.568	31.319	40.985	42.266	41.824	42.465	40.908	42.226	30.785	43.062	
	Renca	-	-	-	-	-	-	-	-	-	-	-	-	
	San Francisco de M	-	-	-	26	20	-	-	36	-	21	-	-	
	San Isidro gas	158.254	104.553	92.426	153.343	34.147	4.515	51.371	13.263	73.409	-	55.265	73.474	
	Taital I	57.562	73.173	41.553	23.958	30.696	5.346	23.850	22.300	47.828	24.960	-	2.914	
	Taital II gas	23.359	75	46.688	5.738	8.479	1.930	386	3.252	-	34.700	49.004	47.870	
	Ventanas 1	7.719	71.409	74.075	80.569	81.054	63.329	15.320	44.804	14.026	15.418	64.881	33.129	
	Ventanas 2	50.430	141.515	144.720	155.075	162.675	127.500	96.090	99.340	94.620	105.280	-	92.850	
	Cholguán	8.409	8.510	7.384	8.845	7.625	6.616	3.922	5.045	4.540	4.598	5.900	6.955	
	Licantén	998	2.085	1.063	1.071	1.501	1.495	1.453	1.578	1.203	1.403	1.456	1.485	
	Antilhue TG	2.766	5.910	1.126	3.079	1.802	13	982	367	-	324	896	200	
	Coronel TG	13.490	11.130	26.817	8.737	-	4.207	5.603	3.935	-	-	-	13.934	
	Horcones TG gas	8	203	1.768	569	1.735	80	1.663	299	-	-	-	11	
	Laguna Verde TG	58	-	-	-	-	41	4	193	-	16	-	8	
	Nueva Aldea I (ex I	10.126	9.562	11.541	11.157	10.998	7.874	5.223	8.332	8.208	9.509	8.937	9.843	
	Pedro de Valdivia	14.889	15.249	17.623	12.076	24.933	15.503	16.249	12.802	11.950	15.963	16.897	19.488	
	Ancud	-	-	-	-	-	-	-	-	6	91	152	6	
	Candelaria 1 gas	4.067	5.210	7.230	2.945	5.741	487	1.333	115	-	-	626	431	
	Candelaria 2 gas	4.323	6.272	13.336	1.634	3.435	1.129	1.431	917	93	197	3.606	993	
	Cañete	-	-	-	-	-	-	-	-	-	-	-	-	
	Collipulli	-	-	-	-	-	-	-	-	-	-	-	-	
	Coronel TG diesel	35	-	37	-	-	1.839	1.543	1.605	922	-	-	46	
	Curacautín	-	-	-	-	-	-	-	-	-	-	-	-	
	Curanilahue	-	-	-	-	-	-	-	-	-	-	-	-	
	Lebu	-	-	-	-	-	-	-	-	-	-	-	-	
	Los Sauces	-	-	-	-	-	-	-	-	-	-	-	-	
	Nehuenco 1 diesel	-	-	-	-	-	3.471	890	1.418	-	-	12.181	174	
	Nehuenco 9B diesel	-	-	-	-	-	323	-	634	-	-	2.114	348	
	Quellón	-	-	-	-	-	-	-	-	10	554	1.321	1.451	
	Traiguén	-	-	-	-	-	-	-	-	-	-	-	-	
	Victoria	-	-	-	-	-	-	-	-	-	-	-	-	
	Campanario diesel	-	-	-	-	-	-	-	-	-	-	-	4.552	
	Campanario gas	-	-	-	-	-	-	-	-	-	-	-	-	
Candelaria 1 diesel	-	-	-	-	-	-	-	535	-	-	1.182	179		
Candelaria 2 diesel	-	-	-	-	-	-	-	438	-	-	1.010	-		
Huasco TG IFO	-	-	-	-	-	138	29	367	13	2	39	36		
Los Vientos	-	-	-	-	-	-	-	-	-	-	2.382	1.094		
Nueva Aldea II	-	-	-	-	229	-	-	-	-	-	-	-		
Nueva Aldea III	-	-	-	-	-	-	-	1	2.210	4.223	2.564	1.784		
Nueva Renca diesel	-	-	-	-	-	11.378	1.285	14.452	-	-	2.365	-		
San Isidro diesel	-	-	-	-	3.415	-	-	-	-	-	5.760	7.178		
Taital II diesel	-	-	-	-	-	5.606	-	60	-	-	-	1.689		
Nehuenco 2 gas	49.717	218.822	200.552	231.614	248.054	192.940	209.346	97.948	152.118	188.652	119.430	216.839		

