



MEMORANDUM

TO: TPB Technical Committee
FROM: Erin Morrow, TPB Transportation Engineer
SUBJECT: Update on the Transportation and Climate Initiative (TCI): Release of Memorandum of Understanding
DATE: January 3, 2020

TPB staff continue to follow the work of the Transportation and Climate Initiative (TCI),¹ a regional collaboration of Mid-Atlantic and Northeast states including Maryland, Virginia, and the District of Columbia, working to reduce greenhouse gas (GHG) emissions from the transportation sector.

A coalition of TCI states² released a statement³ on December 18, 2018 of its intention to design a regional transportation policy proposal to reduce carbon emissions from the transportation sector through a cap-and-invest program or other pricing mechanism.

On December 17, 2019, TCI released a draft Memorandum of Understanding (MOU),⁴ which is included as Attachment A, outlining a regional program that will cap carbon dioxide emissions from the transportation sector and invest millions of dollars annually to achieve further emission reductions. The draft MOU is accompanied by preliminary modeling estimates,⁵ a summary of which is included as Attachment B. The preliminary modeling estimates show projections of potential carbon dioxide reductions, economic impact, and public health benefits of the program. The modeling results were presented at a December 17 webinar. A recording⁶ of the webinar and the webinar slides⁷ are posted online.

TCI will be accepting and considering public input on the draft MOU through February 28, 2020. A final MOU is expected in the Spring of 2020, following additional public input and analysis. At this point, each state will decide whether to sign the MOU and participate in the regional program. The program could begin as early as 2022. TCI provides updates on the policy development process timeline on its website.⁸

TPB staff are participating in discussions with an informal group of staff from other Metropolitan Planning Organizations (MPOs) and Councils of Governments (COGs) in the TCI states. This group is organized by staff at the Metropolitan Area Planning Council (MAPC), the regional planning agency for the Metropolitan Boston area. This group has met on conference calls and at an in-person

¹ <https://www.transportationandclimate.org/>

² Maryland, Virginia, and the District of Columbia were among the states that endorsed the statement.

³ <https://www.transportationandclimate.org/nine-states-and-dc-design-regional-approach-cap-greenhouse-gas-pollution-transportation>

⁴ https://www.transportationandclimate.org/sites/default/files/FINAL%20TCI_draft-MOU_20191217.pdf

⁵ https://www.transportationandclimate.org/sites/default/files/TCI%20Modeling-Results-Summary_12.17.2019.pdf

⁶ <https://www.youtube.com/watch?v=EUmxoMrzSIO&feature=youtu.be>

⁷ https://www.transportationandclimate.org/sites/default/files/TCI%20Public%20Webinar%20Slides_20191217.pdf

⁸ <https://transportationandclimate.org/main-menu/tcis-regional-policy-design-process-2019>

convening that was hosted by the Delaware Valley Regional Planning Commission (DVRPC) in Philadelphia on June 24, 2019.

This group will meet again on January 16, 2020 at the Metropolitan Washington Council of Governments (MWCOCG) in the MWCOCG Board Room. The purpose of this convening will be to learn more about TCI's objectives and the policy development process from members of the TCI leadership team, discuss the draft MOU and accompanying analysis, and consider how COGs and MPOs can explore opportunities to engage with their membership and offer a thoughtful response to encourage a robust and equitable program design.

Attachment A

Cover Page

Invitation for Public Input on a Draft Memorandum of Understanding (MOU) of the Transportation and Climate Initiative (TCI)

TCI jurisdictions encourage people, companies, organizations, and communities to provide their input on the modeling findings and the draft MOU to inform the final program design. Feedback is welcomed on all aspects of a potential program, and TCI jurisdictions are highlighting specific topics on which public input is of particular interest.

Those topics include:

- What factors should TCI jurisdictions consider when setting the starting level and the trajectory for a regional cap on carbon dioxide emissions from transportation fuels?
- How should the compliance period be structured to provide needed flexibility, while ensuring environmental integrity?
- What factors should TCI jurisdictions consider when designing stability mechanisms for managing uncertainties regarding future emissions and allowance prices?

All interested parties are asked to provide their input by Friday, February 28, 2020.

