

July 11, 2013

**Response of IDB to Germany and United Kingdom on Approval by Mail: CTF  
Colombia Technological Transformation Program for Bogota's Integrated  
Public Transport System (IDB)**

Dear Zhihong

Please find enclosed our responses to the new British and German questions.

Many thanks

Claudio Alatorre

# **Responses to the Questions and Comments from the United Kingdom and Germany on the “CTF-IDB Technological Transformation Program for Bogota’s Integrated Public Transport System” Proposal (second round of questions)**

*Prepared by the Inter-American Development Bank (IDB)*

10 July 2013

We would like to thank the governments of the United Kingdom and Germany for the written questions and comments. Please find below our responses.

## **United Kingdom’s Questions**

*Q: Carbon Savings and cost effectiveness. We would like to thank IDB for their responses to our questions. We understand that the cost-effectiveness figure (i.e. investment cost per tonne) in the proposal takes into account the wider emissions reduction potential of the SITP. We are supportive of the overall SITP and think this looks strong. However the SITP appears to be in implementation already and in view of what the CTF is actually financing (i.e. specifically new hybrid / electric buses instead of new diesel buses), we remain concerned that the actual cost-effectiveness of this project does not meet the CTF investment criteria of below \$200/t. Please could you calculate the specific cost-effectiveness of the CTF financed project component? Could you also clarify the counterfactual (or base case) used in this calculation (as from our reading of the proposal this appears to be purchasing new diesel buses)?*

A: The SITP was designed as a comprehensive program for the City of Bogotá and thus the GHG emission reduction indicators reflect the impact of the wider SITP program design. The program was presented and approved in the 2010 Colombia Investment Plan as a sustainable transport program for the City of Bogota with the potential to transform the sector through a series of city-wide investments, a set of regulatory measures, measures to scrap obsolete buses and instruments to set the stage for the deployment of new low-carbon technologies. Three years after the Investment Plan was approved (2013), the scope of the SITP still remains as a city wide effort, and this project is contributing towards this wider effort. The team considered therefore that the evaluation of the project’s costs and benefits (including GHG emissions reductions) must consider the full extent of the SITP in order to adequately capture the impact of the SITP at the city level. The IDB project appraisal was done conceptualizing the SITP as a city project, and considering all the SITP costs and benefits in the economic evaluation and the GHG emissions reduction estimation.

In this context, the counterfactual of the proposed project is Bogota’s Public Transport System before the SITP. This is a system which faces an excess of vehicles, an aging fleet and a lack of boarding infrastructure (see project document pars 1.3 – 1.6). The SITP will address these issues and this CTF financing program will be one source of financing for new vehicles in the context of a city-wide transport reform.

The GHG emissions reductions presented in the “Fit with CTF Investment Criteria” Annex show an investment-effectiveness ratio of US\$ 143.76/Ton. The estimation of the cost effectiveness indicator considers the costs of the project scenario (US\$ 1,100 million) minus the costs of the baseline scenario (US\$ 782 Million). Both cost scenarios were estimated in a 24 year horizon. This difference (US\$ 318 Million) is divided by the total GHG emissions reduction (US\$ 2.2 Million Tons). Thus, the cost-effectiveness indicator of the program is **143.76 US\$/Ton**.<sup>1</sup>

***Q: Transformational impact: Discuss the replication potential after the pilot is concluded***

This Program will support the SITP by financing a pilot fleet of clean technology buses. However, it will also enable to overcome initial knowledge barriers that currently prevent the incorporation of these vehicles in the SITP. Interviews with management staff in bus companies showed that, although financial barriers exist, the lack of experience and knowledge about technologies are a significant concern. The CTF Program will generate operational experience in bus companies that will strengthen the case for a continued uptake of clean technologies in the transport sector. Some of the SITP bus companies are involved also in bus operations in other cities such as Santiago de Chile and Panama City, increasing the likelihood that the SITP experiences can permeate throughout the region.