year		2007				
Suma de sum gener		month				
type	name	1	2	3	4	5
embalse	Canutilar	84.352	108.290	113.989	108.137	111.864
	Cipreses	72.830	66.232	72.897	65.094	66.974
	Colbún	294.793	179.652	248.335	242.936	181.617
	El Toro	266.981	292.229	323.303	312.198	331.977
	Machicura	59.536	37.285	54.636	57.653	47.241
	Pangue	107.080	129.799	135.806	48.248	43.038
	Pehueneche	301.986	196.286	164.328	150.477	148.167
	Rapel	93.401	43.802	52.258	41.353	28.369
	Ralco	173.237				
	Chacabuco	17.412	16.148	16.675	11.885	9.251
pasada	Abanico	36.767	29.935	32.706	31.533	29.301
	Aconcagua	65.168	53.171	48.963	22.754	16.060
	Alfalfal	125.231	111.434	114.620	72.705	58.368
	Antuco	171.173	161.703	167.792	159.288	166.260
	Capullo	5.362	3.258	3.544	4.394	3.936
	Cunillínque	67.338	60.144	67.187	63.529	65.006
	Florida	20.316	18.013	17.229	8.701	3.135
	Isla	51.294	44.366	49.649	47.422	48.785
	Loma Alta	29.646	26.470	29.617	27.968	28.132
	Los Molles	4.432	3.576	3.704	3.390	3.382
	Los Morros	1.932	1.717	1.592	1.172	1.403
	Los Quillos	28.535	25.862	26.938	19.376	15.359
	Maitenes	11.610	9.646	10.471	10.064	10.500
	Mampil	12.047	8.508	4.119	2.649	3.014
	Peuchén	19.155	10.221	4.718	4.767	4.287
	Pitmaiquén	22.615	12.495	12.893	12.182	14.210
	Pullínque	15.756	10.926	10.233	10.174	12.427
	Puntilla	12.767	11.916	13.474	13.628	13.435
	Queltehues	32.082	29.486	32.466	31.393	31.241
	Rucúe	109.111	96.573	100.834	103.145	115.075
	San Ignacio	23.207	13.940	23.016	24.295	22.023
	Sauce Andes	744	672	744	720	744
	Sauzal 50	53.599	46.984	48.168	25.963	17.165
	Sauzal 60	-	-	-	-	-
	Sauzalito	8.638	7.693	8.253	4.915	2.778
	Volcán	9.687	8.862	9.807	9.491	8.942
	Chiburgo	-	-	-	-	-
	Eyzaguirre	-	-	564	794	560
	Quilico	-	-	-	8.221	29.979
térmica	Arauco	1.137	2.531	1.616	2.736	1.009
	Bocamina TV	92.924	80.791	65.952	89.172	77.402
	Constitución Arauco	2.738	3.630	4.447	4.179	1.952
	Constitución Gener	4.685	4.769	5.344	4.728	5.199
	Diego de Almagro	555	356	160	2.061	6.229
	Guacolda 1	108.997	100.969	98.530	94.518	112.968
	Guacolda 2	107.423	99.213	108.687	106.395	110.033
	Huasco TG	1.168	144	11.129	18.516	9.821
	Huasco TV	-	-	-	-	-
	Laguna Verde	-	-	-	16.796	30.127
	Laja	4.705	4.182	4.636	4.359	4.522
	Nehuenco 1 gas	2.238	51.617	215.205	114.350	-
