Imperial College London

Extension of MONET framework to consider "CDR as an exchange-traded commodity"

Huan Sheng, Supervisor: Prof Niall Mac Dowell

Centre for Environmental Policy, Imperial College London

Introduction

With the establishment of Paris Agreement and Kyoto Agreement, the international carbon trade, led by the Europe and United States and expanded to other countries in the world, has gradually become an important element of carbon emission reduction[1]. Meanwhile, companies in these countries are also beginning to produce and trade negative emission credits for carbon dioxide emissions offsetting based on different CDR (carbon dioxide removal) projects using NETs(negative emissions technologies)[2].

With the maturity and growth of carbon trading, many inequities are gradually exposed. On the one hand, from the perspective of CDR technology, the value of carbon credits is unstable due to the lack of development and perfection of CDR monitoring and measuring which is subject to asymmetric information, perverse incentives, and inadequate institutions[3]. On the other hand, from the perspective of marketing and trading, the effectiveness and functionality of carbon credit has been challenged due to its non-implementation and unpredictability[4].

ETCs (Exchange-traded commodities) were first introduced by Investor Resources Limited under its founder Graham Tuckwell in 2003 and listed on the Australian Securities Exchange[5]. They are investment vehicles that track the performance of an underlying commodity index on a single commodity[6].

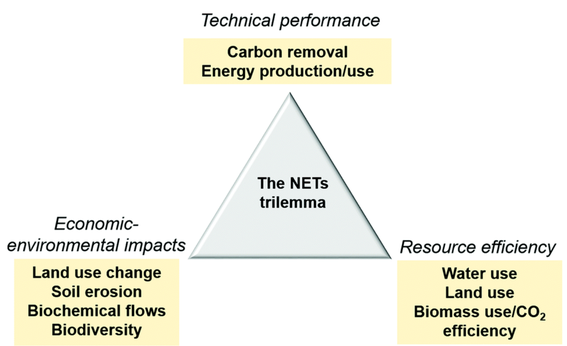

Figure 1. "The NETs trilemma"[7]

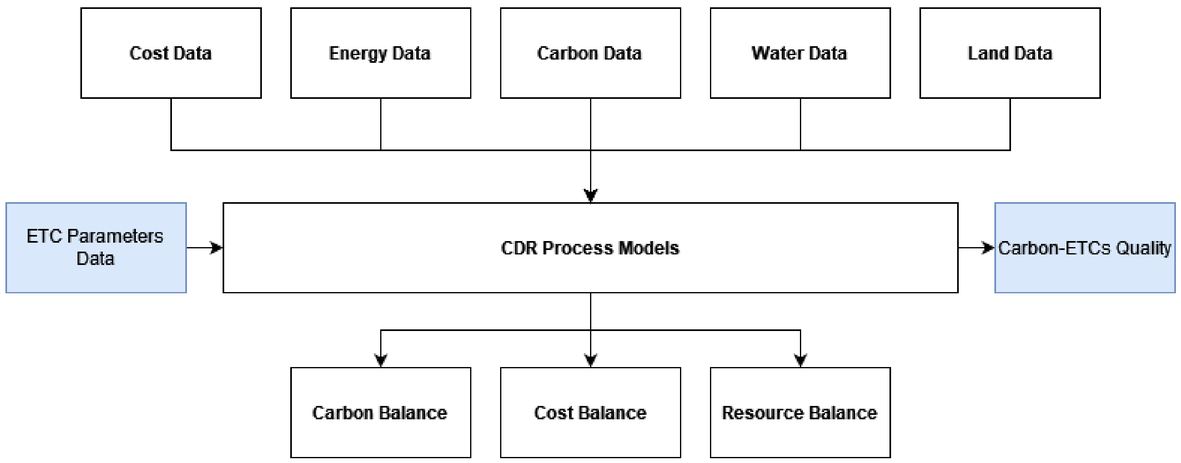

Figure 2. Extended MONET Framework

Research Questions

How can we enhance the predictability and implementation of carbon credits in trading markets, addressing issues of asymmetric information, perverse incentives, and institutional inadequacies, particularly in the context of different CDR pathways and their performance parameters?

How can the indirect impacts of different CDR pathways impacts be assessed and parameterized? Will these impacts influence the carbon trading market choice?

What are the key attributes and performance metrics of mainstream CDR pathways, and how do these factors contribute to their potential integration into Exchange-traded commodities (ETCs)?

what are the unique considerations for developing spatial-specific extensions for regions such as the Middle East, Southeast Asia, and Canada?

Aims & Objectives

In this study, we will explore the possibility to attribute, quantify and model CDR pathways, including their attributes, performance and additional functions, to find the pathway of making CDR into Exchange-traded commodities.

Identify the mainstream CDR pathways and analyze the additionality, permanence, fungibility, and other properties of CDR pathways for the purpose of considering CDR into ETCs.

Write the MONET Framework into Python code, adjust and extend the framework for the purpose of considering CDR as ETCs

Analyze the CDR potential of new regions like Middle East area, Southeast Asia aera, and Canada, and design spatial-specific MONET extension for those area.

Determine the crucial parameters of different CDR technologies when we consider CDR as an exchange-traded commodity consistent with the Paris Agreement's 1.5°C objectives.

Discuss the possible impact of considering CDR into ETCs on the future carbon trading market.

Methodologies

The MONET framework is a spatiotemporally explicit modeling and optimization framework based on the concern of NETs trilemma, which highly emphasizes the specific scenario in the analysis [7].

Thus, different spatial characteristics will be considered, and the MONET will be extended for different CDR regions, such as Middle East area, Southeast Asia aera, and Canada based on the policy and CDR potentials in each region.

Meanwhile, the MONET framework will be adjusted and extended by the purpose of considering CDR as an exchange-traded commodity. More aspects and parameters of analysis will be added to the framework.

Next Steps

The parameters and aspects that are given priority are the following:

Climate Repair Value (CRV) [8], for evaluating the permanence and fungibility of a given CDR pathway.

Additionality, for evaluating the indirect carbon removal function of a given CDR pathway.

Buffer Pool Function, for evaluating the resistance performance of a given CDR pathway against possible events (such as Afforestation/Reforestation Versus wildfire/flood).

Capacity, for evaluating the upper limit and the potential removal quantity of a given CDR pathway.

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