July 9, 2012

Response of Government of Chile and MDB team to Germany and United Kingdom on the Investment Plan for Chile

Dear Zhihong

On behalf of the Government of Chile and the MDB team, I am sending you the responses to the questions by Germany and the UK on the Chile CTF Investment Plan. Please send to the CTF Trust-Fund Committee.

Best regards

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CTF Chile

Responses to comments from CTF donor countries to the Investment Plan

Prepared by the Government of Chile,
with the collaboration of the Inter-American Development Bank (IDB)
and the International Finance Corporation (IFC)

July 9th, 2012

We would like to thank the members of the CTF Trust-Fund Committee for their participation in the discussion about our Investment Plan (IP) during the meeting of May 3rd, and in particular the governments of Germany and the United Kingdom for their written comments and questions. Please find below our responses to these questions.

Germany's questions

Most of Germany's points are relevant suggestions for the preparation of the specific projects and programs under the umbrella of the IP. They will all be taken into account by the Government of Chile (GoC) and the MDBs.

We have identified in Germany's document, however, a few questions of a strategic nature regarding the Concentrated Solar Power Project. We will now address these concerns.

> ***"….. in the Chilean context a potential CSP plant with estimated generation costs of 15-23 $ct/kWh (depending on the expected IRR, financing costs etc.) would need to compete with energy generated from coal at cost of 6-7 $ct/kWh. The IP expects the planned CSP pilot project to be bankable as it will receive concessional financing from CTF resources as well as a grant***

from the GoC. However, additional concessional financing might be necessary to reduce the gap between the estimated CSP production cost and the actual generation cost from coal fired plants."

It is indeed necessary to reduce the price gap. However, we consider that the gap is not as large as suggested, as there are factors that either increase the price that potential off-takers would be willing to pay for renewable energy-based electricity (vis-à-vis fossil fuel-based electricity), or reduce the production costs. Some of these factors concern renewable energy technologies in general:

- First of all, as generators need to comply with current renewable portfolio standard requirements, they provide price signals to off-takers. In other words, these requirements reduce the relative prices of renewable electricity.
- Off-takers recognize the hedging value offered by long-term renewable energy PPAs (hedging against fossil fuels price increases, volatility and potential supply shortages).
- Some off-takers are willing to pay more for clean energy, due to corporate social responsibility considerations.

By virtue of these factors, there are already several renewable energy PPAs above USD100/MWh, and, according to preliminary expert assessments, we estimate that off-takers would be ready to pay between USD 130 and 150/MWh for a renewable electricity PPA with a high capacity factor (e.g. CSP with storage).

There are two additional factors that concern exclusively solar power:

- Given the high solar radiation in the North of Chile (approximately 3,300 kWh/m²/a), CSP levelized electricity generation costs are expected to be about 33-35% lower than in Spain.[1]
- The country's solid industrial infrastructure, and availability of inputs required for molten salts storage systems, can further reduce generation costs.

Despite these factors, we recognize that a gap remains, and that public support is needed to further close it. For the moment, we are counting on the following national and international sources of public support:

- the 14 million USD GoC grant (in addition, the GoC will offer as an option a 400 hectare property located in a strategic area with the highest radiation of the northern region, and with close access to the power grid);
- a CTF concessional loan, and
- loans from multilateral development banks.

Our assessment indicates that with these resources it is possible to close the financing gap for a CSP project.

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[1] See: IRENA; Renewable Energy Technologies: Cost Analysis Series, Vol. 1, issue 2, Concentrating Solar Power, http://bit.ly/IRENA_CSP, p. 31

Nevertheless, given the substantial economies of scale of CSP projects, any additional contribution would multiply the size and/or the capacity factor of this project. Therefore, the GoC and its partners are exploring the possibilities of getting additional concessional resources (grants or soft loans). In particular:

- the support of the UK's International Climate Fund (ICF) has been requested;
- KfW, on behalf of the German government, has shown interest in collaborating with the project;
- if this materializes, KfW and IDB are considering to apply for a grant from the European Union's Latin-American Investment Facility (LAIF), and
- the IDB is considering using concessional resources from the Canadian Climate Fund for the Private Sector in the Americas.

Furthermore, we would like to understand better, how additional CSP projects could reach economic viability without significant concessional financing sources (e.g. a carbon tax could lead to a higher competitiveness of CSP projects).