	Nehuenco 9B gas	3.271	-	4	7.204	2.135
	Nueva Renca gas	159.603	96.497	203.111	170.252	46.541
	Petropower	45.528	40.436	43.135	32.329	44.944
	Renca	-	-	-	-	1.083
	San Francisco de M	-	2	22	1.679	1.952
	San Isidro gas	79.925	62.887	172.132	167.734	20.415
	Taltal I	42.271	21.322	38.586	50.426	3.533
	Taltal II gas	16.916	10.874	10.198	6.400	7.034
	Ventanas 2	33.364	76.782	71.979	75.264	86.566
	Ventanas 2	139.965	134.615	132.870	146.980	148.785
	Cholguán	4.335	8.690	8.894	7.660	8.952
	Licantén	1.717	2.062	2.392	1.818	1.224
	Antihue TG	545	1.394	27.735	31.462	24.945
	Coronel TG	27.838	9.576	14.285	10.094	-
	Horcones TG gas	2.376	4.904	5.418	2.303	57
	Laguna Verde TG	-	-	1.512	4.999	6.237
	Nueva Aldea I (ex II	10.193	9.698	10.712	8.003	10.575
	Pedro de Valdivia	18.354	34.162	44.166	36.004	48.824
	Ancud	-	-	-	383	772
	Candelaria 1 gas	-	-	17.683	18.523	15.755
	Candelaria 2 gas	453	1.201	14.938	2.108	8.469
	Cañete	-	-	-	-	78
	Colipulli	-	-	-	-	144
	Coronel TG diesel	-	18	1.442	7.968	18.461
	Curacautín	-	-	-	-	122
	Curanilahue	-	-	-	-	-
	Lebu	-	-	-	-	79
	Los Sauces	-	-	-	-	78
	Nehuenco 1 diesel	33.940	102.529	26.183	80.674	229.838
	Nehuenco 9B diesel	-	-	1.729	10.596	1.808
	Quelión	784	177	65	688	1.237
	Traiguén	-	-	-	-	82
	Victoria	-	-	-	-	-
	Campanario diesel	2	1.685	9.741	21.580	29.151
	Campanario gas	-	-	-	-	-
	Candelaria 1 diesel	-	-	3.926	12.589	20.554
	Candelaria 2 diesel	-	-	2.647	11.945	14.460
	Huasco TG IFO	-	-	-	-	-
	Los Vientos	2.674	-	-	-	505
	Nueva Aldea II	-	-	-	-	-
	Nueva Aldea III	899	-	-	-	-
	Nueva Renca diesel	69	65.650	208	1.549	170.895
	San Isidro diesel	10.642	91.266	26.932	28.823	169.226
	Taltal II diesel	4.984	17.562	35.187	29.958	50.934
	Nehuenco 2 gas	206.094	30.700	-	77.321	90.322
	Casablanca 1	-	-	12	192	337
	Concón	-	-	-	322	1.189
	Constitución 1	-	-	-	-	-
	Constitución 2	-	-	-	-	-
	Curauma	-	2	169	476	-
	Degán	-	-	-	-	-
	Esperanza DS1	-	-	-	-	-
	Esperanza DS2	-	-	-	-	-
	Esperanza TG1	-	-	-	-	-
	FPC	-	-	-	940	4.530
	Horcones TG diesel	-	-	-	-	2.108
	Las Vegas	-	3	233	971	-
	Montepatria	-	-	-	-	-
	Nehuenco 2 diesel	-	485	42.478	124.272	-
	Punitaqui	-	-	-	-	-
	Rincón	-	-	-	116	100
	San Isidro 2	-	-	-	1.764	-
	San Isidro 2 diesel	-	9.578	40.404	29.086	-

