

Delaware Transit Corporation's Climate Action Plan

Reducing DART's Greenhouse Gas Emissions

April 15, 2022





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EXECUTIVE SUMMARY

REDUCE GHG EMISSIONS GENERATED

Reduce overall GHG emissions by 50% by 2030

Target	Actions
 Revenue Fleet	<ul style="list-style-type: none"> Transition paratransit fleet to 100% propane by 2030 Transition fixed-route fleet to 25% zero emissions bus by 2030
 Support Fleet	<ul style="list-style-type: none"> Transition non-revenue light duty fleet to 20% electric and propane by 2030
 Facilities	<ul style="list-style-type: none"> Reduce facility energy consumption by 10% by 2030

Delaware Transit Corporation (DTC) recognizes that climate change is the biggest environmental threat facing our nation. To lead its efforts to minimize greenhouse gas emissions and maximize resilience to climate change, DTC is releasing its first Climate Action Plan.

A blueprint for DTC’s Sustainability Program, it establishes agency-wide strategies to reach an ambitious goal of “50X30” - a 50% reduction in its total greenhouse gas emissions (GHG) by 2030.

To reach the 50% GHG reduction target from the 2016 baseline year, DTC has established energy efficiency and energy use objectives for its **Revenue Fleet**, **Support Vehicles**, and **Facilities**.

DTC is confident it can meet, or exceed, its “50X30” GHG emissions reduction target.

If DTC meets this Climate Action Plan’s objectives, the estimated annual gross GHG emissions will decline from the 2016 total of 92,217 metric tons of CO₂ equivalent to 39,182 metric tons of CO₂ equivalent in 2030 - **a 58% reduction in GHG emissions**, exceeding the 50% reduction goal.

DTC has established a monitoring program to annually review and assess actual performance results compared to target goals. As funding and regulations change, **DTC will update this plan regularly to continue advancing toward sustainable public transportation.**

DTC GROSS GHG EMISSIONS (2016–2030)*

	2016 GHG Emissions (Baseline)	2030 GHG Emissions (Target)
Fleet 	90,234	37,036
Support Vehicles 	779	675
Facilities 	1,204	1,472
Total GHG Emissions 	92,217	39,182
50x30 Goal	92,217	46,109



* Annualized GHG Emissions measured as metric tons of CO₂ equivalent (MTCO₂-eq)



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Acronyms

ARRA	American Recovery and Reinvestment Act
AV	Autonomous Vehicle
DeIDOT	Delaware Department of Transportation
DTC	Delaware Transit Corporation
EPA	Environmental Protection Agency
eGRID	Emissions & Generation Resource Integrated Database
EV	Electric Vehicles
FTA	Federal Transit Administration
GHG	Greenhouse Gases
KPI	Key Performance Indicators
kWh	Kilowatt Hour
MMBtu	Metric Million British Thermal Unit
MPG	Miles Per Gallon
MTCO₂-eq	Metric Ton Carbon Emissions Equivalent
SEPTA	Southeastern Pennsylvania Transportation Authority
SGR	State of Good Repair
TAM	Transit Asset Management
ULB	Universal Life Benchmark
VMT	Vehicle Miles Traveled
ZEB	Zero Emissions Bus

1. PLAN PURPOSE

For more than a decade, Delaware has taken steps to address the causes and consequences of climate change. Delaware Transit Corporation (DTC), an operating division of the Delaware Department of Transportation (DelDOT), has been striving to reduce greenhouse gas (GHG) production. The State's [2021 Climate Action Plan](#) set a strategic, streamlined sustainable plan for decades ahead. Now DTC follows with its own Climate Action Plan (Plan).

DTC is committed to providing transit services that protect and preserve the environment - with every trip on DTC services and every dollar invested in green technology. In line with this commitment and those set forth by Delaware's Climate Action Plan, this Plan provides a sensible path to reduce emissions in the operation of DTC facilities and bus fleets. Delaware's Climate Action Plan reported that transportation accounts for the largest in-state source of GHG emissions at 61%, offering the most opportunity for improvement.

