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DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

CHILE

SUPPORT OF MARINE ENERGY PILOT PROJECTS IN SOUTHERN CHILE

(CH-G1002/CH-T1139)

TC DOCUMENT

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TC Document
Support of Marine Energy Pilot Projects in Southern Chile
(CH-G1002)(CH-T1139)

I. Basic Information for TC

▪ Country/Region:	Chile
▪ TC Name:	Support of Marine Energy Pilot Projects in Southern Chile
▪ TC Number:	CH-G1002 / CH-T1139
▪ Associated Loan/Guarantee Name:	N/A
▪ Associated Loan/Guarantee Number:	N/A
▪ Team Leader/Members:	Christoph Tagwerker (INE/CCS), Team Leader; Emiliano Detta (INE/CCS); Angelo Angel (INE/CCS); John McGlynn (INE/ENE); Paola Robles (CSC/CCH); Hilary Hoagland (VPS/ESG); Steven Collins (VPS/ESG); Ernesto Corzo (LEG/SGO); Francisco Lois (FMP/CCH); Raúl Lozano (FMP/CPR); Roberto Monteverde (CSC/CCH); and Milagros de Pomar (INE/CCS)
▪ Date of TC Abstract authorization:	May 21, 2013
▪ Beneficiary:	Chile
▪ Executing Agency and contact name	Inter-American Development Bank
▪ Donors providing funding	Sustainable Energy and Climate Change Multi-Donor Trust Fund (MSC) - (CH-G1002) Fund for the Sustainable Energy and Climate Change IDB Special Program (SCI) – (CH-T1139)
▪ IDB Funding Requested:	CH-G1002 - IDB (MSC) US$2,400,000 CH-T1139 - IDB (SCI) US$550,000
▪ Local counterpart funding:	Government of Chile US$13,400,000[1] Private Firm US$13,400,000[2] Total US$26,800,000
▪ Disbursement period:	36 months
▪ Required start date:	November, 2013
▪ Types of consultants:	Individual consultants and consulting firms
▪ Prepared by Unit:	INE/CCS
▪ Unit of Disbursement Responsibility:	Country Office Chile
▪ TC Included in Country Strategy: ▪ TC included in CPD:	Yes Yes
▪ GCI-9 Sector Priority:	Protect the environment, respond to climate change and promote renewable energy.

II. Objectives and Justification of the TC

2.1 The main objective of the proposed project is to promote the market entry of marine energy technologies in Chile in order to diversify the energy matrix and increase the competitiveness of the sustainable energy sector in the country.

[1] These funds are currently being requested for 2015 as part of the budget negotiations, and will come out of a renewable energy program, for which the Government of Chile approved US$85 million.

[2] Final private sector companies selected in two parallel international competitive bidding processes prepared by Ministry of Energy and implemented by the Investment Development Corporation will have to provide the remaining funding gap.

2.2 The specific objectives of this investment grant are: (i) support the deployment of two first-of-its-kind marine energy projects in Chile and Latin-America; (ii) introduction of Chilean companies to the marine energy supply chain; and (iii) development of local experience, knowledge and publicly available data in the marine energy sector.

2.3 Marine energy systems –wave energy and tidal current converters for electricity generation– are mostly at the pre-commercial stage of development. The leading wave and tidal current energy concepts have, in recent years, reached full scale demonstration stage, and in the next 1-2 years will reach a first farm deployment stage. These concepts still require research and pilot testing to be undertaken along the path to commercialization. A huge potential for cost reductions exists, which can be achieved as a result of experience and economies of scale as installed capacity increases. Tidal current is currently the more mature technology as its devices are approaching a convergence of design[3] and there are more developers at full-scale demonstration stage. Activities are mainly concentrated in Europe, the United States and Canada, with increasing activity in Asia and Brazil.

2.4 Chile has one of the largest endowments of marine energy in the world. This resource could represent a significant and world-class opportunity for the development of low carbon power. The potential for marine energy (wave and tidal current) in the country has been characterized in the range of 100-200 gigawatts (GW),[4] whereas installed capacity in Chile's four electricity systems (*Sistema Interconectado Central*, *Sistema Interconectado del Norte Grande*, *Magallanes* and *Aysen*) is around 17GW.[5] In theory, marine energy would be sufficient to supply Chile's current and future electricity needs many times over, and would even be sufficient to make the country a net zero carbon power exporter.