Source: CDEC-SIC

Annex 2: CNE's Official report on SIC Installed Capacity



UNIDADES GENERADORAS SISTEMA INTERCONECTADO CENTRAL
Julio de 2007

NOMBRE CENTRAL	PROPIETARIO	AÑO PUESTA EN SERVICIO	TIPO DE TURBINA	Nº UNIDADES	POTENCIA TOTAL MW
Alfalfal	GENER S.A.	1991	Pasada	2	160,0
Maitenes	GENER S.A.	1923-89	Pasada	5	30,8
Queltehues	GENER S.A.	1928	Pasada	3	41,1
Volcán	GENER S.A.	1944	Pasada	1	13,0
Colbún	COLBUN S.A.	1985	Embalse	2	400,0
Machicura	COLBUN S.A.	1985	Embalse	2	90,0
San Ignacio	COLBUN S.A.	1996	Pasada	1	37,0
Rucúe	COLBUN S.A.	1998	Pasada	2	170,0
Los Molles	ENDESA	1952	Pasada	2	16,0
Rapel	ENDESA	1968	Embalse	5	350,0
Sauzal	ENDESA	1948	Pasada	3	76,8
Sauzalito	ENDESA	1959	Pasada	1	9,5
Cipreses	ENDESA	1955	Embalse	3	101,4
Isla	ENDESA	1963-64	Pasada	2	68,0
Antuco	ENDESA	1981	Embalse	2	300,0
El Toro	ENDESA	1973	Embalse	4	400,0
Abanico	ENDESA	1948-59	Pasada	6	136,0
Canutillar	ENDESA	1990	Embalse	2	145,0
Pangué	PANGUE S.A.	1996	Embalse	2	467,0
Pehuenche	PEHUENCHE S.A.	1991	Embalse	2	500,0
Curillínque	PEHUENCHE S.A.	1993	Pasada	1	85,0
Loma Alta	PEHUENCHE S.A.	1997	Pasada	1	38,0
Mampil	IBENER S.A.	2000	Pasada	2	49,0
Peuchén	IBENER S.A.	2000	Pasada	2	75,0
Pilmaiquén	PILMAIQUEN S.A.	1944-59	Pasada	5	39,0
Pullínque	PULLINQUE S.A.	1962	Pasada	3	48,6
Aconcagua	ACONCAGUA S.A.	1993-94	Pasada	2	72,9
Florida	ACONCAGUA S.A.	1943-89	Pasada	5	28,0
Los Quilos	H.G. VIEJA Y M. VALPO.	1909-93	Pasada	5	39,3
Chacabuco	OyD S.A.	2002	Pasada	4	25,0
Capullo	E.E. CAPULLO	1995	Pasada	1	10,7
S. Andes	GEN. S. ANDES	1909	Pasada	4	1,1
Carbomet	CARBOMET	1944-86	Pasada	4	10,9
Puntilla	E. E. Puntilla S.A.	1997	Pasada	1	14,7
Ralco	ENDESA	2004	Embalse	2	690,0
Eyzaguirre	S.C. DEL MAIPO	2007	Pasada	1	2,1
Quileco	COLBUN S.A.	2007	Pasada	1	35,4
Chiburgo	COLBUN S.A.	2007	Pasada	1	19,0
Autoprodutores	OTROS	-	Pasada	-	6,5
Arauco	ARAUCO GENERACION S.A.	1996	vapor-licor negro	5	33,0
Celco	ARAUCO GENERACION S.A.	1996	vapor-licor negro	2	20,0
Cholguán	ARAUCO GENERACION S.A.	2003	vapor-des. forest.	1	9,0
Valdivia	ARAUCO GENERACION S.A.	2004	vapor-des. forest.	1	61,0
Nehuenco	COLBUN S.A.	1998	ciclo-combinado gas natural	1 (dual)	370,0
Nehuenco 9B	COLBUN S.A.	2002	ciclo-abierto gas natural	1 (dual)	108,0
