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The Design of GHG(Greenhouse Gas) Reduction Control System

Yong-sik Choi, Sang-kyun Cha, Kyeong-jae Cheon, Hwan-chul Kim

Comesta, Inc. #714 Gwanpyoung-Dong, Yusung-Gu, Daejeon, 305-509, Korea.

(Tel : +82-42-863-5259: Fax : +82-42-863-5258)
(nmaster@comesta.com, skcha@comesta.com, kjcheon@comesta.com, hkim@comesta.com)

Abstract: In this era, the GHG(Green House Gas) is regarded as a very important issue of world wide economics. After declaring United Nations Framework Convention on Climate Change, world wide economy environment needs GHG Reduction, changes accelerative by Emission Trading System, and etc. After 2012 when Kyoto Protocol is Finished, New System is established by international agreement. And no matter what the system is, The range of countries have a duty for reducing GHG will be widened gradually. Therefore, the effort for reducing GHG must be necessary and we have to prepare for new trade barrier called the environment regulation for GHG . This paper shows the design of GHG Reduction Control System based on smart metering that can reduce GHG in the manner of dynamic management and planning for the progress of production. Also, we propose the simulation environment that can verify and validate the required functionalities of GHG Reduction Control System

Keywords: Greenhouse Gas. Reduction**.**

I. INTRODUCTION

Kyoto protocol is a main motive which created and developed the present carbon market by Kyoto mechanism, and etc. However, Kyoto protocol is finished by 2012. so, the appearance of carbon market to come changes by the result of international negotiation.

According to fourth Assesement Report IPCC presents in 2007, the emission of whole world's GHG is 49 billion tons that increase about 20 billion tons more than 1997's 28.7 billion tons. Also, the level of GHG in earth's atmosphere is estimated about 455 ppm in 2005. and the carbon dioxide's level of it is about 379 ppm that increase about 100 ppm more than 280 ppm in 1750 before industrialization. If we want to stabilize the level of carbon dioxide at this level, we have to reduce emission of carbon dioxide about 50~85% as of 2000.

As we can see fourth Assesement Report of IPCC and etc for emission of carbon dioxide. In 'Post 2012' system, in order to reduce the damage of climate change by global warming, the reducing goal of Advanced countries include USA must be strengthen more and developing coutries' reducing effort for GHG also must be added According to Human Development Report which UNDP presents in 2007, in order to prevent the average temperature of earth from growing 2℃, the level of carbon dioxide in atmosphere must be stabilized at 450 ppm following of IPCC's fourth Assesement Report, for this, we have to reduce the emission of GHG 50% as of 1990 till 2050. Therefore, the report is pointing to need not only the effort of advanced countries but also the effort of developing countries'.

The specific form of carbon market is decided by the end of 2009 which ongoing international negotiation for 'Post 2012' is finished. Depending on the outcome of negotiations, carbon market will have two situations. The first is made international agreement which Annex I countries includes USA agrees the reduce of respectable scale. The second is not made an international agreement. so, the reducing goal of each countries is decided by depending on their situation. In any situation, carbon market will be widened, and it is inevitable assignment that reduce GHG

This paper shows the design of GHG Reduction Control System based on smart metering that can reduce GHG in the manner of dynamic management and planning for the progress of production because of corresponding to international flow. Also, we propose the simulation environment that can verify and validate the required functionalities of GHG Reduction Control System

II. Simulation Environment

GHG Reduction Control System proposed and designed in this paper is in Carbon Management System based on Smart Metering which Daedeok Innopolis is a supervisor of project. The outlines of Carbon Management System based on Smart Metering is shown as [Fig 1].

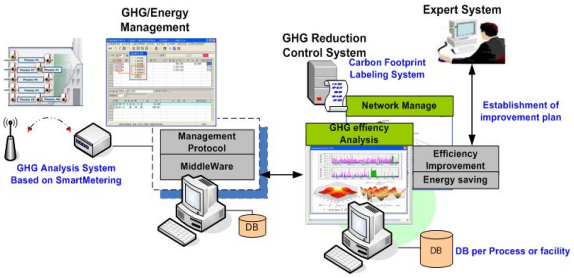

Fig 1. outline diagram of Carbon Management System based on Smart Metering

Carbon Management System based on Smart Metering is divided into two, measurement and analysis system based on Smart Metering and GHG Reduction Control System. Measurement and analysis system based on Smart Metering receives the consumption of electronic power which is measured by process via Zigbee interface, analyzes carbon footprint, and transmits analysis information of carbon footprint to GHG Reduction Control System. GHG Reduction Control System receives analysis information of carbon footprint, establishes statistics information, visualizes it, and presents interfaces that can let operators make a plan for reducing GHG.