2.5 Chile also provides a strong regulatory and business environment; incentives for the establishment of new businesses, a stable and liquid local financial market, a suitable legal framework for start-ups and macro-economic stability that could be the foundation for future investments in this field. The Government of Chile (GoC), through the Investment Development Corporation (CORFO –*Corporación de Fomento a la Inversión*) and the Ministry of Energy (MINENE –*Ministerio de Energía*), wants to foster conditions for local and foreign companies, research entities and academia, to work jointly in order to generate knowledge and experience, help further develop the technology, adapt it to local conditions and reduce its costs.

2.6 This operation will contribute to the Ninth General Capital Increase (GCI-9) lending target of 25% for climate change investments, and directly support its strategic activities, namely: protect the environment, respond to climate change, promote renewable energy, and ensure food security. The project will also contribute to one of the objectives of the 2011-2014 IDB Country Strategy with Chile (GN-2661-4), which is to increase the generation capacity from non-conventional renewable energies by 2014.

[3] Most concepts are based on bottom mounted horizontal axis turbines.

[4] 2009, IDB, Preliminary site selection for marine energy projects in Chile.

[5] 2012, Comisión Nacional de Energía.

III. Description of Activities/Components and Budget

3.1 In order to achieve this program's goals, the GoC and the IDB have joined efforts to implement and plan several activities presented in the document "Government of Chile's activities to foster marine energy development" (Appendix I).

3.2 The Activities 1 and 10 described in Appendix I are supported by the IDB and the consulting firm Wave Energy Center (WavEC) as part of a technical cooperation (ATN/OC-13087-CH). In Activity 1, the IDB has provided inputs for the development of a green paper on marine energy. In activity 10, two parallel international competitive bidding processes will be prepared by the MINENE and implemented by CORFO. One for a full scale tidal current energy pilot project with a rated capacity of at least 1MW (tidal pilot) and one for a small scale wave energy pilot project (wave pilot). Two Capital Grants (CG) will be provided by the GoC: (i) up to US$10 million for the tidal pilot; and (ii) up to US$3.4 million for the wave pilot.[6] The CG are limited with up to 50% of the Capital Expenditures (CAPEX) for each of the pilot projects. The geographical project locations are open and will be defined by the winning bidder in their proposals. It is envisioned that Private Sector Companies (PSPC) will be the bidders. The IDB has been actively involved in the design of the bidding process and related bidding documents, and will also support the evaluation of proposals received. The major components of this proposed program are:

3.3 **Component 1: Two Investment Grants (IG) for tidal and wave pilot projects.** In addition to the MINENE CG, this component will provide US$1.8 million IG funding for the tidal pilot (at least 1MW) and US$600,000 for the wave pilot (small scale) selected in the above mentioned CORFO bidding processes. IG funds can be used by the PSPC for development, design and purchase of goods and works for the project as proposed in the bidding documents. The amount of IG funds to be used for tangible goods will depend on the PSPC proposals and will be defined in a legal agreement to be signed between IDB and the selected PSPC.

3.4 **Component 2: Knowledge Development**. This component will finance the following activities for the tidal current and wave energy projects: (i) support of the MINENE in technical evaluation of proposals received from PSPC during the bidding processes; (ii) design, construction supervision and commissioning for both pilots; (iii) creation of a virtual publicly available information portal (website), including a knowledge database which will be populated with information from the construction, commissioning and operation phases of each of the pilots deployed; (iv) realization of a marine energy resource assessment for the Chacao Straight, which is one of the coastal zones included in Activity 8 of the Appendix I; and (v) development of an Environmental and Social Management System (ESMS) for the pilot projects.

3.5 The expected outcome in connection with the project objectives is the number of private sector companies active in the marine energy sector with offices in Chile. The expected outputs are: (i) one offshore tidal current energy pilot project successfully implemented; (ii) one offshore wave energy pilot project successfully implemented; and (iii) a public marine energy portal in operation and with information uploaded. These outputs are described in Table 1.

[6] These funds are currently being requested by the MINENE for 2015 as part of the budget negotiations and will come out of a renewable energy program, for which the GoC approved US$85 millions.