Nehuenco II	COLBUN S.A.	2003	ciclo-combinado gas natural	1 (dual)	390,4
Laja	E. VERDE S.A.	1995	vapor-des. forest.	1	8,7
Constitución	E. VERDE S.A.	1995	vapor-des. forest.	1	8,7
Huasco Vapor	ENDESA	1965	vapor-carbón	2	16,0
Bocamina	ENDESA	1970	vapor-carbón	1	125,0
Huasco TG	ENDESA	1977-79	gas-IFO 180	3	64,2
D. De Almagro	ENDESA	1981	gas-diesel	2	23,8
Taltal I	ENDESA	2000	ciclo-abierto gas natural	1	120,0
Taltal II	ENDESA	2000	ciclo-abierto gas natural	1 (dual)	120,0
Laguna Verde	GENER S.A.	1939-49	vapor-carbón	2	54,7
Renca	GENER S.A.	1962	gas-diesel	2	100,0
Ventanas	GENER S.A.	1964-77	vapor-carbón	2	338,0
Laguna Verde TG	GENER S.A.	1990	gas-diesel	1	18,8
San Francisco de Mostazal	GENER S.A.	2002	gas-diesel	1	25,0
Guacolda	GUACOLDA S.A.	1995-96	vapor-carbón	2	304,0
Petropower	PETROPOWER S.A.	1998	derivado del petróleo	1	75,0
Nueva Renca	S.E. SANTIAGO S.A.	1997	ciclo-combinado gas natural	1 (dual)	379,0
San Isidro	SAN ISIDRO S.A.	1998	ciclo-combinado gas natural	1 (dual)	370,0
Licantén	ARAUCO GENERACION S.A.	2004	vapor-des. forest.	1	5,5
Horcones	ARAUCO GENERACION S.A.	2004	ciclo-abierto gas natural	1 (dual)	24,3
Cenelca I	CENELCA	2005	gas-diesel	1	45,0
Cenelca II	CENELCA	2005	gas-diesel	1	50,9
Coronel	PSEG	2005	ciclo-abierto gas natural	1 (dual)	50,0
Candelaria	COLBUN S.A.	2005	ciclo-combinado gas natural	2 (dual)	274,2
Nueva Aldea I	ARAUCO GENERACION S.A.	2005	vapor-des. forest.	1	13,0
Nueva Aldea II	ARAUCO GENERACION S.A.	2005	gas-diesel	1	12,0
Ancud	PSEG	2006	gas-diesel	1	3,3
Quellón	PSEG	2006	gas-diesel	1	5,4
Nueva Aldea III	CENELCA	2006	vapor-licor negro	1	20,0
Los Vientos	GENER S.A.	2006	gas-diesel	1	120,8
Campanario	INNERGY S.A.	2006	ciclo-abierto gas natural	1 (dual)	120,0
San Isidro II	SAN ISIDRO S.A.	2007	ciclo-abierto gas natural	1 (dual)	240,0
Curaura	Tecnored	2007	gas-diesel	1	2,5
Casablanca	Tecnored	2007	gas-diesel	1	1,6
Las Vegas	Tecnored	2007	gas-diesel	1	2,3
ConCon	Tecnored	2007	gas-diesel	1	2,7
FPC	Forestal y Pap. Concepción	2007	vapor-des. forest.	1	12,0
Constitución 2	ElektraGen	2007	gas-diesel	2	15,0
Montepatria	ElektraGen	2007	gas-diesel	1	9,0
Punitaqui	ElektraGen	2007	gas-diesel	1	9,0
Esperanza	H.G. VIEJA Y M. VALPO.	2007	gas-diesel	1	19,0
Dogañ	Sociedad Generadora Austral	2007	gas-diesel	1	40,0

