A Greenhouse Gas Baseline Emission Level Reporting System

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Abstract – A web-based reporting system is developed in this study to serve the purpose of establishing facility-based greenhouse gas (GHG) baseline emission levels (BEL). The system, called BELDBS, integrates annual emissions reporting, base year selection, third party verification, BEL application submission and review processes into a general framework. It is equipped with ancillary functions to facilitate the management of BEL reports, such as searching, exporting, map viewing, etc. The BELDBS has been customized for the Saskatchewan Ministry of Environment to support the determination of reduction targets for all regulated facilities.

Keywords: climate change, greenhouse gas, GHG, baseline emission level, reporting system

1. Introduction

The changing climate is already affecting both human society and natural systems, and could lead to significant changes in social and economic activities. Many of the observed changes in the climate can be linked to the increase in greenhouse gases (GHGs) in the atmosphere, caused largely by people burning fossil fuels to generate electricity, heat and cool buildings, and power vehicles [1]. In response, international, regional as well as local initiatives are being developed and implemented to reduce GHG emissions. Such initiatives not only rely on the development of inventory systems for monitoring and reporting of GHG emissions, but also require the establishment of a market-based controlling mechanism by providing economic incentives for achieving target reductions in GHG emissions. In Canada, the Greenhouse Gas Emissions Reporting Program (GHGRP) has been developed by Environment Canada to build up its nation-wide GHG inventory for regulated emitters with direct emissions over 50 kilotonnes CO2 equivalent (CO2e) per year [2]. However, the GHGRP program is launched only for the purpose of collecting GHG emission data and related information. It is unable to establish a baseline emission level (BEL) which would provide a very important basis for local governments in terms of setting targets for future reductions and developing mitigation strategies and policies. Besides, the emissions data are not audited and verified by a third party due to the lack of a verification process in the current GHGRP program.

Therefore, this study presents a dedicated reporting system, BELDBS, for helping local governments with establishing GHG baseline emission levels. The BELDBS has already been customized for Saskatchewan Ministry of Environment (hereinafter referred to as ‘the Ministry’) to help explore a GHG emissions reduction mechanism through
carbon compliance payment (CCP), according to the Management and Reduction of Greenhouse Gases Act [3]. In detail, by establishing a baseline emission level, the government can determine the amount by which a regulated facility will have to reduce each year. This reduction target will, in turn, be used to calculate the CCP that the facility must pay at a given GHG emission level if its emissions do not meet the reduction target. The CCP liability may be reduced with the purchase of carbon offsets or by using approved recognition for early action (REA) credits or pre-certified investment (PCI) credits [3]. The BELDBS integrates an independent verification process which requires the baseline emission levels to be verified by a third party, with the purpose of ensuring the accuracy and completeness of a BEL application.

2. Implementation of the BELDBS

As illustrated in Figure 1, the use of the BELDBS begins with applying for a reporting account. For security consideration, the account request will be directed to the Ministry who decides if a unique reporting account should be created or not. The BELDBS is a facility-based reporting system which requires reporters to select a target facility at the beginning. Annual emissions for the target facility need to be reported from the year the facility came into service to the most recent year. The reporters are only required to enter raw emissions for CO₂, CH₄, N₂O and SF₆, their CO₂e values will be calculated automatically based on the latest Global Warming Potential (GWP) coefficients [4]. As for HFCs and PFCs, the reporters should enter their total CO₂e emissions directly. The base year is the most important input which decides how the GHG baseline emission level of a regulated facility will be computed. According to the technical guidance document issued by the Ministry [5], the preferable base year is 2006 but the reporters may use the average of three consecutive years as the baseline emission level, with one of those years being 2006. Therefore, the BELDBS collects all possible options regarding the base year of a regulated facility based on the availability of annual emissions. The reporter can consult with the Ministry before submitting the BEL application to a third party for verification if they are uncertain about which option is the best. This process is optional in the BELDBS. Once the BEL application is verified by a third party, the reporter can proceed to submit the application to the Ministry for approval, by attaching verification statement, BEL application as well as any other supporting documents. The reporters may need to make some adjustments iteratively to their BEL applications as required by the Ministry to get them approved.

Functionally, the BELDBS allows a reporter to manage all regulated facilities operated by itself as a reporting company, including phase-out of existing facilities and setting up of new facilities. As a web-based reporting system, the BELDBS has no specific requirements for the client side except an Internet browser. The reporters may save the BEL application as a draft before submitting it directly to the Ministry, and can make further changes until they are satisfied. The BELDBS integrates BEL report preview module (see Figure 2) and PDF exporting function to help the reporters check if everything is accurate and correct before final submission. Besides, some other ancillary functions has been developed for the Ministry users, such as searching BEL reports by facility name and BEL status, exporting emissions data to comma-separated values (CSV) file, viewing BEL reports graphically through a map viewer based on Google map (see Figure 3), generating an overall report for statistical purpose, etc.
3. Summary

The BELDBS integrates the process of reporting GHG baseline emission level into a general framework, including annual emissions reporting, base year selection, third party verification, BEL application submission and review, etc. It also comes with some ancillary functions to facilitate the management of BEL reports, such as searching, exporting, map viewing, etc. The BELDBS has been customized for the Saskatchewan Ministry of Environment to support the determination of reduction targets for all regulated facilities.
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Figure 2: Screenshot of BEL Report Preview Page
(Note that all information presented in the figure is not real, just for demonstration purpose.)

Figure 3: Map Viewer of the BELDBS
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References


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