



## ETA Concept Program for Reducing Green House Effect in Indonesia Industrial Scale with IoT Integrated

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# ETA Concept Program for Reducing Green House Effect in Indonesia Industrial Scale with IoT Integrated

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**Abstract.** Carbon emissions are one of the big polemics in Indonesia, around 200 tons of carbon per hectare comes from 94.1 million hectares of forest land and around 1000 tons of carbon per hectare comes from 22.5 million hectares of peat soil. Indonesia is the largest emitter in the world with an emission value of 1.68% of the total 40.9 billion carbon dioxide that has an impact on climate change and global warming. In the Kyoto agreement, there is a solution in the form of an Emission Trading scheme which was announced at a macro level. This study aims to design an application called Emission Trading Application (ETA) to control the high demand and low demand of a factory/manufacturer that requires emission slots in the Emission Trading scheme that limits emissions from a factory/manufacturer to overcome domestic trade problems in Indonesia. In addition, the Emission Trading Application (ETA) is also expected to help in increasing the country's foreign exchange with sustainable development. The method used in the development of this application, namely the qualitative descriptive method with the deepening of the material through the study of literature. The ETA program will offer emission quotas available to companies that should reduce their emissions. The ETA program will facilitate demands that have excess carbon emission quotas to become suppliers for companies with production levels of emissions that exceed the specified emission quota.

**Keywords:** Carbon Emission, Emission Trading, Emission Trading Application

## 1 Introduction

In the 21st Century, the reduction of fossil fuels and the occurrence of climate change have led to energy conservation as well as reduction of carbon emissions. Emission Trading is widely adopted by policy makers from several countries related to environmental sustainability and making sustainable development possible. Several Emission Trading schemes have been carried out including European Union Emission Trading, Australia Emission Trading, California Emission Trading and others [1].

Based on satellite monitoring, the estimated net carbon flux in the tropics including Indonesia is lower, from 0.6 to 1 billion tons/year, which is partly due to emissions from deforestation and partly offset by forest regeneration. [2], [3]. Although the net change in carbon flux in Indonesia is low, it remains one of the most significant contributors to global warming and atmospheric changes.

Indonesia as the largest tropical country can be said to be the largest contributor to carbon emissions, this is good for Indonesia's economic cycle, but not good for health because the release of excessive carbon emissions can release harmful gases including O<sub>3</sub> and aerosols, most of which are black and organic carbon that interact directly with the climate system, reduce the quality of the air in the atmosphere, and the worst thing is that it endangers the health of the surrounding community [4], [5].

According to the UNSD in 2016 shows that Indonesia has become a country with the 10th largest economic growth in the world in terms of purchasing power, according to the United Nations statistics field shows that Indonesia's GDP per capita continues to increase from 1990 which was initially \$877 to \$1,973 in 2014 [6] it is quite significant in GDP per capita [7], but this must be balanced with the growth in the amount of carbon emissions [8], [9]. Based on carbon emissions data sourced from the World Development Indicator's data, Indonesia contributed 17.59 million metric tons of carbon emissions in 1981 and in 2014 it reached 44.25 million metric tons, this can be seen in Figure 1 which shows a gradual increase from Indonesia as a source of emissions. carbon.

Actually, there is a solution offered as a result of the 1997 Kyoto Protocol to reduce carbon dioxide, namely the Carbon Trading scheme, both on a multilateral, bilateral/regional scale, and on a domestic scale. The carbon trading system itself has been implemented in many countries, including the European Union ETS, New Zealand ETS, Japan Voluntary Emission Trading System (J-VETS), Regional Greenhouse Gas Initiative (RGGI), Tokyo Metropolitan ETS, and so on. [10]

The Emissions Trading Scheme conceptualized by the European Union is claimed to be the first concept in changing the world in many ways. This is also known as the cap and trade system for greenhouse gases [11]. By far, Emissions Trading is the largest emissions trading marketplace ever created by man [12]. Indonesia also follows the Emission Trading Scheme feature designed by the European Union, but the federalist structure that includes the law on this matter is still weak and the disparity is too significant in economic conditions. [13], [14]. This encourages Indonesia's doubts in terms of Emission Trading, it is feared that there will be changes in regulations that will harm Indonesia in the future in limiting emissions. [15].