* Capacidad dual implica que las centrales a gas natural tienen la posibilidad de operar con diesel y viceversa (la potencia máxima puede verse reducida).

Source: CNE

Annex 3: Emission Factors of System Thermal Units

Promedio de avg_ef		year					
type	name	2002	2003	2004	2005	2006	2007
térmica	Antihue 25	728	728	728	728		
	Antihue 50	728	728	728	728		
	Arauco	1.079	1.079	1.079	1.079	1.079	1.079
	Bocamina TG	-	-	-	-		
	Bocamina TV	923	915	923	940	940	940
	Cabrero 120	-	-	-			
	Cabrero 50	-	-	-			
	Cabrero 90	-	-	-			
	CMPC Puente Alto	-	-	-	-		
	Constitución Arauco	1.079	1.079	1.079	1.079	1.079	1.079
	Constitución Gener	1.079	1.079	1.014	982	982	982
	Diego de Almagro	1.071	1.080	1.089	1.071	1.071	1.071
	Guacolda 1	858	871	891	952	952	952
	Guacolda 2	858	871	891	952	952	952
	Huasco Grupo Electro	-	-	-			
	Huasco TG	1.207	1.207	1.135	1.081	1.150	1.150
	Huasco TV	1.866	1.829	1.829	2.214	2.392	2.316
	Indio	839	839	839			
	Laguna Verde	2.194	2.155	2.165	2.136	2.136	2.136
	Laja	1.079	1.079	1.079	1.079	1.079	1.079
	Los Robles	-	-	-			
	Los Robles 21	-	-	-			
	Nehuenco 1 gas	367	380	404	405	432	429
	Nehuenco 9B gas	784	800	696	604	604	604
	Nueva Renca gas	390	398	410	402	425	422
	Petropower	879	879	879	879	879	879
	Rapel Grupo Electro	-	-	-			
	Renca	1.150	1.150	1.152	1.160	1.160	1.160
	San Antonio	-	-	-	-		
	San Francisco de Mostaza	839	839	934	982	982	982
	San Isidro gas	375	389	424	425	427	441
	Taltal I	598	610	651	644	650	659
	Taltal II gas	598	610	651	644	650	659
	Ventanas 1	1.071	1.052	1.057	1.043	1.043	1.043
	Ventanas 2	1.025	1.007	1.012	998	998	998
	Cholguán		1.079	1.079	1.079	1.079	1.079
	Licantén		1.079	1.079	1.079	1.079	1.079
	Antihue TG			747	747	736	731
	Coronel TG			604	597	588	597
	Horcones TG gas			944	929	863	916
	Laguna Verde TG			839	839	839	839
	Nueva Aldea I (ex Itata)			1.079	1.079	1.079	1.079
	Pedro de Valdivia			1.079	1.079	1.079	1.079
	Ancud				752	769	769
	Candelaria 1 gas				1.005	867	867
	Candelaria 2 gas				1.005	867	867
	Cañete				752	769	769
	Collipulli				749	747	747
	Coronel TG diesel				747	647	597
	Curacautín				752	769	769
	Curanilahue				752	769	769
	Lebu				752	769	769
	Los Sauces				752	769	769
	Nehuenco 1 diesel				512	512	512
	Nehuenco 9B diesel				888	888	888
	Quellón				749	747	747
	Traiguén				749	747	747
	Victoria				752	769	769
	Campanario diesel				886	886	886
	Campanario gas				886	886	886
	Candelaria 1 diesel				867	867	867
	Candelaria 2 diesel				867	867	867
	Huasco TG IFO					1.207	1.207
	Los Vientos					794	794
	Nueva Aldea II					604	604
	Nueva Aldea III					1.079	1.079
	Nueva Renca diesel					543	543
	San Isidro diesel					588	588
	Taltal II diesel					886	886
	Nehuenco 2 gas		465	422	521	397	394
	Casablanca 1						683
	Concón						690
	Constitución 1						-
	Constitución 2						-
	Curauma						-
	Degañ						-
	Esperanza DS1						-
	Esperanza DS2						-
	Esperanza TG1						-
	FPC						-
	Horcones TG diesel						512
	Las Vegas						696
	Montepatria						-
	Nehuenco 2 diesel						916
	Punitaqui						-
	Rincón						-
	San Isidro 2						635
	San Isidro 2 diesel						635