**Draft Memorandum of Understanding
of the Transportation and Climate Initiative**

For Stakeholder Input

Draft - 12/17/2019

WHEREAS, climate change has resulted in the increased frequency and severity of extreme weather events that have adversely impacted every Signatory Jurisdiction; and

WHEREAS, climate change poses a clear, present, and increasingly dangerous threat to the communities and economic security of each Signatory Jurisdiction; and

WHEREAS, these jurisdictions participate in the Transportation and Climate Initiative, which was founded in 2010 as a collaboration of states and the District of Columbia to develop strategies to reduce greenhouse gas emissions from the transportation sector; and

WHEREAS, Signatory Jurisdictions have individually committed to mitigate the risks of climate change through strategies intended to reduce greenhouse gas emissions across all sectors; and

WHEREAS, transportation currently accounts for approximately 40 percent of greenhouse gas emissions in the Signatory Jurisdictions; and

WHEREAS, Signatory Jurisdictions will need to implement bold initiatives to mitigate the impacts of greenhouse gas emissions from the transportation sector; and

WHEREAS, Signatory Jurisdictions remain committed to working with communities and businesses to develop and implement a regional program that addresses the urgent need to mitigate greenhouse gas emissions and other harmful pollutants generated by the transportation sector; and

WHEREAS, accelerating the transition to cleaner, more efficient transportation sector will improve public health, create new economic opportunities, and provide enhanced mobility options for all communities; and

WHEREAS, Signatory Jurisdictions recognize and are committed to investing in and mitigating the impacts on low-income and disadvantaged communities that are disproportionately burdened by vehicular pollution, the costs of the current transportation system, the lack of access to clean transportation options, and vulnerable to the impacts of a changing climate; and

WHEREAS, continued collaboration on clean transportation strategies, including regional electric vehicle charging infrastructure; improved multi-modal transit infrastructure; more sustainable freight movement; and support for lower carbon fuels will provide greater economic, social and public health benefits to residents and communities across the region than if each jurisdiction acted alone;

NOW, THEREFORE BE IT RESOLVED, that the undersigned Signatory Jurisdictions hereby enter into this Memorandum of Understanding to express their commitment to collaborate on the establishment of a regional program to transition to a more sustainable, resilient, lower carbon transportation sector that provides their residents with more transportation options, improved air quality and public health, and economic opportunity; and

BE IT FURTHER RESOLVED, that the Signatory Jurisdictions will seek to implement a regional cap-and-invest program, through the implementation of individual programs in each Signatory Jurisdiction, that will ensure emissions reductions and enable Signatory Jurisdictions to strategically invest in programs to help their residents transition to affordable, low-carbon transportation options that provide substantial public health benefits, reduce congestion, and increase economic and job opportunities; and

BE IT FURTHER RESOLVED, that Signatory Jurisdictions will work with communities to ensure that the benefits of a cap-and-invest program flow equitably to communities that are underserved by clean transportation alternatives, disproportionately bear the costs of the current transportation system, or suffer disproportionate impacts of vehicular pollution and climate change; and

BE IT FURTHER RESOLVED, the Signatory Jurisdictions will establish in the final memorandum of understanding (MOU) a regional carbon dioxide emissions cap that will decline over time, to reduce emissions from on-road diesel and finished motor gasoline, and an objective methodology for apportioning proceeds to each Participating Jurisdiction, to invest at each jurisdiction's discretion to support the goals of the program; and

BE IT FURTHER RESOLVED, that Signatory Jurisdictions will jointly develop a Model Rule in accordance with this memorandum, including Appendix, that will:

- Implement the regional cap to reduce CO₂ emissions, from on-road diesel and finished motor gasoline;
- Develop a process for auctioning emission allowances;
- Require regulated fuel suppliers to hold allowances to cover emissions from regulated fuels and report emissions to each applicable jurisdiction;
- Provide flexibility and ensure market stability, which may include a three-year compliance period, cost-containment and emissions-containment mechanisms, provisions to allow for the banking of allowances, and alternative compliance mechanisms such as offsets; and

BE IT FURTHER RESOLVED, that each Signatory Jurisdiction will follow any required legal processes within each respective jurisdiction to implement the program in accordance with this memorandum and the Model Rule as soon as practicable; and

BE IT FURTHER RESOLVED, that the Signatory Jurisdictions seek to create as large a regional market as possible to enable the most cost-effective emissions reductions. The program will include provisions that enable seamless expansion, for jurisdictions that will participate in

the program after the initial launch of the regional program, as well as for other jurisdictions to participate in the program; and

BE IT FURTHER RESOLVED, that Signatory Jurisdictions remain committed to regularly assess the program’s effectiveness in meeting shared greenhouse gas emissions reduction, resilient transportation, and equity goals; and

BE IT FURTHER RESOLVED, that Signatory Jurisdictions recognize that meeting greenhouse gas emissions reduction goals will require additional measures and collaboration in pursuing complementary policies and programs to enable further transportation greenhouse gas emission reductions and achieve other shared policy goals.

