June 27, 2012

Response from IBRD to Comments from the United Kingdom on Approval by mail: Vietnam Distribution Efficiency Project (IBRD)

Dear Zhihong,

Please find attached our responses to UK and German comments.

Regards,

Gevorg

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Thank you for your comments on the Vietnam Distribution Efficiency Project proposed for CTF cofinancing. The project has been developed based on the update for the CTF IBRD project under Vietnam's CTF National Investment Plan, presented to and endorsed in concept by the CTF Committee meeting held in June 2011 in Cape Town, South Africa.

The submitted PAD is a pre-appraisal stage document and responses to your comments will be reflected in the final document. We would like to inform that the Prime Minister has approved the project detailed outline, which allows proceeding to negotiation once appraisal is completed.

This document provides clarifications and further information in response to your comments.

> *1- The proposal does not make clear the case for using concessional CTF financing for this project. Can financing not be raised through the IBRD, local banks, large customers or the power companies themselves, given the obvious benefits? Have previous attempts been made to get private finance to fund similar projects? It would be useful if you could explain this a bit further as well as how will the risk of oversubsiding will be reduced.*

Response:

The power sector in Vietnam is facing financing challenges due to the large volume of infrastructure investments planned to supply demand growth in the next 10 years. Financing from the World Bank and other multilateral development banks (MDB) to the Power Corporations (PCs) is targeted and prioritized by the Government of Vietnam (GoV) and EVN to finance distribution system investments, mainly to rehabilitate and upgrade the networks. Although investment in smart grid Advanced Metering Infrastructure (AMI) technologies are considered important by the Government and the electricity regulator, they have been set aside for the future, as the PCs and the Government would like to see their potential benefits - reducing demand growth, the need for network upgrade investment, and thereby strengthening supply security – to be first demonstrated in Vietnam context.

The possibility of CTF financing provided the Bank with the opportunity to present to and agree with the GoV and PCs adding investment in smart grid AMI that would otherwise not have been undertaken in the absence of CTF. CTF co-financing offered this opportunity because (i) CTF financing entails concessional terms (financing at lower cost than IBRD) and the concessionality is passed through to PCs; and (ii) CTF cannot be used to finance traditional distribution investments, which currently are GoV's priority for IBRD lending. Accordingly, the opportunity to pilot a relatively small AMI project was discussed and agreed with the GoV (MONRE and MOIT) and the PCs, to demonstrate its quantified impact, costs and benefits. The proposed AMI IBRD CTF project in Vietnam CTF National Investment Plan was presented to CTF Committee in June 2011, and endorsed in concept. At the time, given the perceived uncertainties, only three PCs were willing to participate in the project, including HCM PC, which has been leading initiatives in demand response or control programs in Vietnam.

The pilot supported by Component B will be complemented by the Component C technical assistance for activities related to AMI and demand response programs and enhancing the pricing signals in tariffs.

In summary, in Vietnam, the benefits of AMI investments, data management and enabling programs have still to be demonstrated, and the proposed AMI CTF project is the pilot to address the credibility gap. Worldwide, some jurisdictions have chosen not to deploy smart meters due to the uncertainties over whether the benefits of their deployment will outweigh the costs. In particular, in countries like Vietnam, with relatively low labor costs, staff reduction savings is not the key objective or the justification of AMI deployment. Internationally, pilot programs and other detailed studies have been used to address this uncertainty and increase confidence in the benefits of deployment. Accordingly, the proposed project has been designed as a small pilot for AMI deployment, covering (i) key substations in the distribution network; and (ii) only around 1% of customers of participating PCs representing the largest consumers where it is expected to achieve the highest impact. (Initially, the PCs had considered a broader scope, all consuming above 500 kWh/month, but analysis during project preparation identified that the AMI project would be economically beneficial but financially not.) Leveraging CTF financing with the AusAID grant under Component C, through technical assistance for the supporting regulatory framework (enhancing the tariff structure, incentives for consumers and enabling compensation to PCs for

participation in demand response programs and load reductions etc.) and awareness campaigns, will contribute to address the credibility gap.

Given the current financing environment in Vietnam and priorities set by the GoV and PCs, the availability of alternative sources of funds for AMI investments is unlikely. The PCs have access to loans by commercial banks for their operation and traditional investments, but AMI investments would still be perceived too risky for commercial loans until benefits of smart grid AMI investments are demonstrated.

Investment and operating costs related to AMI investments included in the proposed project cover key points of PCs' distribution systems and the implementation of the Metering Control Centers (MCCs) have to be financed by PCs. In principle, large customers would not be willing to finance these costs before the demonstration of their benefits. Moreover, as established in Vietnam Electricity Law, costs of electricity metering equipment should be covered by the seller.