Source: Calculations based on IPCC and CNE node price reports

Annex 4: Monthly Project EF calculations

Operating margin EF calculations

name	id.unit	año	mes	Energy MWh	ER tCO2	OMEF tCO2/GWh		
Chacabuquito	105	2002	7	11.779	3.119	265		
			8	16.607	4.754	286		
			9	15.655	6.180	395		
			10	17.237	6.376	370		
			11	16.858	6.937	411		
		12	18.040	6.557	363			
		2003	1	17.921	9.231	515		
			2	16.457	4.992	303		
			3	17.378	7.470	430		
			4	14.590	12.610	864		
			5	11.858	6.907	582		
			6	12.210	7.147	585		
			7	12.067	2.636	218		
			8	10.963	2.514	229		
			9	12.006	5.452	454		
			10	17.368	2.708	156		
			11	18.627	11.767	632		
			12	19.221	9.443	491		
		2004	1	19.273	7.559	392		
			2	16.837	759	45		
			3	16.186	8.212	507		
			4	10.579	6.787	642		
			5	7.232	3.739	517		
			6	6.910	6.061	877		
			7	6.960	10.684	1.535		
			8	8.538	5.427	636		
			9	12.755	4.415	346		
			10	12.979	14.347	1.105		
			11	16.098	10.282	639		
			12	17.892	11.307	632		
		2005	1	17.458	9.840	564		
			2	14.255	6.315	443		
			3	13.882	9.861	710		
			4	8.927	8.488	951		
			5	8.050	5.306	659		
			6	12.327	9.738	790		
			7	12.845	8.695	677		
			8	13.690	8.184	598		
			9	16.657	10.830	650		
			10	18.222	11.737	644		
			11	17.774	13.418	755		
			12	17.812	11.240	631		
		2006	1	17.090	6.307	369		
			2	12.991	3.110	239		
			3	17.900	2.788	156		
			4	14.598	8.609	590		
			5	11.314	6.043	534		
			6	10.190	10.506	1.031		
			7	12.916	12.157	941		
			8	14.471	12.931	894		
			9	15.147	10.959	723		
			10	17.279	14.380	832		
			11	16.423	14.551	886		
			12	17.392	16.787	965		
		2007	1	17.412	14.925	857		
			2	16.148	10.397	644		
			3	16.675	12.406	744		
			4	11.985	10.481	874		
			5	9.251	8.034	868		
		Total Chacabuquito				850.161	495.398	583
		Total general				850.161	495.398	583

Build margin EF calculations

año	mes	Latest 20% Sys. Generation GWh	Latest 20% Sys. Emissions tCo2e	BM EF tCo2e/GWh
2002	7	560	177.364	317
	8	594	180.129	303
	9	544	185.667	341
	10	564	151.616	269
	11	563	163.152	290
	12	571	167.969	294
2003	1	645	257.220	399
	2	736	255.638	347
	3	615	234.769	382
	4	606	232.223	383
	5	621	271.694	437
	6	599	195.851	327
	7	764	248.673	326
	8	602	248.702	413
	9	630	257.806	409
	10	666	280.136	420
	11	566	220.986	391
	12	611	242.972	398
2004	1	658	318.808	485
	2	683	337.582	494
	3	800	411.439	514
	4	590	291.650	494
	5	654	315.897	483
	6	648	275.068	424
	7	700	283.600	405
	8	617	287.930	467
	9	619	151.730	245
	10	707	133.297	188
	11	622	133.994	216
	12	680	232.095	341
2005	1	667	298.321	447
	2	598	254.370	426
	3	691	315.627	457
	4	753	406.351	540
	5	671	343.552	512
	6	658	192.645	293
	7	650	92.010	141
	8	650	121.611	187
	9	657	107.130	163
	10	694	149.399	215
	11	659	111.106	169
	12	666	129.966	195
2006	1	814	325.421	400
	2	781	346.178	443
	3	846	359.092	424
	4	691	227.282	329
	5	722	283.416	393
	6	681	127.022	186
	7	741	116.017	156
	8	712	92.298	130
	9	657	86.011	131
	10	718	108.775	152
	11	673	133.895	199
	12	712	218.615	307
2007	1	718	285.977	398
	2	684	348.790	510
	3	753	455.503	605
	4	729	460.983	633
	5	932	628.498	674
Total general		39.612	14.271.520	360