Table 1. Indicative Results Matrix

Results Indicators	Unit	Baseline		Year 3	Comments
Indicator		**Value**	**Year**	**Planned**	
Result #1					
Private sector companies active in marine energy (with offices in Chile)	#	15	2013	5	Based on information from the MINENE; it is expected that the bidding process and pilot project implementation will incentivize involvement of existing companies in marine energy sector. This includes project developers, technology providers, supply chain and service consultants, etc.
Products	**Unit**	**Value**	**Year**	**Planned**	
Component 1: Investment Grant					
Number of offshore tidal current energy pilot projects successfully implemented	#	0	2013	1	This is a direct effect of the development of this operation that will be associated to the incentive allocation of the international competitive bidding process.
Number of offshore wave energy pilot projects successfully implemented	#	0	2013	1	This is a direct effect of the development of this operation that will be associated to the incentive allocation of the international competitive bidding process.
Component 2: Knowledge development					
Public marine energy info portal populated and operating	#	0	2013	1	The pilot project shall make public selected on-site information and develop a relationship with local academia for increasing activities in the field of marine energy resources and technologies.

3.6 The indicative budget for the components is detailed in Table 2.

Table 2. Indicative Budget (amounts in US$)

Activity/Component	Description	IDB/Fund		GoC	PSPC	Total Funding
		CH-G1002	**CH-T1139**			
C1: Investment Grant	Tidal current energy pilot projects.	1,800,000	0	10,000,000	10,000,000	21,800,000
	Wave energy pilot project.	600,000	0	3,400,000	3,400,000	7,400,000
C2: Knowledge development	Technical assistance to support pilot projects	0	450,000	0	0	450,000
Other Costs	Project management	0	60,000	0	0	60,000
	Miscellaneous	0	25,000	0	0	25,000
	Consultant Travel	0	15,000	0	0	15,000
Total		**2,400,000**	**550,000**	**13,400,000**	**13,400,000**	**29,750,000**

IV. Executing Agency and Execution Structure

4.1 This IG will be IDB executed, as requested by the MINENE.[7] The Bank's Country Office of Chile will have the Unit of Disbursement Responsibility (UDR) and will also be responsible for procurement and implementation of all consultancies under the rules and procedures of the Bank. For contracts with consulting firms; the Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank (GN-2350-9) will apply, for contracts with individual consultants, human resource standards (AM-650) will apply; and for the dissemination expenses and other services, corporate procurement policies will apply until the new Bank's policies in this area become effective. The Climate Change and Sustainability Division (INE/CCS) will have the technical responsibility, in close cooperation with the Energy Division (INE/ENE) of the Bank. All activities, including selection of consultants, project supervision, review and approval of final products will be coordinated with the MINENE.

4.2 For the Component 1, the MINENE, through CORFO, will launch two separate international competitive bidding processes in the 4th quarter of 2013. The first one for a tidal current energy pilot project providing a CG of US$10 million, and the other one for a wave energy pilot project providing a CG of US$3.4 million. The biddings processes will be based on eligibility requirements and evaluation criteria developed in cooperation with the IDB and the MINENE. A committee including several government agencies such as the MINENE, CORFO and the Renewable Energy Center (CER–*Centro de Energías Renovables*) and the IDB (through Component 2) will select the two pilot projects and related PSPC.

4.3 The IDB will facilitate the IG projects through two direct cash transfers to the selected PSPC, reimbursing the PSPC based on conditions, milestones and environmental and social requirements (see section VII) defined in a legal agreement to be signed between the IDB and each of the selected PSPC prior to the transfer. This legal agreement will, among other things, require the hiring of an auditing firm for which the terms of reference will have to be agreed upon by the IDB. The disbursement schedule will be defined with the PSPC according to the proposal received in the bidding process. The IG will be disbursed first in an early project development phase with a maximum of four disbursements followed by the MINENE's CG in a later phase.

4.4 For Component 2, activities (i), (ii), (iv) and (v), will be implemented by a specialized consulting firm which will work closely with the IDB, the MINENE and the PSPC. Activity (iii) will be implemented by an individual consultant, who will create, upload and maintain the information portal for the first year. This activity also entails the purchase of an internet domain.

4.5 All monitoring activities will be coordinated with the MINENE and the consultant responsible for the construction, supervision and monitoring of the implementation (Component 2, activity ii). The terms of reference for this consultant will include, among other tasks, periodic project on-site inspections and progress monitoring. Also, IDB personnel will perform periodic project site visits for reporting and monitoring purposes.

[7] See Letter of Request.

V. Major Issues

5.1 Knowledge sharing is critical for this project as these technologies are not commercial yet and little information is available about them in Chile. Therefore, one of the goals of the project is to generate a wealth of information and lessons learned to be shared with the public. PSPC might be reluctant to sharing sensitive information. The above mentioned legal agreement will require that all collected information is accessible to the MINENE and IDB, and should also define what kind of information will be published through the information portal.

