# EVALUATION FRAMEWORK
# SOCIETAL PERFORMANCE

CONNECTICUT GREEN BANK

## Public Health Impact Overview

An important measurement of success for the Connecticut Green Bank (Green Bank) and its programs is how our investment activity improves the air quality of the state. This are measured by the decrease in the amount of nitrogen oxides ($NO_x$), sulfur dioxide ($SO_2$), and particulate matter ($PM_{2.5}$) emitted by the region's fossil fuel electric generation due to Green Bank projects

The changes in quantities of these emissions impacts the quality of health of those that breathe this air. Air pollution influences the prevalence and severity of asthma, bronchitis, coronary disease, and even death.

The Green Bank uses the US Environmental Protection Agency's (EPA) Co-Benefit Risk Assessment (CoBRA) model to calculate and report on the public health benefits of the Green Bank's clean energy investment activity in Connecticut.

The Green Bank will include public health impacts of its programs as part of the Societal Benefits in its Comprehensive Annual Financial Report, green bonds issuances, and other communications.

## Methodology

The Green Bank has long recognized the environmental benefits of its investments. After working with the Connecticut Department of Energy and Environmental Protection (DEEP), Connecticut Department of Public Health (DPH) and the US Environmental Protection Agency (EPA), the Green Bank adopted the EPA's CoBRA to model the public health impacts of the air quality benefits associated with Green Bank projects.

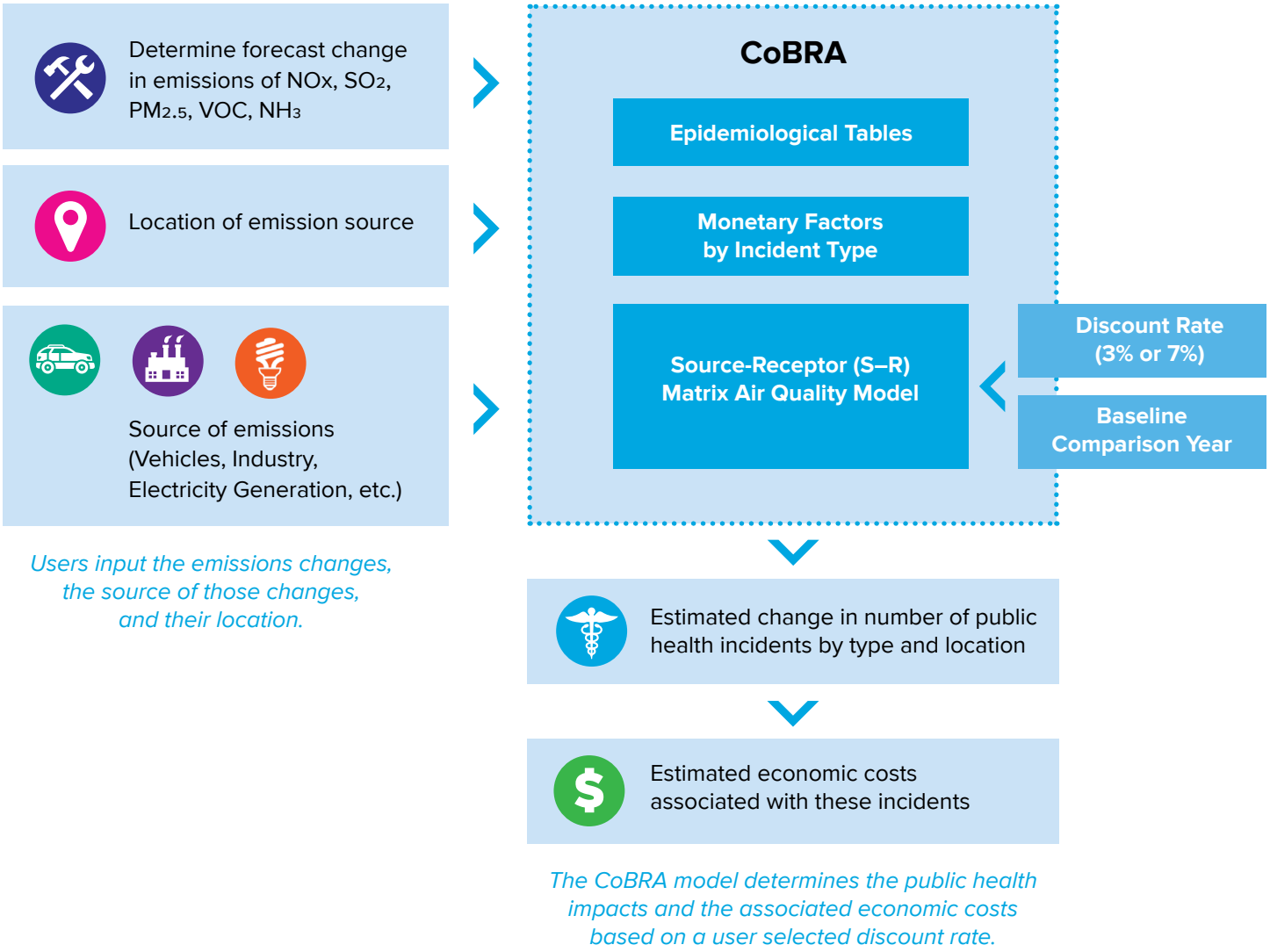
CoBRA is a complex model that uses a baseline of emissions and models the increase or decrease in public health incidents and their costs based on the change in emissions of nitrogen oxides ($NO_x$), sulfur dioxide ($SO_2$), particulate matter ($PM_{2.5}$), volatile organic compounds (VOC) and ammonia ($NH_3$). The tool takes into account the method through which these are emitted (vehicles, energy production, type of industry, etc) and their location. It uses an air dispersion model (Source-Receptor (S-R) Matrix) and standard EPA epidemiological estimation methods to gauge the change in number of incidents, and then applies monetary factors to give an economic impact of these emissions changes.