Regarding private sources, at this stage of development of the Vietnamese power sector, the GoV is pursing private investment in power generation capacity. Private participation in power distribution is within the GoV power sector reform program in the future, after the electricity tariff framework has been completed and the market moves to wholesale competition arrangements.

> *2- Where will funding for wider replication come from? Is more public funding anticipated? Are there any plans to lever in private sector investment given the considerable costs of scaling this up? How will it become sustainable?*

Response:

Once the expected results and impacts of the demonstration project are achieved, the PCs will prioritize and propose similar investments for scale up in future projects. The scope and results of the project will be disseminated to other development partners, as part of the Bank's donor coordination activities.

As the PCs can also access loans from commercial banks, the demonstration of results, costs and benefits from the proposed pilot under this project can be used to establish the viability of loans for AMI related investments.

> *3- Please can we have an explanation as to why the baselines and indicators set out in the Results Framework will be finalized during appraisal? Can the team also provide details of the methodologies that will be used to set them and measure them? The Results Framework does not track the impact on poor people nor is there any reference to how the poor will benefit from the project. Through which mechanism will the benefits be passed onto poor people? The indicators included also do not appear to tally closely with the CTF results framework and it would be useful to see the theory of change set out more clearly.*

Response:

Project Baseline and Indicators:

The result framework is an important part of the project preparation, and World Bank policies and guidelines establish that the result framework has to be agreed on during Negotiations. According to Bank policies and guidelines, results indicators have to be attributable to the project, measurable and how each indicator will be measured and calculated should be agreed on between the Bank and the Borrower/Recipient. We are attaching the current version of the results framework, with the caveat that some adjustments may still be agreed on by negotiations.

It has been agreed during the pre-appraisal mission that reliability and quality of service indicators will be measured in areas with subprojects. Project documents refer to the Vietnam Distribution Code, where the methodology and formula for the calculation of those indicators are defined. A short summary is provided below, and we can provide the full translated version of the Distribution Code.

a) System Average Interruption Duration Index (SAIDI) is defined as the total duration of interruption/outages (longer than 5 minutes) of Users (consumers and distribution connected generation) and Distributor and retailers who buy the electricity from a Distributor divided by the total number of Users and other Distributors and retailers who buy the electricity from that Distributor.

b) System Average Interruption Frequency Index (SAIFI) is defined as the total number of interruptions/outages for Users and Distributors and retailers who purchase electricity from a Distributor divided by the total number of Users, other Distributor and retailers who buy electricity from that Distributor.

c) Quality: allowed voltage variations are defined for normal operation, single fault or restoration operation.

d) Customer consumption is based on PCs billing / sales.

Benefits for the poor:

Overall, the proposed project aims to improve power distribution services by all PCs, covering the entire country and benefitting all customers, including the poor. For people in rural areas, Component A includes medium and low voltage system, subprojects aiming to rehabilitate the distribution system in the rural communes, and directly benefit the poor people in the communes. The improvements will support accelerating economic and social development, increasing productive uses of electricity, and improving quality of life and expanding access to better public services.

By upgrading and expanding the distribution system, the project will improve quality and reliability of power supply services (to be measured with proposed indicators), reduce electricity losses, and improve the performance and accessibility of electricity distribution services. Therefore, the overall project will contribute to enhancing the effectiveness of the GoV poverty reduction program, the reduction of the current gap in equality of access to services among regions.

The AMI investments target the key points in the distribution network, which will bring about both reliability improvements and loss reductions that will benefit all consumers in

project areas. The AMI investments will cover the customer segment with the largest consumption, to promote their demand reduction. This impact is expected to reduce the risk of shortages that lead to planned load curtailments.

Historically, load curtailments have been concentrated in rural areas where tariffs are lower, causing a significant negative impact for the poor. In 2010, when rolling load shedding was implemented during several months due mainly to droughts and delays in entry of new generation capacity, complaints from the rural areas included load curtailment for one or more days, while industrial customers continued to be fully supplied.

Indicators for CTF framework:

The project has two outcome level core indicators from the CTF Results Framework which are directly attributable to AMI investments, namely CO2 reduction, and reduction in kWh from the core list of indicators. The indicators will be monitored on an annual basis and will be used to judge about success of the project. In addition, there are a number of co-benefits (as indicated in the Annex 7) which will also be evaluated qualitatively or where possible quantitatively in the due course. Finally, the impact level indicators will need to be retrofitted and monitored at the IP level after the revised Results Framework is approved.