Another element that this program could accomplish is to reduce financial barriers once the CTF Program concludes, by supporting the development of the bus and battery manufacturing industries. In the case of Colombian BRTs, for instance, a local assembling industry has been developed for diesel bused, and only the chassis and engines are imported. Thus part of the cost difference between conventional diesel buses and hybrid or electric buses has to do with the fact that the latter need to be fully imported. It is expected that the penetration of these alternative technologies will lead to the development of a local assembling industry, and thus to further cost reductions. In the case of the battery industry, it is also likely that once the CTF Program is concluded, the final prices of hybrid and electric buses will be lower, given the fast development of the technology and the increasing demand for battery-operated vehicles, not only in Colombia, but around the world. The combination of lower battery prices, developments in the local bus manufacturing industry and the overcoming of knowledge barriers in operators are indications that the program has a potential to be replicated in Bogota, other cities and the region, and thus have a key role in transforming the sector.

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<sup>1</sup> Regardless of this, we would like to invite the Trust-Fund Committee to revise the definition of cost effectiveness. The [CTF Investment Criteria for Public Sector Operations](#) mentions two different indicators: *CTF investment per ton of CO<sub>2</sub>-equivalent reduced*, and *marginal cost of reducing a ton of CO<sub>2</sub>-equivalent*. The document refers to the International Energy Agency's [Energy Technology Perspectives 2008](#) Report, which uses as well the *marginal cost* nomenclature, referring to the ratio of the economic net present value of the project to the emission reductions. According to our interpretation, the USD 200 per tonne threshold refers to the latter indicator. By using such indicator, i.e. by accounting for all the benefits hybrid buses will deliver during their lifetime (notably fuel savings), the project's cost effectiveness is actually a negative number, as the economic analysis shows. Even though we understand that USD 200 per tonne threshold is probably too high for CTF purposes if such a definition is adopted (in most, if not all, CTF projects, the value of this indicator would be negative), we still consider that this is the right indicator to measure cost-effectiveness.

## Germany's Questions

***Q: Potential for GHG emissions savings: The GHG estimate does not appear to be based on a methodologically correct representation of the effect of substituting conventional buses with electric ones; appears to be assuming the electric buses are powered by 100% emission free electricity instead of using the relevant grid factor; does not provide for a clear differentiation of emission savings achieved through the proposed project itself vs. wider replication and transport system design effects***

A: The methodology for the estimation of the GHG emissions is described in detail in Optional Document 5. It is the methodology recommended by the Intergovernmental Panel on Climate Change in 2006. This methodology is based on estimating the number of kilometers travelled by type of vehicle and fuel. The number of kilometers is then multiplied by the emission factors in grams of CO<sub>2</sub> per kilometer.

In the case of electric buses, you are right to point out that we mistakenly omitted the upstream emissions of electricity generation. If the grid factor is considered the impact to the overall GHG emissions reduction would not be significant, however, as the electricity generation in Colombia is relatively clean (during the last decade, an average of 78% of electricity generation has been based on hydropower). The average emission factor was recently estimated by the Ministry of Mines and Energy at 0.27 kg CO<sub>2</sub>/kWh. In the scenario of a 50% of the program resources invested in electric buses, there would be a total of 135 GWh consumed over the 24 year SITP concession period. These would represent total additional 36,501 Tons of CO<sub>2</sub> emissions, which is a small figure when compared to the 2.2 million tons of CO<sub>2</sub> estimated in savings for the SITP.<sup>2</sup>

The team considered relevant to show what the expected impacts are at the city level and also the impacts at the bus fleet level. Therefore, the indicators in Annex 2 (Results Matrix) are presented in two tiers:

The *impact indicators* in the IDB Results Matrix (Annex 2) show the baseline yearly GHG emissions (2013) at 528,773 Ton/year and the future GHG emissions (2017) at 470,662 Ton/year. These indicators measure the GHG-reduction impact of the implementing the SITP in Bogotá with the pilot clean technology bus fleet. Over a 24 year period (SITP concession period), the project leads to a GHG emissions reduction of 2.2 million Tons.

The *results indicators* in the IDB Results Matrix (Annex 2) show the baseline yearly GHG emissions (2013) at 15,157 Ton/year and future GHG emissions (2017) at 8,095 Ton/year. These indicators measure the impact of implementing only the pilot clean technology bus fleet in Bogotá, in the context of the SITP. Over a 24 year period (SITP concession period), the pilot fleet only will lead to a GHG emissions reduction of 151,800 Tons of CO<sub>2</sub>.