Carbon Management System based on Smart Metering chose one facility and will have an test after implementation is finished. So, Before Testing, in order to verify and validate the required functionalities of GHG Reduction Control System, simulation environment that simulate Carbon Management System based on Smart Metering is established. Organization of simulation environment is show as [Fig 2].

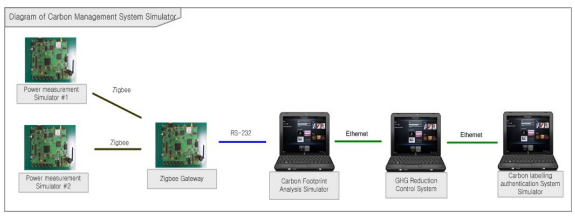

Fig 2. Organization diagram of simulation environment

Simulation environment is made up of three boards for communicating and three notebooks based Windows platform. Three boards and one notebook takes a role as measurement and analysis system, one notebook takes a role as GHG Reduction Control System, and last one takes a role as a Carbon Labeling Authentication System. Carbon Labeling Authentication System receives carbon labeling information from GHG Reduction System.

Two boards simulate smart meter of electronic power and transmit information of electronic power's consumption via Zigbee interface. One board takes a role as Zigbee gateway, receives the information, and transmits to notebook which generates carbon footprint information via RS232. Carbon footprint information is transmitted to notebook which takes a role as GHG Reduction Control System. The notebook generates carbon labeling information from analysis information of carbon footprint and transmits to notebook which takes a role as Carbon Labeling Authentication System.

III. GHG Reduction Control System

GHG Reduction Control System takes two primary roles. The first is exchanging the information with measurement and analysis system, generating carbon labeling authentication information and transmitting it to Carbon Labeling Authentication System. The second is establishing statistics information, visualizing it, and making a plan for reducing GHG. The outline of functionalities is shown as [Fig 3]

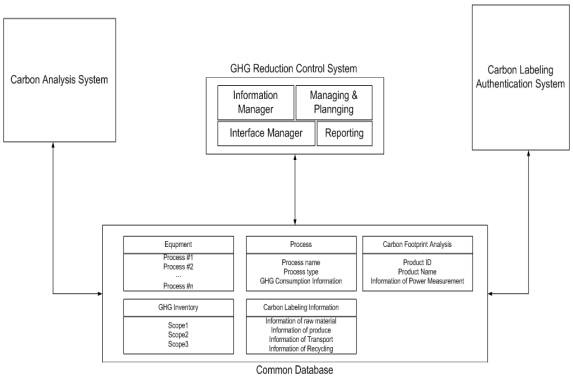

Fig 3. Outline diagram of GHG Reduction Control System

All the systems in Carbon Management System based on Smart Metering share the necessary information by Common database. All the system have their own databases, but they read the information to need, and write the information to be transmitted

1. Information managing

This functionality is Managing Information which will be transmitted to and received from. Information doesn't means only carbon footprint information, carbon labeling information, and GHG Inventory but also equipment, process, and product information. So, let GHG Reduction Control System have a scalability that can manage a number of equipment.

2. Managing and Planning

GHG Reduction Control System presents visualization of statistics information for GHG. Also, let operator can establish the plan of reducing GHG and progress by them.

3. Carbon Labeling Authentication Information

Carbon Labeling is the system that labels product with the emission of GHG which adds the emission whole level of product from raw material, to discard. Carbon Management System based on Smart Metering only measure electronic power. So, GHG Reduction Control System reads the necessary information from GHG Inventory except receiving from measurement and analysis system, and generates carbon labeling authentication information

IV. Conclusion

GHG Reduction Control System in this paper is designed as a part of Carbon Management System based on Smart Metering. Carbon Management System based on Smart Metering presents the functionality which measures the consumption of electronic power by Smart Metering by process, and makes a plan for reducing GHG by analysis information of carbon footprint that smart meter generates accurately more. its goal is growing efficiency of The Environment Management System

GHG Reduction Control System takes a role that manage carbon footprint information and GHG inventory and etc. and makes a plan for reducing GHG so that will correspond to the environment regulation to come.

In order to firm up operational ability and the scalability which can manage a number of facilities, Additional Experiment for minimizing access chances to common database of [Fig 3] is needed. Because, present design makes all the systems use one common database. So, have to find out more suitable data modeling by analyzing the quantity and the property of data and traffic that each equipment generates.

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