Signatures:

APPENDIX - Draft Memorandum of Understanding for Stakeholder Input

1. TCI CAP-AND-INVEST PROGRAM GOALS AND SCHEDULE

A. Definitions.

- (1) “TCI Program” shall mean the regional cap-and-invest program to reduce carbon dioxide (“CO₂”) emissions from transportation and to invest proceeds from the program in measures designed to further reduce CO₂ emissions and provide incentives for low-carbon and more resilient transportation.
- (2) “Signatory Jurisdictions” shall mean those jurisdictions that sign the final Memorandum of Understanding (MOU).
- (3) “Participating Jurisdictions” shall mean those jurisdictions that adopt a program consistent with the Model Rule and that complete the procedures needed to become a Participating Jurisdiction.
- (4) “Regional Organization” shall mean a nonprofit entity created and maintained by Participating Jurisdictions to facilitate the ongoing administration of the Participating Jurisdictions’ TCI Programs.

B. Model Rule. The Signatory Jurisdictions shall use their best efforts to collectively release a regionally coordinated final Model Rule, as detailed in Section 2 of this Appendix, by December 31, 2020, after providing for a 60-day public review and input period.

C. Legislation and/or Rulemaking. Each Signatory Jurisdiction commits to follow any required legal processes within its jurisdiction to implement the TCI Program, through implementation of individual jurisdictions’ programs, consistent with the Model Rule, including by seeking to establish in statute and/or regulation that Signatory Jurisdiction’s TCI Program, and to have each Signatory Jurisdiction’s TCI Program effective as soon as practicable.

D. Launch of TCI Program. Each Signatory Jurisdiction intends that the first compliance period of the TCI Program shall commence as early as January 1, 2022.

2. MODEL RULE FOR ESTABLISHMENT OF THE TCI PROGRAM

The Model Rule will include provisions as follows:

A. Affected Fuel. Regulated fuels shall include the fossil fuel components of motor gasoline and on-road diesel fuel destined for final sale or consumption in a Participating Jurisdiction, upon removal from a storage facility (e.g., at a “terminal rack”) in the Participating Jurisdiction, or, for fuel removed from a facility in another jurisdiction, upon delivery into the Participating Jurisdiction.

B. Regulated Entities. “State Fuel Suppliers” shall be required to hold allowances to cover CO₂ emissions from Affected Fuel and report CO₂ emissions to each Participating Jurisdiction. State Fuel Suppliers shall include:

- (1) “Position Holders,” which shall mean owners of Affected Fuel at terminals delivering across a terminal rack. Affected Fuel that is destined for final sale or consumption in a Participating Jurisdiction.
- (2) “Enterers,” which shall mean owners of Affected Fuel delivered into a Participating Jurisdiction from a facility in another jurisdiction for final sale or consumption in the Participating Jurisdiction. Enterers may not be required to hold allowances to cover emissions from Affected Fuel where a Position Holder sells Affected Fuel destined for final sale or consumption in a Participating Jurisdiction and the Position Holder holds allowances to cover emissions from such Affected Fuel. Sufficient documentation must exist to demonstrate that the compliance obligations are being fulfilled by the Position Holder (on behalf of the Enterer).

C. Other Entities with Reporting Obligations. Owners and operators of other fuel supply infrastructure (terminals, pipelines, distributors, blenders, etc.) may also have reporting or recordkeeping obligations.

D. Regional Emissions Cap. An initial regional base annual CO₂ emissions cap for the first year of the TCI Program will be set in the final MOU.

The Model Rule shall reflect a regional base annual CO₂ emissions budget for each year of the program; each Participating Jurisdiction’s individual emission budget will be based on its apportionment of the regional cap for each year of the TCI Program, and the regional annual limits, called the regional base annual CO₂ emissions budget, shall decline over time in order to reduce the amount of CO₂ emissions from the Affected Fuel covered by the TCI Program.