5.2 Since there is little knowledge of the PSPC to be selected, there is uncertainty regarding their fiduciary conditions, skills, and their familiarity with multi-lateral cooperation. This risk will be mitigated through:

a. An external consultant (Component 2, activity i) responsible for: (i) the evaluation of received bids, to assure that financial strength and credit worthiness are significant considerations as per the selection criteria; and (ii) design, construction and commissioning supervision.

b. Requirement for the PSPC to present yearly financial statements and a final statement audited by an independent firm selected by the Bank.

c. A condition on the corresponding agreement that disbursements will only be made to reimburse the PSPC.

d. A condition on the corresponding agreement that property rights of all the tangible goods will stay with IDB until all conditions defined in the legal agreement are met satisfactorily.

5.3 Along the innovation chain, all technologies in the demonstration and pre-commercial development stage face lack of funding; the so called “Valley of Death” (end of technology push and early market pull). This IG funding, as well as the MINENE CG (usually venture capital or private equity), is crucial to bring down costs of new technologies and increase market expansion, but also faces a number of risks which are normal in technology development. Since this IG has been designed to cover part of this lack of funding, it is exposed to several risks described in the following section.

VI. Project Risks

6.1 These risks relate to the project itself and includes:

a. Administrative risk: experience about the technologies involved is almost non-existent in Chile, and there is a regulatory gap for marine energy in the country which affects the process of obtaining permits.

b. Technological risk: it is not unusual that a new technology at the development stage faces the risk of failing at a certain point during its operation. The marine energy industry is very diverse and includes important players from the technology sector, as well as many small companies. Long track records of the technologies currently do not exist.

c. Financial risk: the range of cost is still wide and public information is rare. The amount of this IG might, therefore, not be sufficient to achieve the expected results, and might need to be increased in the near future through additional donor funding.

d. Environmental and social: there are environmental impacts related to deployment of the machines and electrical infrastructure on the seabed. Also, a potential conflict of coastal zone use with other productive areas might arise.

6.2 The risks mentioned above will be mitigated by being included in the evaluation criteria of the bidding documents. The project with less risk will be better rated. Component 2 (design and construction supervision) will also help to mitigate related risks.

6.3 **Delays in construction**. The devices for the pilot projects will be either floating or installed on the seabed and deployed by specialized vessels which usually have limited availability and are costly to contract. Furthermore, deployment can only happen at certain time windows with favorable weather conditions on open sea. As a consequence, coordination of vessel availability and related costs, marine logistics and weather time windows might be challenging and cause delays in the deployment of the pilot projects on sea.

6.4 **Governance.** Change of priorities of the newly elected administration is another potential risk. However, the IDB is currently working with the GoC to release the bidding call before the new GoC is elected and these funds are therefore allocated internally.

VII. Exceptions to Bank Policy

7.1 Exceptions to the Bank's policy are not applicable for this project.

VIII. Environmental and Social Strategy

8.1 The pilot projects will likely generate moderate temporary and local impacts during construction and additional long-term moderate impacts during their operation. Although the impacts have not yet been fully defined, the exclusionary conditions have been established to ensure that there are no long-term significant impacts. Based on those assumptions, the team has classified this project as "B" under Policy OP-703 (Safeguard Screening Form -CH-G1002 and CH-T1139, and Safeguard Policy Filter Report -CH-G1002 and CH-T1139).

8.2 Details of the environmental and social aspects of this operation are included in the Environmental and Social Management Report. A summary is presented below.

8.3 The construction and operation of the pilot projects could have impacts on the areas habitats, which include sensitive species on Chiloe Island and offshore, such as blue whales, sea lions and sea otters. It is anticipated that the equipment will be located far enough from these areas to prevent significant impacts. However, until an environmental impact assessment is completed, the full nature and extent of the impacts cannot be determined. Other potential impacts include conflicts with tourist activities and marine traffic, especially ferries and fishing vessels, as well as with aquaculture. These activities are especially important for the indigenous communities in this area. Similar impacts are likely for the wave energy pilot project. To determine the site selection process in order to prevent significant environmental and social impacts and risks, the Bank has established a set of exclusionary criteria requiring that the pilot projects avoid sensitive habitats, special fishing areas, shipping lanes, breeding or nursery grounds for marine mammals, significant impacts to indigenous people or resettlement, and certain devices that cause linear impacts such as barrage structures.