We expect CSP projects to reach financial viability in the medium term. According to Bloomberg New Energy Finance (see figure 15 in the IP), this could happen by 2020.

In addition to the above-listed factors that increase the willingness-to-pay or reduce production costs, we expect the following factors to play a key role in accelerating the grid parity of CSP during the coming years:

- Although CSP is a mature technology, its commercial ramp-up started only a few years ago. Therefore, there is a substantial potential for breakthrough technology innovations and incremental improvements. Some of the leading CSP technology companies expect energy cost reduction of around 50% in the following years, considering the different CSP projects currently under construction in several countries (i.e. USA, Spain, India, South Africa, Morocco, Saudi Arabia, etc.).
- In Chile, the CSP project to be financed by CTF resources will help remove risk-return imbalances and cost barriers; moreover, it will serve as a valuable benchmark for the financing and technology assessment of future CSP projects;
- This project will be the "cornerstone" of the CSP industry in Chile. It will foster the development of the manufacturing capacity of CSP components in Chile, thereby contributing to reduce the procurement cost of components.
- Finally, moving from medium to large scale projects will allow CSP companies to achieve economies of scale in the procurement, construction and operation and maintenance phases. These large scale projects may deliver the electricity either to several consumers or to the grid.

Despite these factors, the GoC is aware that further public support will be needed to provide additional competitiveness to the CSP technology. Policies under study by the GoC include (i) an increase in non-conventional renewable portfolio standards for generators, and (ii) a CO_2 tax scheme for polluting companies.

Furthermore we would like to understand better, how the lessons learnt from this pilot project "CSP" will be systematically collected and disseminated. (Knowledge creation and management)

We agree that knowledge creation and management systems need to be in place in order for the first CSP project to have a significant multiplicative effect in the market.

The GoC is playing an active role in this. It is facilitating the drafting of bankable PPAs agreements for CSP projects between market stakeholders. At the beginning of this year, representatives of the Ministry of Energy and of the mining companies traveled together to Spain to have a first-hand experience with CSP projects. Finally, the GoC plans to include within the terms of reference for the tendering process an obligation for the developer to make some key data publicly available, thereby ensuring that knowledge creation will be spread across the market.

The CSP project proposal will define the mechanisms for ensuring data collection and dissemination to Chilean and international stakeholders.

Also, we would like to understand better whether the proposed timetable [for the CSP Project] with an anticipated disbursement for June 2013 is realistic.

The GoC and the MDBs are committed to work hand in hand in order to reach the project award in the shortest possible term. A realistic schedule for milestones, including disbursements, will be provided with the project proposal.

... We therefore recommend a close cooperation with KfW and GIZ.

There is a close collaboration between the GoC and German Cooperation organizations such as GIZ, KfW, BMU and BMZ. A mission of KfW visited Chile in June to discuss its work program. GIZ has an office in the Ministry of Energy and has been working with the GoC in the field of renewable energy and climate change. For instance, nowadays, GIZ and BMU have two projects: developing a strategy to expand grid-connected non-conventional renewable energy projects, and co-generation and energy efficiency in hospitals.

The CSP project is in direct alignment with German cooperation activities in Chile, and activities within IDB (KfW and GIZ). Continuing cooperation and synergistic planning will be of very high importance and it will be especially important to plan the RESSEE component (Component 3) in order to take advantage of the excellent work already performed such as the Initiative for Climate and Environmental Protection (IKLU).

We are in direct contact with several consultants with KfW and GIZ, and would like to particularly recognize the work of GIZ with the Energy Ministry on 9 solar radiation measurements in the past years; and a GIS system including radiation and land water availability. KfW has been included in our planning activities already - for instance in the IDB's ATACAMATEC solar market study - and we expect and hope that this collaboration will continue.

United Kingdom's questions

> ***Explain how [the Chile IP] meets all of the CTF investment criteria, in particular the emission savings and cost-effectiveness. We strongly encourage estimates of the GHG savings and cost-effectiveness to be provided in order to allow expected results from CTF Investment Plans to be aggregated.***

Demonstration potential. Please see section 5.2.2, page 23, of the IP.

Development impact. As stated throughout the IP, the main development impact of the different components of the IP is the reduction of the dependence on imported fossil fuels and the diversification of energy supply. The monitoring and evaluation framework (pages 33-35) establishes job creation as a further, relevant impact.