Indonesia itself has participated in world emissions trading and has good potential to become the largest supplier of emission trading produced by industry. On the

other hand, by becoming a supplier of emission quotas, it will also become income for the country considering that many countries and companies have prepared funds to purchase emission quotas. Unfortunately, Indonesia does not yet have a market mechanism that regulates emissions trading in the country, which causes Indonesia's potential to be unexplored to become a large supplier in the emission tradition [16]. In addition, Indonesia is also not yet a country that has a low level of emissions, this is evidenced by Indonesia's ranking which is ranked as the 10th largest carbon-producing country in the world. [17].

This study aims to reduce the use of industrial-scale carbon emissions in Indonesia but still increase the country's foreign exchange with a prototype Emission Trading App (ETA) that allows it to be used in these problems and can also continue to be developed along with a solution to overcome the problems of domestic emissions trading in Indonesia, by so that Indonesia can become a low-emissions country and can become the largest supplier country in emission quotas in the carbon market.

## **2 Research Methods**

### **2.1 Data Collection Techniques**

The data used in this paper are qualitative and quantitative data from various relevant literatures as well as several existing sources and references. According to the Big Indonesian Dictionary, qualitative data is data that is not in the form of numbers obtained from recordings, observations, interviews, or written materials. While quantitative data is data that can be measured or calculated directly as a variable number or number. The sources used include data from the Ministry of Environment of the Republic of Indonesia, the Ministry of Industry of the Republic of Indonesia as well as journals and books that are relevant to the issues raised.

### **2.2 Data Analysis Techniques**

The research method used is descriptive analysis. Descriptive analysis is a method of examining the status of a group of people, an object, a set of conditions, a system of thought or a class of events in the present [18]. The data to be analyzed is data sourced from literature studies. Literature study is a series of activities related to the method of collecting library data, reading and taking notes and managing research materials [19]. Here are the points from the sub-chapters along with their explanations:

#### **Overview of ideas**

An overview of the idea explains how the ETA program in the form of an application regulates internal carbon trading in Indonesia, which can help demanders, namely carbon producing companies, to find suppliers, namely low emission companies.

#### **Prototype**

This sub-chapter describes the prototype of the Emission Trading App (ETA). The application prototype describes how the application will look like.

### Idea Analysis

This sub-chapter uses case studies in analyzing the ideas raised. With the aim of describing the advantages and benefits in the long term from this program.

### Potential for Success

Potential success explains how the ETA program has the potential to prevent global warming due to the greenhouse effect of domestic industries.

### Parties implementing ideas

In this sub-chapter it will be explained who the stakeholders will be involved.

## 2.3 Framework of Research

The Research Framework can be seen in Figure 1, where in the analysis stage the topic formulation is carried out in determining the topics that are carried out in the discussion, the discussion formulation is in the form of carrying out problems that will be solved after the topic has been formulated, and also the purpose of the analysis is to get the initial objectives of the research. the results of the research which was then carried out by research and development in order to produce the ETA Concept application consisting of; (1) General Description; (2) Carbon Trading Scheme; (3) Prototype ETA Concept App; (4) Successfully Potential Description; (5) Implementing Party Description.