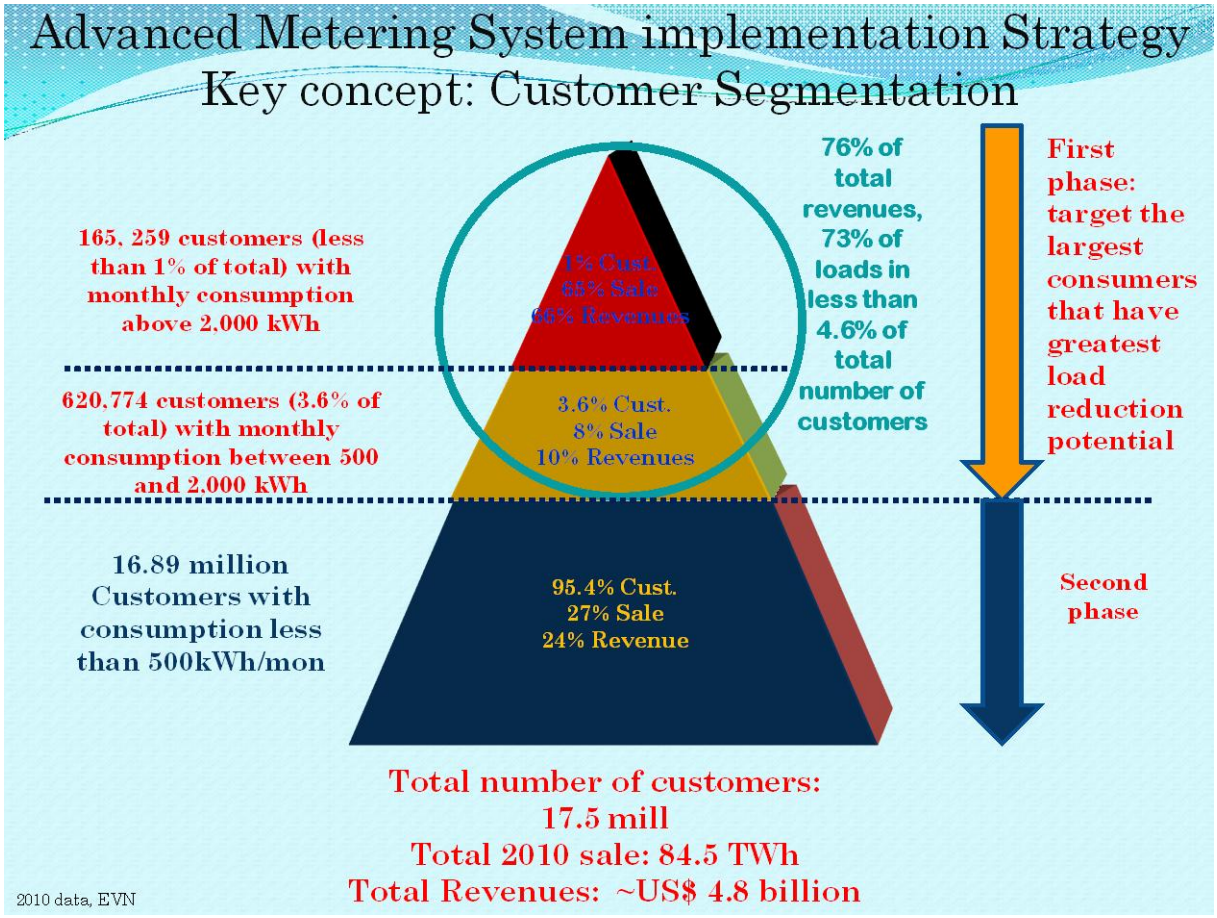
We believe that the above approach is consistent with measures to improve operations of CIF and the spirit of the discussions on revision of Result Frameworks.

4- Has any consideration been given to the negative employment impacts associated with reduced meter readers? This is low skilled work but employs a large number of people. What plans are there to reskill existing meter readers?

Response:

The project would not cause negative employment impacts associated with reduction in meter readers.

During project identification and preparation, work was carried out on customer segmentation analyses and development of the roadmap for smart grid in power distribution in Vietnam.



Based on the findings of these assessments, the AMI will be deployed in phases. The first phase involves only large customers with consumption greater than 500 kWh/month, representing about 5% of the total number of PCs' customers. The proposed CTF project starts the first phase targeting only those that consume at least 2,000 kWh/month, representing around 1% of the total number of PCs' electricity consumers.