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<sup>2</sup> Similarly, we should consider the upstream emissions of diesel production, which are often disregarded in these calculations.

***Q: Cost-effectiveness.*** *The proposed amount of CTF funding appears very high for the relatively small amount of vehicles to be funded, leading to a relatively high specific mitigation cost if wider replication effects are not included. We would therefore appreciate if a more detailed itemized budget could be provided to address this concern.*

A: Please see our answer to the UK's similar question.

***Q: Demonstration Potential.*** *We deem it important to include information as to how/whether the project is integrated within ongoing World Bank support for the Bogota Metro; The significantly higher ROI of investment in conventional buses from the operators' perspective appears to be a major barrier to implementation and wider replication. Similarly, given the uncertain market size and potential and the proposed interest rate cap, the incentive of commercial banks to participate in the program is not clear. We would therefore appreciate to be provided with a more detailed account on the economic incentives for both bus operators and commercial banks to participate in the project; The proposal is lacking an estimate or target regarding the minimum number of commercial banks that would have to be involved in the initial and replication phases for the project to meet its objective.*

A: There is a close coordination between the SITP and the Bogotá Metro Project. Conceptually, the SITP is designed to integrate all modes of transportation in Bogotá (including future rail lines) from an operational, physical and fare collection standpoints. The Bogotá Metro Project is still on a design stage and will not likely be inaugurated before year 2017. This means that specific provisions have not been yet been designed to ensure full integration between bus and rail. However both projects lie under the same entity (Secretariat of Mobility) and most likely the design of the Metro Project will have to consider the SITP.

Regarding the incentives to participate in the program, the main incentive is financial. Bus companies will have access to a line of credit with concessional conditions below their market rate. This line of credit will be available exclusively for the purchase of hybrid or electric buses, which are cleaner but more expensive bus technologies. Based on the financial analysis performed by the IDB, the concessional conditions will provide competitive returns to the investments in hybrid buses, when compared with a diesel bus option. This is one of the main barriers, as indicated in the question, and this line of credit is designed specifically to overcome it.

Regarding the commercial banks, there is no “proposed interest rate cap”. As indicated in the project document (paragraph 2.4 item iii): (...) interest rates are to be freely negotiated between final beneficiaries and the LFIs, taking into account the risk profile of each borrower, the risks entailed by sub-loans, and the discount rate offered by Bancoldex. The incentive for the commercial bank will lie in taking advantage of a limited amount of concessional resources provided by Bancoldex and successfully negotiating the financial conditions of the loans to be granted to SITP bus companies.

Finally, there is not necessarily a minimum number of banks to meet the project objectives. As indicated throughout the document, the size of the clean technology bus fleet (282) is rather small compared to the size of the bus fleet to be incorporated in the SITP in Bogotá

(9,900). Consequently, the size of the CTF financing program is also small compared to the available credit offered for SITP financing. Four commercial banks are already the main source of financing for SITP concessionaires to invest in diesel buses. Given the small size of the clean technology bus fleet, compared to the overall SITP investment, the team considers that even only one commercial bank could be capable of lending the resources of the Program. CTF resources will, however, be available to all commercial banks as per Bancoldex eligibility criteria.

Regarding the replication phase of the project, the financial sector would be prepared to lend additional resources to SITP concessionaires to finance clean technology buses. Credit establishments in Colombia have healthy indicators that indicate so by owning total assets of about USD 202 billion, recording 15% net profits in 2012 and disbursing about 13.6 USD billion in the same year. Credit lines are already available to SITP concessionaires to finance SITP investments in diesel buses, therefore in a replication phase it would only require to increase lending availability based on the additional costs of clean technology buses. A full analysis of the financial sector in Colombia was prepared (Optional Document 10) and is available upon request.