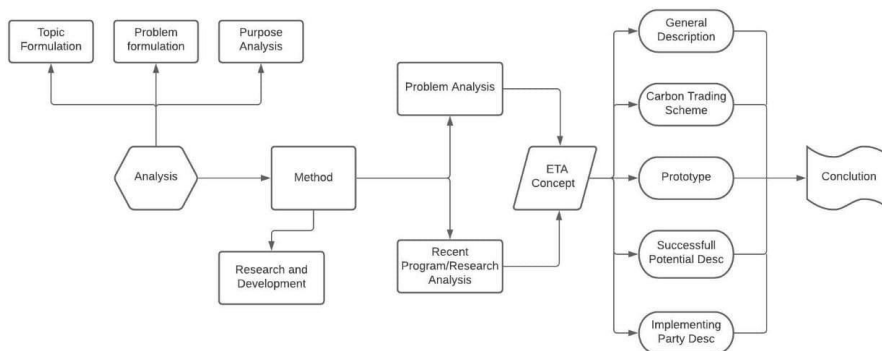


Figure 1. Framework Research

## 3 Results and Discussion

### 3.1 Carbon Emission Analysis in Indonesia

By using MODIS L1B satellite image data processing, researchers can find out the value of the haze index in Indonesia in order to determine the amount of carbon emissions produced on a surface in Indonesia. Figure 2 shows the data on the distribution of carbon emissions in Indonesia according to data from the 2019 Power Plant Emission Factors multiplied by the area of Indonesia.

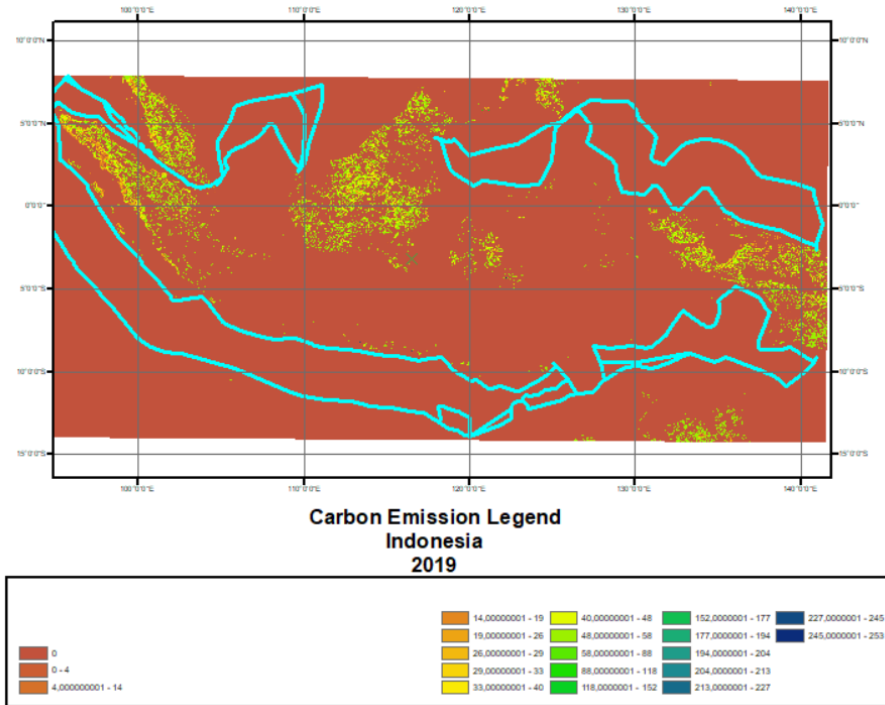


Figure 2. Carbon Emission Legend Indonesia 2019

### 3.2 Pre-existing Programs

#### Carbon Tax Concept

Carbon tax is a levy on the carbon content of fossil fuels. Almost all the carbon in fossil fuels emits carbon dioxide (CO<sub>2</sub>) hence the carbon tax is equivalent to a tax per unit of carbon dioxide emissions[20]. A carbon tax can also be interpreted as a tax on the carbon content of fossil fuels (or their carbon emissions) can help address both of these problems. Carbon taxes are potentially the most effective and cost-effective policy for reducing CO<sub>2</sub> emissions[21].