Implementation potential. Page 32 of the IP describes the capacity of the GoC. Given the private sector focus of the IP, it is also necessary to stress the robustness of the Chilean private sector (including financial institutions, project developers, utilities, large consumers, energy technology manufacturers, etc.).

Potential for long-term GHG emissions savings.

1. *CSP*

The expected GHG emission reductions are between 3.9 and 7.2 M Tons of CO_2e, and the cost-effectiveness of GHG mitigated per CTF dollar invested ranges between 9.2 and 17.3 USD per Ton CO_2e abated. The following values were assumed.

- Capacity factor: 40% to 75%
- Capacity: 50MW in the Northern grid (SING)
- SING emission factor: 0.738 Ton CO_2e/MWh
- Lifetime: 30 years
- CTF investment: 67 million USD

2. *PV large-scale*

The expected GHG emission reductions are between 2.9 and 4.9 M Tons of CO_2e, and the cost-effectiveness of GHG mitigated per CTF dollar invested ranges between 10.2 and 17.0 USD per Ton CO_2e abated. The following values were assumed:

- Capacity factor: 15% to 25%
- Capacity: 100 MW, including 50MW in the Northern grid (SING), and 50MW in the central grid (SIC).
- Emission factors: SIC: 0.379 Ton CO_2e/MWh; SING: 0.738 Ton CO_2e/MWh
- Lifetime: 40 years
- CTF investment: 50 million USD

3. *RESSEE*

The potential amount of GHG mitigated by the RESSEE program will be calculated in more detail with the preparation grant. In order to present a preliminary estimation, recent studies[2] were used to identify investments, potential energy savings, and GHG abatement potentials in different economic subsectors and technologies. The most cost-effective subsectors were selected, assuming that the program would cover approximately 50% of the market, and that 400 million USD would be invested (see Table 1).

According to this analysis,[3] the expected GHG emission reductions are 59.4 M Tons of CO_2e, and the cost-effectiveness of GHG mitigated per CTF dollar invested is 6.7 USD per Ton CO_2e abated.

Table 1. GHG abatement potential through energy efficiency and renewable energy self-supply technologies, in selected subsectors

Sector	Technologies			Investment	Emission reductions	Cost effecti-veness
	RE self-supply	Thermal EE	Electrical EE	USD M	M Ton CO_2e	USD/Ton
Agroindustry - fruits and vegetables	✓			7.7	1.0	7.8
Agroindustry - refrigeration		✓	✓	3.6	0.3	12.9
Agroindustry - pulp drying		✓		4.6	0.3	13.7
Chemical industries		✓		4.0	0.2	21.4
Copper mining			✓	40.2	5.7	7.1
Dairy products		✓	✓	32.3	1.1	30.2
Fisheries		✓		2.8	0.9	3.1
Meat products		✓	✓	7.9	0.4	17.8
Non-metallic mining		✓	✓	1.7	0.2	7.4
Other mining			✓	4.1	0.9	4.4
Pulp and paper	✓	✓	✓	201.3	31.1	6.5
Sugar industry	✓			29.9	3.9	7.7
Timber and furniture			✓	6.6	0.2	39.6
Tourism	✓			32.4	10.7	3.0
Wineries	✓	✓		20.9	2.6	8.2
Total				**400.0**	**59.4**	**6.7**

Provide information about the intention to seek carbon credits and how the proposals differ from relevant existing CDM projects in-country (if any).

Since the projects will be carried out by private companies (project developers or energy consumers), they would be free to seek additional resources from the CDM or other carbon markets. However, with the current prices of CERs or equivalent instruments, we do not foresee that the corresponding income would be significant.

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[2] Universidad Técnica Federico Santa María, 2010. *Usos finales y curva de oferta de conservación de la energía en el sector industrial y minero de Chile* (http://bit.ly/utfsm2010); and: Instituto de Asuntos Públicos, Universidad de Chile, 2009. *Caracterización preliminar del mercado de energías renovables en chile para aplicaciones industriales y comerciales no eléctricas (PRIEN).*

[3] Project lifetime was assumed as 15 years for energy efficiency technologies, and 25 years for renewable energy self-supply technologies. Renewable energy self-supply includes primarily biomass power generation using sustainably harvested biomass fuels.

Provide a set of clear developmental results, with indicators, baselines and targets, setting out the approach that will be taken to measure the results.

The results, indicators, baselines and targets are described on Table 4, pages 33 to 35 of the IP.