8.4 For the reason stated in paragraph 8.3, the IDB will require that the PSPC completes an environmental impact assessment for the pilot projects, each including an alternative analysis and a detailed baseline and assessment on the selected sites. These assessments will be required to be consistent with the policies and procedures of the IDB. The TC has allocated resources for the services of a consultant to assist the IDB with the management and supervision of the environmental and social aspects of the project.

IX. Required Annexes:

9.1 **Annex I**: Procurement Plan

X. Required Electronic Links

10.1 Letter of Request from the GoC

10.2 Terms of Reference for Activities/Components to be Procured

XI. Optional Electronic Links

11.1 **Appendix I**: Government of Chile's Activities to foster Marine Energy Development

PROCUREMENT PLAN FOR NON-REIMBURSABLE TECHNICAL COOPERATIONS

Country: Chile | **Executing agency: Inter-American Development Bank** | **Public or private sector:** Public sector

Project number: CH-T1139/CH-G1002 | **Title of Project: Support to marine energy pilot projects in southern Chile**

Period covered by the plan: July 2013 - July 2016

Threshold for ex post review of procurements: **Goods and services (in US$):** | **Consulting services(in US$):440,000**

Item No.	Ref. AWP	Description (1)	Estimated contract cost (US$)	Procurement Method (2)	procurement (ex-ante or ex-post) (3)	Source of financing and percentage		Estimated date of the procurement notice or start of the contract	Technical review by the PTL (4)	Comments
						IDB/MIF %	Local/other %			
1		**Component 1: Knowledge development**								
		Cash Transfer Tidal Pilot	1,800,000	N/A	N/A	100			Ex ante	A cash transfer will be provided to private sector companies. This is not an acquisition.
		Cash Transfer Wave Pilot	600,000	N/A	N/A	100			Ex ante	A cash transfer will be provided to private sector companies. This is not an acquisition.
		Component 2: Knowledge development								
2		**Consulting firm**								
		Technical evaluation of proposals received	40,000	SSS	Ex-ante	100		Sep-13	Ex ante	Wave Energy Center (WavEC) will be hired for this activity
		Desgin and construction supervision and commissioning	200,000	QCBS	Ex-ante	100		Jul-14	Ex ante	
		Marine energy resource assessment in the Chacao Channel	80,000	SSS	Ex-ante	100		May-14		A very limited number of firms exist with experience in this sector and in Chile
		Development of ESMS and other oversight of pilot projects	80,000	SSS	Ex-ante	100		Jul-14		A very limited number of firms exist with experience in this sector and in Chile
		Individual consultant								
		Knowledge database and info portal	40,000	IICQ	Ex-ante	100		Jan-15		
3		**Non consulting services**								
		Purchase of internet domain for knowledge database and info portal	10,000	PC	Ex-ante	100		Jan-15		
4		**Others**								
		Project Management	60,000	N/A	N/A	100				This is not an acquisition
		Miscellaneous	25,000	N/A	N/A	100				This is not an acquisition
		Consultant Travel	15,000	N/A	N/A	100				This is not an acquisition

Total	2,950,000	Prepared by: Christoph Tagwerker	Date: July 15th, 2013	

(1) Grouping together of similar procurement is recommended, such as computer hardware, publications, travel, etc. If there are a number of similar individual contracts to be executed at different times, they can be grouped together under a single heading, with an explanation in the comments column indicating the average individual amount and the period during which the contract would be executed. For example: an export promotion project that includes travel to participate in fairs would have an item called "airfare for fairs", an estimated total value od US$5,000, and an explanation in the Comments column: "This is for approximately four different airfares to participate in fairs in the region in years X and X1".

(2) **Goods and works:** CB: Competitive bidding; PC: Price comparison; DC: Direct contracting.

(2) **Consulting firms:** CQS: Selection Based on the Consultants' Qualifications; QCBS: Quality and cost-based selection; LCS: Least Cost Selection; FBS: Selection nder a Fixed Budget; SSS: Single Source Selection; QBS: Quality Based selection.

(2) **Individual consultants:** IICQ: International Individual Consultant Selection Based on Qualifications; SSS: Single Source Selection.

(3) **Ex ante/ex post review:** In general, depending on the institutional capacity and level of risk associated with the procurement, ex post review is the standard modality. Ex ante review can be specified for critical or complex process. **N/A : Non Aplicable, related to cash transfers or other non procurement cases.**

(4) **Technical review**: The PTL will use this column to define those procurement he/she considers "critical"or "complex"that require ex ante review of the terms of reference, technical specifications, reports, outputs, or other items.