The purpose of this Plan is to set agency-wide objectives and targets to guide DTC's Sustainability Program through 2030. This Plan will become a benchmark to assess DTC's success in reducing emissions of its revenue fleet, supporting vehicles, and all facilities.

The Plan uses the following terminology:

- ❖ **Focus areas** selected to measure performance: **energy efficiency & energy use**
- ❖ **Targets:** specific, measurable metrics to achieve within a set timeframe – **by 2030**
- ❖ **Actions:** steps DTC has committed to or aspires to take to accomplish **targets** for each **focus area**



2. DTC OVERVIEW

Public transportation in Delaware dates to when the Wilmington City Railroad Company operated horse-drawn trolleys in Wilmington. Since those early days public transportation has expanded across the entire state.

In 1995, all statewide public transportation providers merged into DTC to enhance connectivity and service availability. **DTC is the public transit division of DeIDOT** and operates under the name of “DART”.



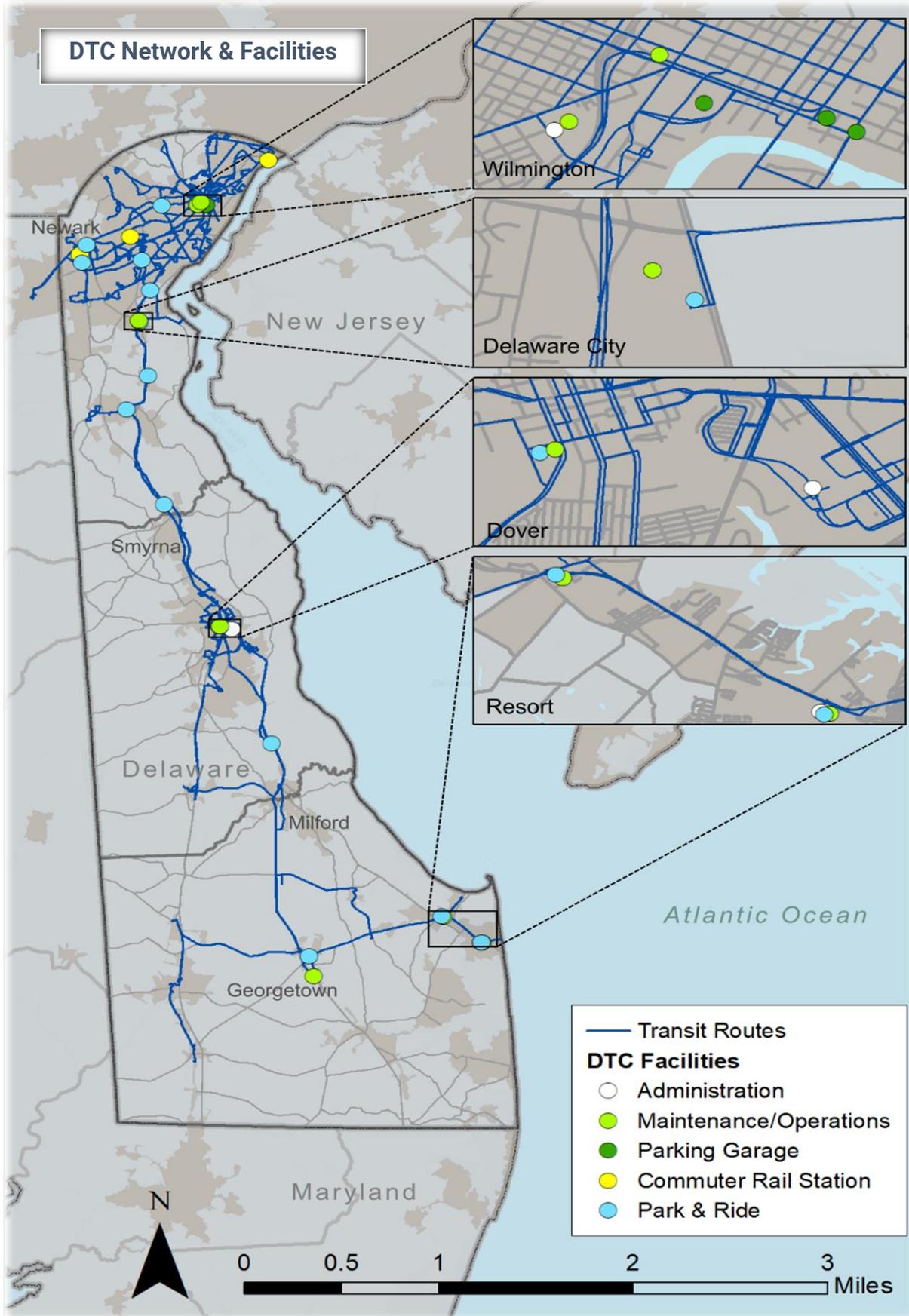
Trolleybuses at the Delaware Coach Company garage in Wilmington, 1950. Source: shorpy.com