We would like to clarify that the three PCs are already using smart meters – time of use (TOU) meters with remote reading capability – for selected large consumers for billing purposes. Meter readers for large customers require specialized skilled workers and involve specialized permanent staff of PCs, as they involve metering facilities more complex than a simple meter. Given the number and skills of the affected readers by the proposed project, it is expected that those workers can be easily reinserted in the PCs' organizational structure and some absorbed in the Metering Control Centers (MCCs).

The concern on loss of jobs of the readers will be studied and addressed during the second phase, when AMI is broadened to residential user. The speed (when and how) of phase 2 has been discussed with PCs during project preparation. It has been agreed that, before moving to phase 2, further studies will be carried out on how far down in the customers segmentation will be to get the maximum economic benefits, and taking into account of reskilling of workforce to address the job loss factor.

5- (i) Regarding the GHG benefits, what evidence/assumptions have been made for the 0.5% to 1% reduction in electricity sales. (ii) Would it be useful to track technology costs from the beginning to the end of the intervention so we could show how the project had made AMI more affordable?

Response:

Reductions in electricity sales / consumption:

In adopting reductions assumption and impact in avoided GHG due to avoided power generation, the project has pursued a conservative approach, in particular based on international experiences and studies (the low end of range of impact in consumption reductions).

Estimates in the literature can vary, ranging from 1% to up to 15% depending of the case. More recent studies of the benefits of smart meters estimate the consumer response is a reduction of consumption by 1-3% range. However, it must be noted that studies and experiences usually assess the demand reduction impact of AMI deployment, or impact of TOU and demand response programs, but in general not the case of combining the impact of all together as in the proposed CTF project. Some examples are presented below:

- The study by Frontier Economics of the smart meter program for the British utility Centrica, UK (Frontier Economics, Smart Metering for Centrica, October 2007) assumed as likely reductions in consumption attributable to smart meters: 2% for domestic electricity credit customers, 1% for domestic pre-payment customers, and 0.25% for small business customers. It must be noted that this does not include reductions due to TOU tariffs. The proposed CTF project expects additional impacts from AMI investment leading to systematic load profiling and improvement in the pricing signals of TOU.
- A review of the smart meter programs of three North American utilities by the Indian Center for Study of Science, Technology and Policy (Center for Study of Science, Technology and Policy, Bangalore, Technology, Enabling the Transformation of Power Distribution, report to the Ministry of Power, Bangalore, 2008) shows that in those cases the AMI costs outweigh the benefits, unless the benefits of consumer demand response are included. Accordingly, the proposed AMI project is complemented by the AusAID grant to ensure effective awareness campaigns and demand response programs, incentives to attract participation and compensation to PCs on expected revenues from load reductions.
- In preparations for the roll-out of smart meters in the UK, the Report by the Comptroller and Auditor General, 30 June 2011, evaluated that if only retail and supplier benefits are considered, the costs exceed the benefits for residential consumers, but benefits are greater than costs for non-residential customers. This is consistent with the phased approach in Vietnam for AMI and the proposed CTF project will target large non-residential consumers.
- An international consultant contracted by the PCs considered that reasonable estimates for the reduction in consumption attributable solely to smart meters would

be a 2% reduction in overall consumption for residential consumers, and 1.5% for commercial and industrial consumers. In addition, where there is a time-of-use tariff in place, the load shift can be calculated using an elasticity of substitution of 0.1.30 (Economic and Financial Analysis of Distribution Projects: Principles, Methodology, and Case Studies, 20 February 2012, Consultant report for PCs, Peter Meier). However, the consultant noted that these values are subject to uncertainties. The project has adopted a lower assumption, ranging between 0.5 and 1 % for large consumers.

- The implementation of AMI projects provide data collection and data management to enable more effective demand response programs and revenue protection programs. Smart metering focused on large consumers has supported Revenue Protection (RP) programs in a number of emerging countries (Brazil, Dominican Republic, Honduras, Colombia, Mexico, Montenegro, Uzbekistan, India). These countries represent two different cases: (a) distribution utilities with high losses, in particular non-technical losses (Dominican Republic, India, Montenegro); and (b) utilities with relatively low distribution losses (for example in Brazil, the first pilot being CEMIG, responsible for power distribution in Minais Gerais State and being replicated countrywide by other distribution companies) in the context of increasing electricity tariffs and concerns of detecting a growth (even if still small) in non technical losses.
- The Bank distribution rehabilitation project for Eletrobras' six affiliate distribution companies in Brazil has a similar AMI approach (AMI investments plus MCCs), justified based on and targeted mainly at non-technical loss reduction to customers with more than 500kWh/month (some 12% of customers). It is estimated that theft detection will result in a 3.3% reduction in the amount of electricity generated (the principal benefit in the economic analysis); in the financial analysis the increased revenue collection represents the main benefit. Of the expected reductions in non technical losses and based on estimations that around 50% of unbilled consumption disappears once it is metered, 50% (around 1% of sales) is expected as increase in revenues and 50% as reductions in consumptions.
- CEMIG (the largest distribution company in Brazil, serving around 7 million customers in the state of Minas Gerais) has implemented AMI for customers and feeders substations combined with Integrated Metering Center and Meter Data Management, covering load control, outage detection, remote operations and time of use. In 2009 the company had non-technical losses around 2.3 percentage points of sales, showing a clear increasing trend. In that context, CEMIG decided to implement a phased program focused on its largest 30,000 customers (around 0.5 percent of total number but representing close to 45 percent of total sales) and key feeders substations, which also allowed the improvement of the accuracy of loss calculation. Through that focused action, CEMIG managed to reduce the total non-technical losses to less than 2 percent of sales in 2011.