E. Participating Jurisdictions’ Emission Budgets. The regional base annual CO₂ emissions budget shall be apportioned to the Signatory Jurisdictions in the final MOU, in the form of Participating Jurisdiction annual CO₂ emission budgets, and such budgets shall be revised as necessary to reflect the entry or withdrawal of Participating Jurisdictions.

F. Scheduled Reductions. Beginning with the initial regional base annual CO₂ emission budgets for 2022, the regional base annual CO₂ emission budgets shall decline by an amount per year to be set in the final MOU.

G. Stability Mechanisms.

- (1) Cost Containment Reserve. The Model Rule may include a Cost Containment Reserve (“CCR”), consisting of a quantity of allowances in addition to the annual CO₂ emissions budget which are held in reserve. The CCR allowances are only made available for sale if emission reduction costs are higher than projected. The CCR is replenished at the start of each calendar year.

- (2) Emissions Containment Reserve. The Model Rule may include an Emissions Containment Reserve (“ECR”) that allows the Participating Jurisdictions to withhold allowances from circulation if CO₂ emission reductions costs are lower than projected.
- (3) Linking. The TCI Program could link to other emissions reduction programs through mutual agreement to accept each other’s emission allowances. Linking is not immediately contemplated, but the TCI Program and Model Rule shall be developed to enable potential linking in the future, if desirable.

H. Emission Reporting Requirements.

The Model Rule shall include an electronic emissions reporting system informed by existing reporting requirements for State Fuel Suppliers. Participating Jurisdictions will establish mechanisms to ensure the accuracy of the reported data. The Model Rule could provide for the use of existing platforms for the accompanying allowance tracking system. Compliance obligations shall be calculated based on the CO₂ emissions that occur when the Affected Fuel is combusted, using standard emission factors developed by the United States Environmental Protection Agency or other similar sources.

I. Regulated Entity Compliance and Flexibility.

- (1) Compliance Period. The Model Rule shall include three-year compliance periods, at the end of which State Fuel Suppliers must surrender emission allowances equivalent to their emissions during the compliance periods, and shall include interim compliance obligations.
- (2) Banking. The Model Rule shall provide that allowances not used at the end of a compliance period can be retained for sale or use in future compliance periods without limitation.
- (3) Offsets. The Model Rule may provide, as a compliance alternative, the limited use of offsets. The Model Rule may provide for the award of offset allowances to sponsors of approved CO₂ (or CO₂ equivalent) emission offsets projects for reductions that are realized on or after the date of this MOU. Offset allowances may be used for compliance by State Fuel Suppliers.

J. Allowances and Allowance Auctions. The Model Rule shall provide for a shared auction platform. Participating Jurisdictions shall originate allowances consistent with the Model Rule established through their own laws and regulations as set forth in this MOU. Participating Jurisdictions shall accept allowances sold or originated in other Participating Jurisdictions for compliance with their own laws and regulations implementing the Model Rule as set forth in this MOU. Participating Jurisdictions shall offer all allowances for sale through auction, except that Participating Jurisdictions may set aside a small number of allowances to be used to achieve other TCI Program goals. The Participating Jurisdictions shall establish a minimum reserve price, below which allowances will not be sold.

3. INVESTMENTS AND EQUITY

A. Investment of Proceeds from Auction of Allowances. Each Participating Jurisdiction shall invest the proceeds from the auction of allowances as determined appropriate by each Participating Jurisdiction to achieve TCI Program goals. Participating Jurisdictions may identify shared or common priorities for investment of proceeds, including to maximize the efficiency of the regional program and to ensure greater benefits, and to achieve CO₂ emission reductions and other related TCI Program goals, such as improved air quality, public health, resilience, and more affordable access to clean transportation alternatives.

B. Equity Shared Priority. Each Signatory Jurisdiction agrees that it is a shared priority to expand low-carbon and clean mobility options in urban, suburban, and rural communities, particularly for populations and communities that are disproportionately adversely affected by climate change and transportation pollution and currently underserved by the transportation system. Each Participating Jurisdiction will work with communities to assess the equity impacts of the program on an ongoing basis to evaluate whether program changes are needed and to inform investment priorities.

4. REGIONAL ORGANIZATION

The Regional Organization shall operate pursuant to by-laws agreed upon by the Participating Jurisdictions. The Regional Organization shall have an executive board comprised of two representatives from each Participating Jurisdiction. The Regional Organization may employ staff, and acquire and dispose of assets, to perform its functions.