DPH Keeping Connecticut Healthy

EPA United States Environmental Protection Agency

**The graphic below presents a simplified representation of the model.**

**Figure 1: CoBRA Flow**




*Users input the emissions changes, the source of those changes, and their location.*

*The CoBRA model determines the public health impacts and the associated economic costs based on a user selected discount rate.*

Further information about the CoBRA is available at:
https://www.epa.gov/sites/production/files/2017-10/documents/cobra_user_manual_september2017_508_v2.pdf

The Green Bank will directly run a project or projects' environmental impacts through the CoBRA model to obtain the associated public health benefits that its projects support. CoBRA will report back the low and high estimates of avoided incidents, locations, and associated costs of the following health outcomes:

| | |
|---|---|
| Acute Bronchitis | Lower Respiratory Symptoms |
| Asthma Exacerbation | Minor Restricted Activity Days |
| Emergency Room Visits, Asthma | Mortality |
| Hospital Admits, All Respiratory | Nonfatal Heart Attacks |
| Hospital Admits, Cardiovascular (except heart attacks) | Upper Respiratory Symptoms |
| Infant Mortality | Work Loss Days |

## Example of Health Impacts

The following shows an example of public health impacts associated with the decrease of 155 tons of $PM_{2.5}$, 1,169 ton decrease in $SO_2$, and a 2,331 ton decrease in $NO_x$ (the equivalent of what the Green Bank's projects avoid emitting in one year).

**Table 1**

| CT Emissions Decrease (in tons) | | | Location of impact | Value of Total Health Benefits | |
|---|---|---|---|---|---|
| $PM_{2.5}$ | $SO_2$ | $NO_x$ | | low estimate | high estimate |
| 7 | 98 | 116 | Connecticut | $1,223,571 | $2,765,763 |
| | | | Rest of US | $2,746,739 | $6,208,563 |
| | | | Nationwide | $3,970,310 | $8,974,326 |

*continued >*

## About the Connecticut Green Bank

The Connecticut Green Bank was established by the Connecticut General Assembly on July 1, 2011 as a part of Public Act 1º1-80. As the nation's first full-scale green bank, it is leading the clean energy finance movement by leveraging public and private funds to scale-up renewable energy deployment and energy efficiency projects across Connecticut. The Green Bank's success in accelerating private investment in clean energy is helping Connecticut create jobs, increase economic prosperity, promote energy security and address climate change. For more information about the Connecticut Green Bank, please visit www.ctgreenbank.com.

## About the Department of Energy and Environmental Protection

The Connecticut Department of Energy and Environmental Protection (DEEP) was established on July 1, 2011 with the consolidation of the Department of Environmental Protection, the Department of Public Utility Control, and energy policy staff from other areas of state government. It is charged with conserving, improving and protecting the natural resources and the environment of the state of Connecticut as well as making cheaper, cleaner and more reliable energy available for the people and businesses of the state. The agency is also committed to playing a positive role in rebuilding Connecticut's economy and creating jobs – and to fostering a sustainable and prosperous economic future for the state. For more information about the Connecticut Department of Energy and Environmental Protection, please visit www.ct.gov/deep.

## About the Department of Public Health

Established in 1878, the Department of Public Health (DPH) is the lead agency in protection of the public's health, and in providing health information, policy and advocacy. DPH is a central part of a comprehensive network of public health services, and is a partner to local health departments for which it provides advocacy, training and certification, technical assistance and consultation, and specialty services that are not available at the local level. The agency is responsible for providing accurate health information to the Governor, the Legislature, the federal government and local communities. This information is used to monitor the health status of Connecticut's residents, set health priorities and evaluate the effectiveness of health initiatives. The agency is also a regulator focused on health outcomes, maintaining a balance between assuring quality and administrative burden on the personnel, facilities and programs regulated. DPH is currently staffed by approximately 800 employees organized into fourteen branches, sections, and offices; each tasked with ensuring and/or providing services to help the agency achieve its mission. For more information about the Connecticut Department of Public Health, please visit www.ct.gov/dPh/site/default.asp.

## About the United States Environmental Protection Agency

The mission of the EPA is to protect human health and the environment. For more information about the United States Environmental Protection Agency, please visit www.epa.gov.

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