*Q: Development Impact: It should be more clearly underlined that any significant development and in particular gender impact cannot be attributed to the proposed project itself and expected as immediate project outcome, but can only be attributed to uncertain system-wide and long term replication effects; The proposal does not provide sufficient information on how/whether stakeholder consultations with both bus operators/drivers and users were conducted;*

The team agrees that benefits such as affordability and gender will depend on the implementation of the SITP. In particular, affordability benefits will materialize if the proposed fare policy is fully implemented and sustained over time in order to ensure lower fares in comparison with the current ones (full-cost transfers). Similarly, the described gender benefits will materialize when the boarding infrastructure and systems are fully implemented. The team acknowledges that this is a complex project which requires important implementation efforts. Based on the appraisal, the team identified that the SITP has a broad support at the political and technical levels and is confident that the ongoing implementation will be completed, thus producing affordability and gender benefits.

Regarding consultations, the SITP has been presented to user groups, transport experts, bus companies, interest groups and other major stakeholders. The design of the system was presented in open forums, focus groups and neighborhood meetings (*Juntas de Acción Local*). Users' opinions have been incorporated in the system design and in key elements such as the SITP route definitions and the way-finding. Aspects related to the perception of public transport performance are gathered in public transport opinion surveys and household mobility surveys, which are carried out by the Secretariat of Mobility or Transmilenio S.A, both entities directly involved in the SITP design and implementation.

***Q: Implementation Potential:*** Very frequent changes in policies and key administration official indicate that the political framework in Bogota with regards to project implementation might be much less favorable than presented in the project. We would therefore appreciate if 1-2 alternative and more conservative scenarios could be examined to find out whether the project would still be beneficial under less favorable political and institutional circumstances (and more conservative assumptions for replication).

The team considers that the support for the implementation of the SITP is strong at the political and technical level. This is a project that was initially conceptualized in 2006, designed, consulted and structured between 2007 and 2009 and started to be implemented in 2010 with the awarding of the operation zones. Since then, bus companies have been preparing themselves for the deployment of new vehicles and the city has been preparing for the implementation of infrastructure and support systems. In 2012, the first SITP buses were incorporated and gradually more and more have been deployed in the city. By April 2013 about 11% of the bus fleet had been incorporated to the system and deployed to operation. There have been three different mayors involved between 2006 and 2013 and all have provided strong support to the SITP. The SITP has systematically been included in the Bogota Master Mobility Plan and is considered as a structural project for the improvement of mobility in the city. Contrary to the question, the team believes that the transport policy in Bogota that is pertinent to the SITP has remained highly supportive through the different administrations in Bogotá, regardless of the changes in administration officials.

The team considered pertinent to pursue a sensitivity analysis to assess the impact of potential risks as shown in Optional Document 5. The sensitivity analysis reviews the benefit/cost ratio of the Program in the case of increased costs due to different factors such as: i) Infrastructure cost overruns during construction, ii) Increase in the market price of buses; iii) Future variations in the cost of oil and changes in the pricing structure of the electricity company; iv) Increase in relevant operation costs such as maintenance, labor, repair parts, etc. The variables that were analyzed were selected due to their relevance in the cost structure. Results show that under all scenarios the benefit/cost ratio of the program stays above 1.0 and the project is still beneficial. The most sensitive variable to changes is fuel/electricity cost which would affect the viability of the program at increases greater than 15%, while changes in all other variables do not affect the viability even at 25% cost increases.

***Q: Monitoring:*** We would appreciate of more detailed account of how monitoring or project results will be ensured and by whom (i.e. Bancoldex or commercial banks)?

The Monitoring and Evaluation arrangements have been prepared as part of the operation design. The details of these arrangements are available as Optional Document 3. This document presents the definition of the indicators to be monitored, the frequency of measurements and the means of verification for each. The program will be monitored on the basis of biannual reports prepared by the executing agency (Bancoldex) and delivered to the IDB within 60 days after the end of each calendar six-month period. Reports will measure progress regarding program outputs, results, and also regarding the eligibility criteria for the program. Both the borrower and the IDB will conduct a mid-term evaluation either 24 months after the first disbursement or once 50% of the loan has been executed. This mid-term

evaluation will deal with progress achieved regarding objectives and results of the programs according to the Results Framework in order to identify the necessary corrective measures. Monitoring and evaluation arrangements also include an impact evaluation, which will replicate the methodology of an ex-post economic evaluation to verify that the development objectives of the program have been achieved on the basis of impact and outcome indicators.