A. Regional Organization Functions, Authorities and Limits on Authorities. The Regional Organization shall have the following functions:

- (1) Administrative Forum. Act as the forum for collaborative discussion regarding administration of the TCI Programs as the agent of each Participating Jurisdiction, as each Participating Jurisdiction implements its own individual programs.
- (2) Emissions and Allowance Tracking Agent. Act as the agent of each Participating Jurisdiction to develop, implement, and maintain the system to receive and store reported emissions-related data from regulated entities and track allowance accounts for the Participating Jurisdictions' individual programs.
- (3) Auction Administration. Act as the agent of each Participating Jurisdiction to administer allowance auctions on behalf of the Participating Jurisdictions.
- (4) Carbon and fuel market monitoring. Act as the agent of each Participating Jurisdiction to monitor emission allowance and transportation fuel markets on an ongoing basis.

- (5) Contracting. Contract with appropriate experts, with the agreement of the Participating Jurisdictions, to implement tracking systems, reporting systems, auction systems, banking systems or other administrative functions needed to assist and support the implementation of the TCI Program.
- (6) Limitation on Authority. The Regional Organization is an agent for the Participating Jurisdiction as specified in this MOU and a technical assistance organization only. The Regional Organization shall have no authority to adopt, implement or enforce the TCI Program. Authority is reserved to each Participating Jurisdiction for the enactment or promulgation of laws for the implementation and enforcement of its individual program.

B. Funding for the Regional Organization. The Signatory Jurisdictions agree that the Regional Organization shall be funded by payments from each Participating Jurisdiction in proportion to the Participating Jurisdiction's annual base CO₂ emissions budget, subject to any necessary appropriations process in the respective jurisdiction. The Regional Organization's budget shall be determined and approved by the Regional Organization's executive board.

5. ADDITION OR WITHDRAWAL OF PARTICIPATING JURISDICTIONS

A. New Participating Jurisdictions. The Participating Jurisdictions shall work together to encourage non-signatory jurisdictions to become Participating Jurisdictions and shall welcome the participation of new jurisdictions with a goal to expand the geographic reach of the regional TCI Program. Participating Jurisdictions would execute any necessary measures to adjust the TCI Program.

B. Withdrawal from the TCI Program. A jurisdiction may withdraw from the TCI Program. In this event, the remaining Participating Jurisdictions would execute any necessary measures to adjust the TCI Program.

6. PROGRAM MONITORING AND REVIEW

Each Participating Jurisdiction shall monitor the progress of its individual program and the regional TCI Program on an ongoing basis. No later than three years after program launch and regularly thereafter, the Participating Jurisdictions shall commence a comprehensive review of the regional TCI Program and the Model Rule to determine its effectiveness and whether it is achieving emission reductions at reasonable cost.

The Participating Jurisdictions shall annually review and report the impacts of each Participating Jurisdiction's individual program. The Participating Jurisdictions may pursue additional reductions after 2032.

EXECUTIVE SUMMARY

Evaluating the Potential Environmental and Economic Benefits and Costs of a Cap and Invest Program for Transportation Emissions in the TCI Region

The jurisdictions participating in the Transportation and Climate Initiative (TCI) have used multiple economic and public health models to understand the potential impacts of a cap-and-invest program for transportation emissions. The models were used to analyze three different cap stringency scenarios. The modeling results provide an estimate of impacts from these scenarios that will help inform decision-making but do not guarantee particular outcomes. We welcome public input on the modeling results.