DTC’s mission is to connect people to what matters

- ✓ Every Ride
- ✓ Every Customer
- ✓ Every Day

DTC service snapshot (2022)

- ❖ Type: fixed routes and paratransit
- ❖ Coverage: statewide, including seasonal resort trips
- ❖ Span: 7 days a week, hours and frequencies vary
- ❖ Fleet: 510 revenue vehicles:
 - 242 fixed-route buses
 - 268 paratransit vehicles
 - 16 million annual Vehicle Miles Travelled
- ❖ Ridership: 9.3 million annual trips
- ❖ Contracted service: First Transit (paratransit) & SEPTA (commuter rail)
- ❖ 60+ bus routes serving:
 - 2,307 bus stops
 - 9 park & rides
 - 5 transit centers
- ❖ Statewide facilities:
 - 7 operations & maintenance facilities
 - 2 administration facilities
 - 8 passenger facilities



3. EMISSIONS REDUCTION TARGETS

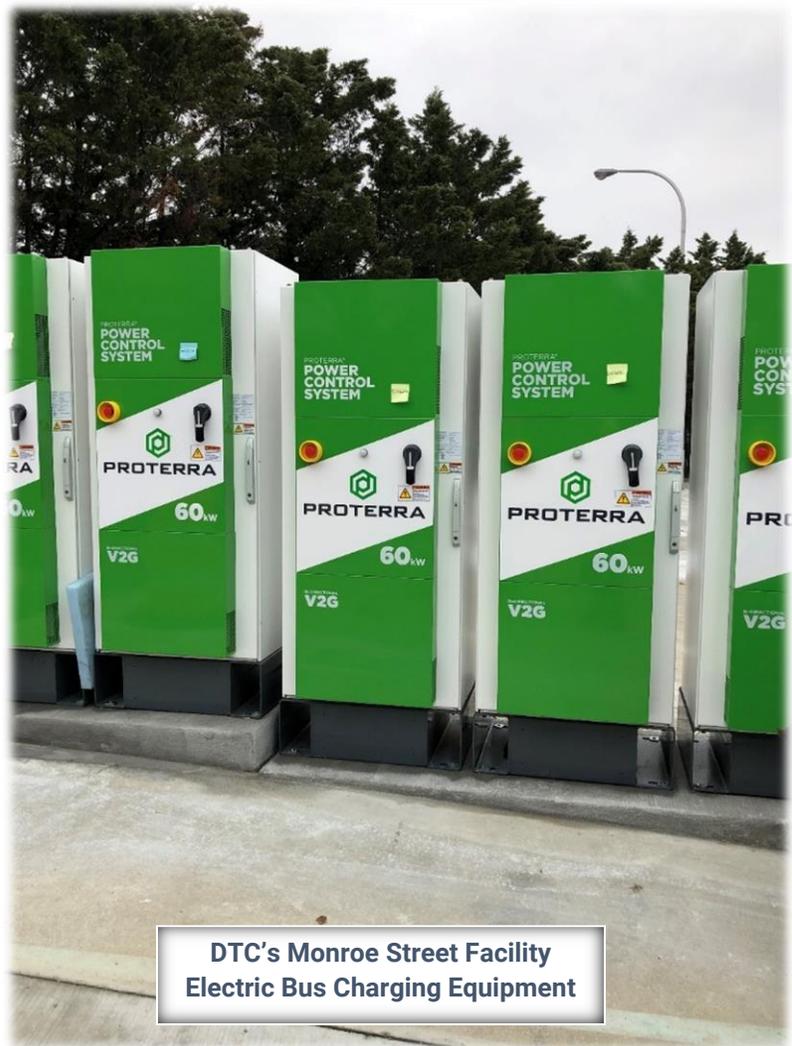
“50X30” Target

To meet climate goals, transportation emission reductions are essential.

While DTC already reduces GHG emissions across Delaware through provision of public transportation services, it is taking further steps by developing its own CO₂ emission reduction targets based on federal, state, and local guidance and best peer practices. DTC’s **Climate Action Plan offers a path to a cleaner, more sustainable future.** DTC’s overarching goal is to develop a comprehensive and inclusive sustainability framework for sustained, cost-effective and equitable DTC operations. DTC defined target is “**50X30**” - to reduce the total cumulative GHG emissions from all DTC operations by 50% between 2016 (baseline year) and 2030.

“50X30”

This Climate Action Plan outlines “50X30” target strategies: a 50% reduction in GHG emissions by 2030 – with focus on ‘greening’ fleet and facilities.



DTC's Monroe Street Facility
Electric Bus Charging Equipment

Focus Areas

DTC has established two key focus areas to categorize the 2022 Climate Action Plan initiatives to reach the “50X30” GHG emissions reduction target:

1. Energy Efficiency: fleet and support vehicles fuel use.

Improvements in energy efficiency offer pathways to decrease GHG emissions. In 2020, DTC’s revenue fleet (fixed-route and paratransit buses) and non-revenue fleet (support vehicles) accounted for nearly 97% of DTC’s energy consumption, suggesting that initiatives that reduce utility consumption or fuel consumption offer the most effective way to cut GHG that began in 2016 emissions.