#### Implementation of Carbon Tax in Various Countries

The Organization for Economic Co-operation and Development (OECD) stated that the implementation of the carbon tax is starting to show signs in various parts of the world. Based on the Carbon Pricing Dashboard data, the World Bank (2019) as many as 24 countries in the world have implemented a carbon tax, one country is currently scheduling, namely South Africa, and one country, Ivory Coast, is under consideration. [22]. The carbon tax was first implemented by Finland in 1990, which then began to develop in various countries in the 2000s. Several countries such as New Zealand began to implement a carbon tax in 2005, Ireland (2010), Japan (2012), Australia (2012), UK (2013), Chile (2014), Portugal (2015), and China (2017). In the Southeast Asia region, only Singapore will start imposing a carbon tax in 2019[23]. Empirical experience proves that carbon tax can reduce emission levels. Until 2018, Japan was able to reduce its carbon emission level by 8.2 percent from 2013. Carbon tax surveys

in Finland, Denmark, the Netherlands and Sweden show that these countries are able to reduce emissions ranging from about 1.5% to almost 6% [24]

### Carbon Tax as a Global Agenda

Although it has an impact on reducing the level of carbon emissions, the implementation of a carbon tax has not been on the agenda for many countries. In fact, global warming cannot be prevented if there is no active participation of all countries in reducing carbon emissions. America's withdrawal from the Paris Agreement was because other countries were not subject to the agreement. If all countries think so, then the hope of keeping carbon emission levels low is just wishful thinking. Because of this, international cooperation plays an important role. Policy harmonization is intended to encourage countries to internalize cross-border externalities [25].

### 3.3 Overview of ETA

This system is fully named Emission Trading App (ETA) or emission trading system with application. ETA is a program designed to establish a domestic emissions trading system with the help of an application. In this system, each market participant, which can be an organization, company, or industry, will be given an obligation to reduce/limit emissions by the state (commonly called CAP). Generally, CAP is applied in the form of allocating emission allowances for market participants at the beginning of the period. At the end of the period, participants must submit (surrender) the quota unit to the agency determined by the government (in this case the ministry of environment and ministry of industry) the actual amount of emissions they have released.

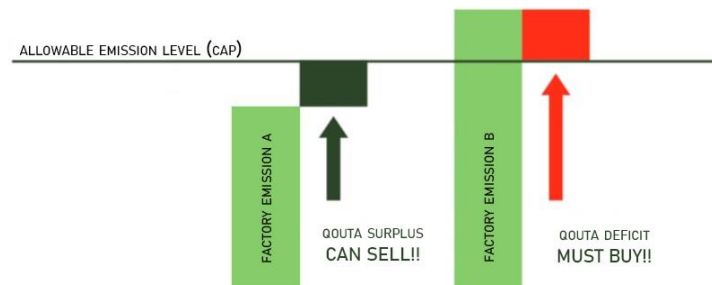


Figure 3. ETA Overview

Market participants who pass their CAP can purchase additional quota units from those whose quotas are not being used, resulting in emissions trading. In this system, each party subject to emission restrictions must report their greenhouse gas emissions periodically (usually annually) to the designated agency. From this data, it can be seen whether the party's emission exceeds the specified limit or not. In practice, the implementation of emissions trading does require quite a long preparation, especially regarding data collection, but the management is relatively simple because the focus is on the organization's emission data, not the results of emission reduction activities. Thus, it is not necessary to calculate emission reductions using complicated scientific methodologies. Through ETA, there will be a meeting between demanders, namely companies/industry that produce at emission levels that exceed the limits set by the state, and

suppliers, namely those who have excess industrial emission quotas up to the specified limit.

### 3.4 ETA Program Scheme

To provide a more in-depth explanation of the program initiated. Here the author describes the operational scheme of the ETA program on figure 4:

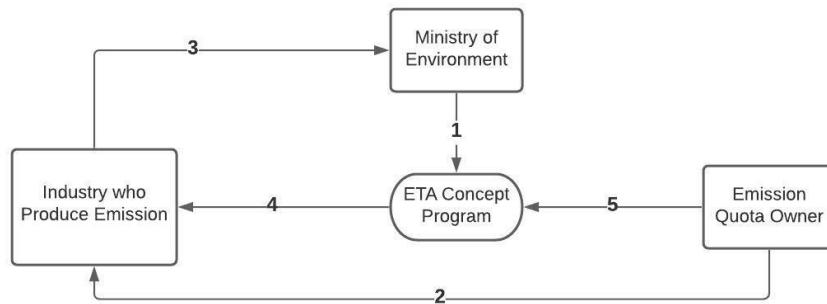


Figure 4. ETA Operational Scheme

1. The government through the Ministry of Environment launched the ETA program and is responsible for the technical implementation.
2. Excess Emission-Producing Industries submit emission absorption requests to ETA.
3. The ETA will forward the request to the party who has the emission quota.
4. If the supplier is available, then the emitting company will buy the emission quota within one period from the party offering
5. Industries with emission quotas report to the Ministry of Environment.