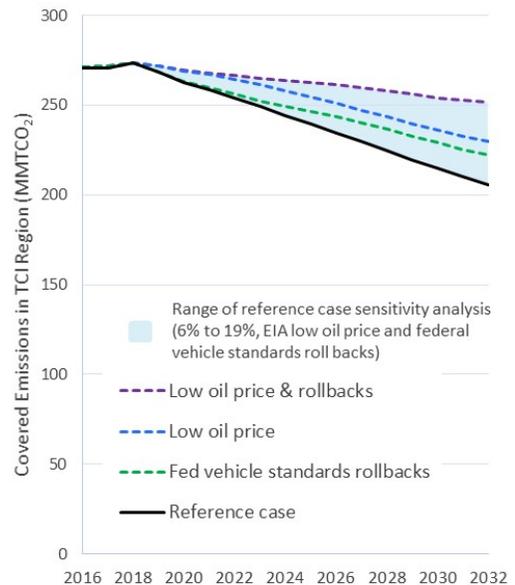
KEY FINDINGS

- Under all three cap reduction scenarios, the program is projected to produce positive overall environmental, health, economic and other benefits.
- A declining emissions cap could lock in decreases in carbon dioxide emissions that are expected through 2032 and potentially drive additional reductions.
- The program would enable the jurisdictions to work with communities and businesses to reduce carbon dioxide emissions through programs that expand access to clean mobility and other transportation options, spur economic growth, and improve the lives of residents.

Transportation Emissions under “Business as Usual” (Reference Case)

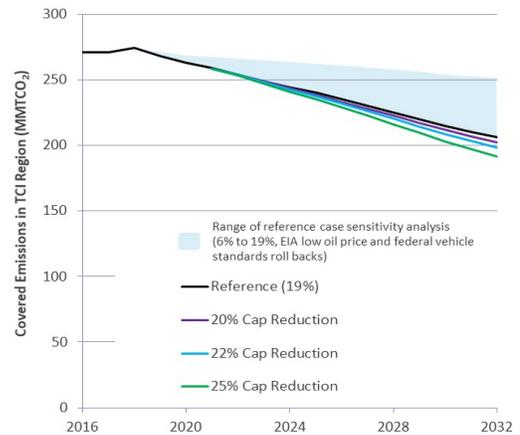
The results of the business-as-usual analysis, or Reference Case, suggest that carbon dioxide emissions from on-road transportation fuels are expected to decrease by 19 percent by 2032 compared to emissions in 2022. This decline is largely the result of improving vehicle efficiency and greenhouse gas emission standards and a shift away from internal combustion engines and toward zero emission vehicles (ZEVs). The shift to ZEVs is achieved through implementation of existing federal and state regulations, shifts in consumer preferences, and innovation that lowers technology costs.

In modeling the Reference Case, the TCI jurisdictions used the best-available projections of technology and commodity prices as well as the continuation of existing regulation. If key variables change, such as lower-than-expected oil prices or existing federal vehicle standards are rolled back, the emission reductions anticipated in the Reference Case would be significantly less (declining by as little as 6% between 2022 and 2032), as illustrated by the range of potential future emissions on the graph to the right.



Emission Reductions under a Cap-and-Invest Program

As the TCI jurisdictions evaluate the program details that will be included in the final Memorandum of Understanding, we invite the public to provide input on the modeled cap reduction scenarios. The different cap levels lead to different projected allowance prices and proceeds to invest. These projections are detailed in the chart to the right.



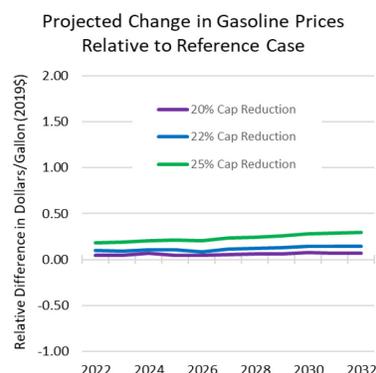
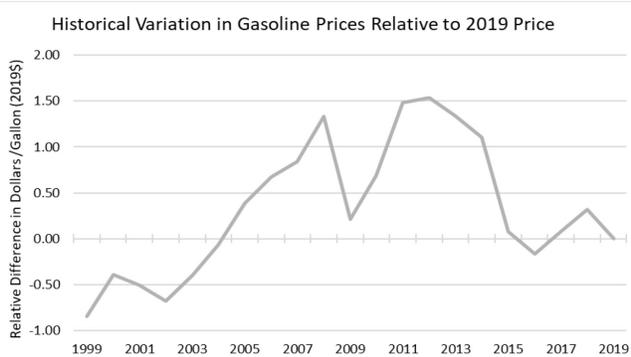
Economic and Public Health Benefits

Under each cap reduction scenario modeled, regional gross domestic product (GDP), disposable personal income (DPI), and jobs are projected to increase modestly. A preliminary region-wide analysis conducted by Cambridge Systematics projected that cleaner air, improvements in safety, and more physical activity would result in significant net public health benefits for residents of the region. For illustrative purposes, the table on the right illustrates some of these projected benefits in the year 2032. In the spring of 2020, a multi-university team led by Harvard C-CHANGE will complete detailed modeling and mapping of the health consequences of county-level changes in air pollution and physical activity across the entire region for multiple cap reduction scenarios.