DTC’s “50X30” target builds upon recent initiatives to invest in cleaner and zero emissions fleet. To reduce GHG emissions, it will continue the transition of paratransit fleet to propane gas – with a full transition expected by 2030. By that benchmark year, it also intends to transition 25% of the diesel-powered, fixed-route buses to zero-emissions (electric or hydrogen). Finally, DTC has set a realistic target of converting 20% of its light-duty support vehicles to battery-electric and propane by 2030.

2. Energy Use: energy consumption at facilities.

DTC uses energy for every aspect of its operations—from powering, washing, and maintaining buses to lighting, heating, and cooling facilities. Efficient energy use helps it to manage increasing energy costs and reduce GHG emissions from energy generation and use.

DTC is working to increase energy efficiency and decrease energy consumption by transitioning to lower carbon forms of energy and more energy-efficient ways to power and provide support for the fleet and facilities, including energy-saving LED lighting, motion sensors, timers, solar rooftop panels, waste generation, water reduction, recycling measures, and commuting incentives for employees to minimize energy use.



DTC’s Dover Administration Facility Roof Solar Panels



CLIMATE ACTION PLAN TARGETS

Greenhouse Gas (GHG) Emissions



Reduce GHG emissions generated



Reduce overall GHG emissions by 50% by 2030

Fleet

Reduce fleet GHG emissions generated



Transition paratransit fleet to 100% propane by 2030



Transition fixed-route fleet to 25% zero emissions bus by 2030



Support Vehicles

Reduce non-revenue GHG emissions generated



Transition non-revenue light duty fleet to 20% electric and propane by 2030

Facility

Reduce energy consumption



Reduce facility energy consumption by 10% by 2030



4. EMISSIONS PROFILE

Scope

Per the U. S. Environmental Protection Agency’s (EPA) Center for Corporate Climate Leadership, there are three different scopes related to how emissions are produced. Scope 1 encompasses direct emissions produced through vehicles and facilities, while Scopes 2 and 3 are indirect sources of emissions.