The current scenario in Vietnam is relatively similar to case (b) and Brazil. Currently non-technical losses are relatively low in Vietnam PCs, but the government's tariff reform program, combined with financing needs, show that tariffs will continue to increase in the next years, following the trend worldwide. International experience has been that in a condition of increasing tariffs, there is a growth in non-technical losses.

In the power sector of Brazil, where most of the 64 distribution companies show relatively good performance in terms of total losses, non-technical losses increased countrywide by 23 percent in physical terms (2 percentage points of total sales) between the first tariff review period (2003-2005) and the second (2006-2008) periodic tariff review, accompanying the significant tariff increases during the period. A public consultation on the minimum functionalities for smart metering in Brazil was launched by the country's energy regulator, ANEEL, for the proposed countrywide rollout of smart metering combined with time of use tariffs.

The proposed AMI projects will systematically record and monitor demand of targeted consumers, allowing detection and elimination of formerly unmetered consumption. It has a permanent "watchdog" effect on consumers, equivalent to a permanent presence of field inspectors in their premises, but with higher performance effectiveness. High effectiveness of the approach is shown by several cases in utilities in developing countries operating in very challenging environments: Tata Power Delhi Distribution (formerly NDPL; 2003), distribution companies in the Dominican Republic (2011).

Experience in developing countries (for example Enersis affiliates in Latin America) during the last two decades have shown that if consumers demand is monitored on a systematic manner to avoid unmetered consumption, around 40 to 60% percent (on average 50%) of formerly unmetered consumption becomes reduced demand.

The proposed AMI sub-component of DEP in Vietnam follows the same approach of the CEMIG case. It aims to improve the current acceptable condition in terms of total losses and ensure its sustainability in a context of increasing electricity prices in the country. The expected results (reduction of demand up to 1 percentage point of sales compared to the "scenario without project") are actually conservative, taking into consideration the CEMIG experience and other similar cases.

Please note that, although the difference is minor, technically each 1 MWh reduction in PC sales represents a slightly greater reduction in power generation (energy sales increased to take into consideration distribution and transmission losses). In the calculations of avoided power generation and associated avoided GHG, the simplified calculation of avoided GHG proposed in the results framework is based on energy sales, thus not including the avoided generation due to losses.

Tracking technology costs:

The project is expected to provide an integral approach to maximize advantages deriving from the use of AMI technology and information it provides, including organizational and management aspects (implementation of the MCCs, etc.) AMI technology is now highly standardized and affordable worldwide.

Although it would be possible to track evolution of AMI technology costs internationally, it would not be considered attributable to the proposed CTF project given the scale of the pilot.

> *6- The implementation of this ambitious project will require a highly qualified workforce with a wide range of skills. Is workforce availability a significant risk?*

Response:

The skills required to operate the AMI systems on a sustainable manner are available at this time in Vietnam.

Since 2009, the government established that TOU tariffs would apply to all industrial and commercial customers, and required PCs to implement the metering arrangements. All five PCs in Vietnam have carried out smart meter deployment programs to different extents and scales, although only the largest customers are equipped with remote data reading systems. The PCs participating in the proposed CTF project are already using TOU meters with remote reading capability of selected large consumers for billing purposes, and outsource the communications services to mobile phone companies operating in the country.

Experience in the implementation of Metering Control Centers (MCCs) in other emerging countries show that recently graduated power engineers, without any previous job experience (recruited by the distribution company straight out of university) are adequate candidates for staffing MCCs. A very successful case has been implemented in the power distribution companies in the Dominican Republic, with technical assistance provided by the World Bank. In that country, availability of skilled resources in the power sector is very low compared to Vietnam.