Economic and Health Indicators, in 2032	20% Cap Reduction	22% Cap Reduction	25% Cap Reduction
% increase in GDP growth, from Reference Case	0.01%	0.03%	0.05%
% increase in DPI growth, from Reference Case	0.01%	0.02%	0.04%
% Increase in Jobs, from Reference Case	0.004%	0.01%	0.02%
Reduced asthma symptoms/exacerbation	338	673	1,366
Deaths and premature deaths avoided	307	610	1,014
Total monetized public health benefits (Billions of 2017\$)	\$3	\$6	\$10

Estimated Changes in Fuel Prices

Gasoline and diesel prices vary widely over time due to a variety of global factors. If the regulated entities in the petroleum industry choose to pass the costs of compliance with a cap and invest program on to consumers, our modeling estimates an incremental price increase in 2022 of \$0.05, \$0.09 or \$0.17 per gallon in the 20%, 22% and 25% Cap Reduction Scenarios, respectively. These changes would be well within the range of historical variability. The goal of a regional cap-and-invest program would be to use the proceeds to invest in clean transportation options, reducing the exposure of our economy to these oil market price fluctuations. Complementary programs that reduce fuel consumption, such as



more ambitious federal and state vehicle emissions standards, would be expected to moderate costs further.

Targeted Investments

Cap-and-Invest programs inherently leverage market dynamics to achieve guaranteed emissions reductions at relatively low costs for consumers and businesses. When auction proceeds are invested in low-carbon transportation programs, it makes it easier to meet the emissions cap in any given year. This is particularly true when investments are targeted toward the most cost-effective strategies – i.e., solutions that reduce more tons per dollar invested. When a regional cap and invest program is implemented, each participating TCI jurisdiction will determine how to invest its share of the proceeds. For comparison, the table below summarizes three hypothetical investment scenarios that were modeled with a 25% Cap Reduction scenario and the figure on the right illustrates allowance prices that result from the analysis.

Low-Carbon Transportation Investment Strategies	Illustrative Investment Portfolios		
	A	B*	C
Electric cars, light trucks and vans	5%	30%	54%
Low & zero-emission buses and trucks	21%	23%	27%
Transit expansion and upkeep	35%	18%	-
Pedestrian and bike safety, ride sharing	16%	14%	10%
System efficiency	7%	8%	8%
Indirect/ Other	17%	8%	-



Background Information on the Modeling Approach

Economic, transportation, and public health modeling tools provide information to help policy makers and the public understand what trends—such as changes in VMT¹ and emissions—we can expect in transportation and other sectors of the economy. Typically, a modeling analysis begins with the question, “What can we expect in the future without new policy, if the future is business as usual?” Next, policy scenarios are added to the model to test how the policies could affect future trends. By comparing the business-as-usual, or “Reference case,” projections with those that result from new policies, one can better understand the potential impacts of proposed policies like the TCI cap-and-invest program.

The modeling analysis presented here is derived from a few different models.² The National Energy Modeling System, developed and maintained by the U.S. Energy Information Administration, was modified for use in the TCI region (i.e., TCI-NEMS) and used as the primary modeling tool to better understand trends in both the transportation and electricity sectors with and without a new TCI cap-and-invest program. An investment strategies modeling tool developed for the states was used to estimate the effect of investing auction proceeds in a wide variety of low-carbon transportation technologies and programs, and those effects were fed back into the TCI-NEMS model. This tool, in combination with the World Health Organization’s HEAT model, was also used to provide preliminary estimates³ of the health benefits provided by investments through cleaner air and increased use of active transportation options (walking and biking). The REMI model⁴ was used to project macroeconomic impacts, including changes in economic growth, income and employment.

¹ Vehicle miles traveled (VMT) measures the total distance traveled by all vehicles in a geographic region over a given period of time, typically 12-months.

² For more information regarding modeling tools and methods, please go to [this link](#).

³ More detailed and comprehensive health benefit analysis is underway and will be completed in early 2020.

⁴ The REMI model is a dynamic forecasting and policy analysis tool commonly used to evaluate the macroeconomic effects of energy and environmental policies.