### 3.5 Prototype Program ETA

The ETA program will be implemented using an application system that is useful to help demanders (excess emission companies) find suppliers (parties with emission quotas). The prototype of ETA program application can be seen on figure 5.



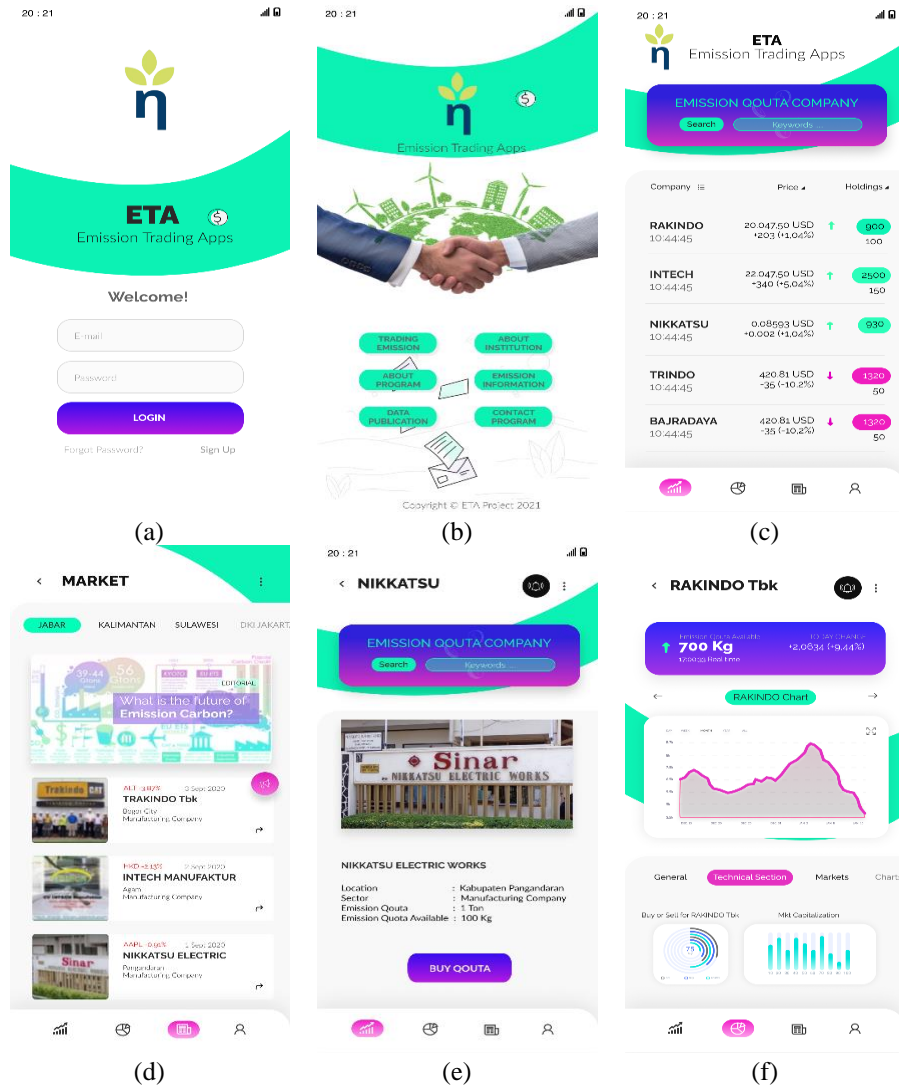


Figure 5. (a) Login Display, (b) Home Screen, (c) Companies List Menu, (d) Emission Provider Menu, (e) Companies Information Menu, (f) Detailed Information

On account login display the user before using the application features, users are required to login first using the account that has been created. If the company has not registered yet, it must create an account first. On application home screen, the home page, application visitors will be given several options for the features they need. There are six features in this application as shown in the picture. Then in this app will provide Information of companies with emissions quota list that produce excess emissions can

see companies that are willing to provide their emission quotas for sale on this page, then the buyer will be informed through the detailed information about the quota.