For example, a company using purchased electricity would result in Scope 2 emissions, because the emissions are not being directly produced on-site. Nevertheless, the electricity that is used to operate stems from processes directly related to GHG emissions and must be considered as part of any emission reduction plan. Scope 3 also includes indirect emissions, like the transportation of goods used for operations and waste generated in operations. One activity that falls under the Scope 3 category of emissions generation is employee commuting. DTC’s emission inventory includes each of the three scope items: Scope 1 (revenue and non-revenue vehicles). Scope 2 (facilities), and Scope 3 (employee commute).

Conversion Factors

For bookkeeping purposes, this 2022 Climate Action Plan uses the Center for Transportation and Environment, Federal Transit Administration (FTA), and EPA region-specific conversion factors to create a comprehensive energy and GHG emissions inventory. DTC currently uses four energy sources in its system and services. Three on-site combustion sources: diesel, propane gas, and gasoline, and one purchased energy, where combustion occurs elsewhere: electricity.

DTC reports GHG emissions in metric tons of carbon-dioxide equivalents (MTCO₂-eq), per mile for transit vehicles powered by electricity and equivalent to MTCO₂-eq in indirect emissions based on annualized kilowatt hour (kWh) used. For comparison to MTCO₂-eq impacts, only for energy use at our facilities. DTC also normalizes energy units and reports them in Metric Million British Thermal Unit (MMBtu).

DTC’s path to “50X30”

Emission inventory considers all three EPA source scope categories:

1. Revenue & non-revenue vehicles
2. Facilities
3. Employee commutes

DTC GHG Emissions Factors

Fuel	Asset	Factor*
Gasoline	Fleet	0.009072
	Support vehicles:	
	❖ Passenger cars	0.00041
	❖ Vans	0.00121
Propane	Fleet	0.002364
Diesel	Fleet (Diesel)	0.00268
	Fleet (Hybrid)	0.00216
	Support vehicles: Trucks	0.00143
Electricity	Fleet	0.001078
	Support vehicles	0.000164
	Facilities	0.000454 [MTCO ₂ -eq] 0.003412 [MMBtu]

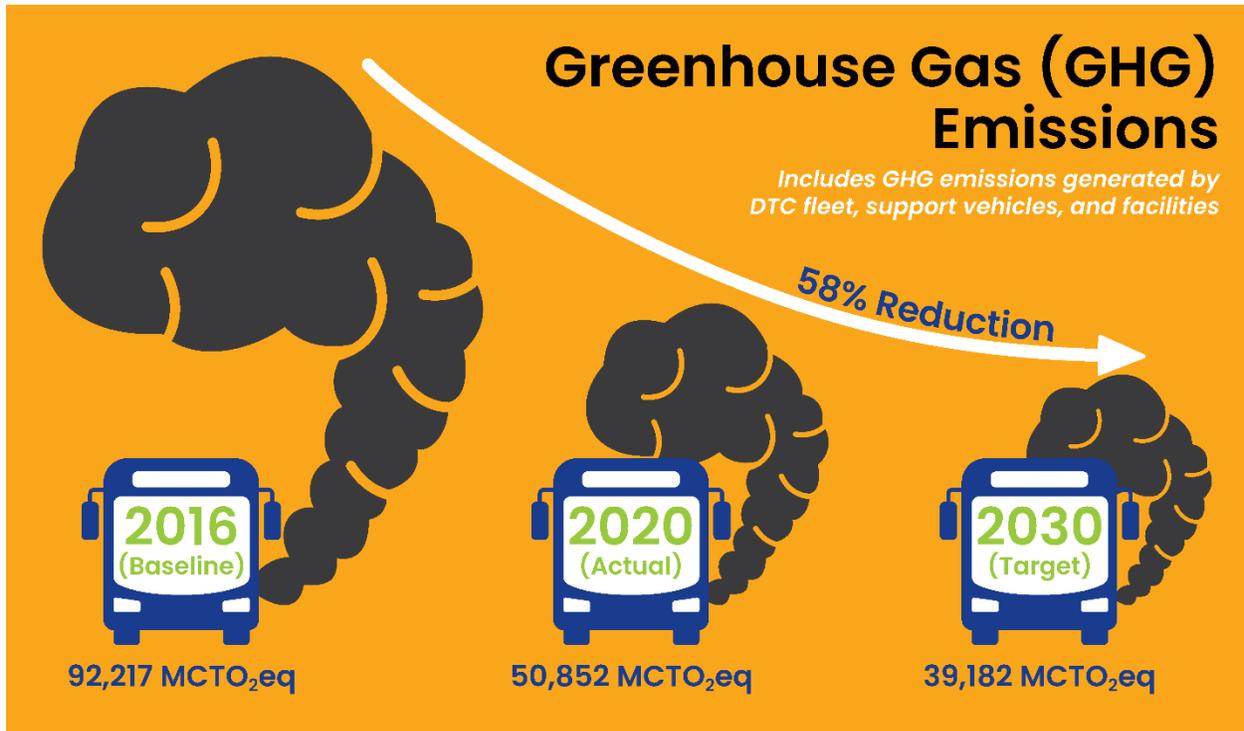
*Average CO₂ Production / Metric Ton (MTCO₂-eq)