### **3.6 Potential for Success**

#### **Low Emission Industry in Indonesia**

Several types of industries that have low emissions due to their annual emission burden include the pharmaceutical industry, wood adhesive industry, biscuit industry, coffee powder and tea industry, glass product industry, cosmetic industry and plastic seed industry. Based on data from the ministry of industry in 2019 it was stated that in 2018 the national pharmaceutical industry grew by 4.46%. The pharmaceutical industry is also a priority industry that plays a major role as the main driver of the Indonesian economy [26]. Currently, the domestic pharmaceutical industry is 206 companies. The number is dominated by 178 national private companies, 24 multi-national companies and four State-Owned Enterprises (BUMN). The domestic pharmaceutical industry is an industry that has been around for a long time and is able to meet 75 percent of domestic drug needs.

Then based on data from the ministry of industry in 2018 which shows that the cosmetics industry in 2017 grew by 20% or four times the national economic growth. The increase in growth to double digits was driven by huge demand from the domestic and export markets in line with the trend of people starting to pay attention to body care products as their main needs. The domestic cosmetic industry increased by 153 companies in 2017, so that currently the number has reached more than 760 companies. Of this total, 95% of the national cosmetic industry is the small and medium-sized industry (IKM) and the rest are large-scale industries [27]. From these two industrial sectors, it can be concluded that the number of low-emission companies in Indonesia is large and can be utilized optimally in the implementation of carbon trading in Indonesia as an effort to realize overall global emission reductions.

#### **Fund Launched For Emission Reduction**

Indonesia will soon enjoy funding from the Norwegian government for greenhouse gas emissions from its program to reduce emissions from deforestation and land degradation (REDD+). The two countries have agreed on key rules for paying for results-based emissions reductions. The amount of emission reduction that will be borne is around 4.8 million tons of CO<sub>2</sub>. The two countries agreed on climate resources through a letter of intent (LOI) commitment in 2010. Norway pledged the support of up to US\$1 billion. So far, only about 13% of funds have been used to support government measures to tackle deforestation from a technical and capacity-building perspective. The remaining funds will be given to pay for the emission reduction results.

#### **Number of Industries participating in Emissions in Indonesia**

Based on data published by the Manufacturing Industry Directory in 2018, the total number of manufacturing industries in Indonesia reached 37,929. This number represents a very large number and has the opportunity to be able to encourage the success of this idea. Because many of these industries produce emissions in every production activity they do.

### 3.7 Program Implementing Parties

#### Ministry of Environment and Forestry

The Ministry of the environment and forestry through the Directorate General of Climate Change Control (DJPP) which is one of the agencies for work dealing with climate change and in its duties also focuses on reducing greenhouse gas emissions, acting as the implementer of the ACTS program.[28].

#### President of the Republic of Indonesia

The President of the Republic of Indonesia acts as a supervisor in the implementation of the ACTS program. With direct supervision from the president, it will increase the credibility of the ACTS program.

#### Company/Industry

The company acts as a demander which is a company that produces carbon in its production activities.

#### Low Emissions Company

Low Emission Companies act as suppliers who have the potential to be able to absorb carbon emissions from companies with higher emissions.

## 4 Conclusion

The Emission Trading App (ETA) is the right program to design a domestic emissions trading mechanism in Indonesia by bringing together demand and supply. The scheme of this program begins with the Ministry of Environment which launches the program, then the industry producing excess emissions will make a request for emission absorption to the ETA (demander), to be forwarded by ETA to the company that has an emission quota (suppliers). This program has a good potential for success considering the many factors that support the implementation of this program, such as the number of companies that have excess emission quotas, high emission-producing industries, and funds that have been prepared for emission trading.

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