Sources: Center for Transportation and Environment, FTA, and EPA

DTC Today and its Outlook for Tomorrow

Based on fleet and facilities greening commitments and aspirations, DTC is confident that it can meet, or exceed, its “**50X30**” GHG emissions reduction target. In 2016, DTC’s gross annualized GHG emissions from fleet and facilities operations totaled nearly **92,200** MTCO₂-eq. Since then, DTC has reduced fleet-related GHG emissions significantly, primarily due to 1) introducing 14 Zero Emission Bus (ZEB) fixed-route fleet vehicles replacing diesel-powered buses, and 2) a shift away from gasoline to propane gas-powered paratransit fleet. Overall GHG emissions from fleet and support vehicles, as well as improved operation of administrative and storage and maintenance facilities decreased GHG emissions to **50,900** MTCO₂-eq. by 2020.

Through the efforts outlined in this Climate Plan, DTC expects to further reduce energy consumption such that it will recognize energy consumption reductions that meet or exceed our target reduction. DTC expects to reach a reduction of baseline 2016 GHG emissions by 58% by 2030, or approximately **39,200** MTCO₂-eq.



DTC Gross GHG Emissions [2016-2030] *

Focus Area	2016 [Baseline]	2020 [Actual]	2030 [Target]	2016-2030 [Expected]
Fleet	90,234	48,436	37,036	-59%
Support Vehicles	779	789	675	-13%
Facilities	1,204	1,627	1,472	22%
Emissions	92,217	50,852	39,182	-58%
<i>Benchmark 50X30</i>	<i>92,217</i>	<i>61,509</i>	<i>46,109</i>	<i>-50%</i>

*Annualized GHG Emissions MTCO₂-eq

Fleet Emissions

The GHG emissions reduction targets for DTC’s fleet were developed with the future contribution of both revenue fixed route bus and demand-responsive fleet services and associated fuel consumption in mind – currently a mix of ZEBs and diesel for the former and gasoline and propane gas for the latter.

As of 2020, DTC’s fixed route and paratransit fleet included 530 vehicles, including 288 paratransit vehicles and 242 fixed-route buses. Together, these vehicles have a total annual vehicle mile traveled (VMT) of over 16 million – an increase of nearly 3% compared to our 2016 baseline VMT data. Using emissions factors prepared for DTC by the Center for Transportation and Environment, the VMT resulted in **48,436** MTCO₂-eq.

Compared to the set baseline year of 2016, this is a 46% decrease in metric tons of CO₂ equivalent when using the same emissions factors. This is attributable to the ‘greening’ process of the fleet, with GHG emissions decreases from the on-going shift away from gasoline to propane gas for demand-responsive vehicles and the continued purchasing of multiple fixed route ZEBs.

DTC Fleet GHG Emissions in 2016 [Baseline]*

Service / Vehicle Type	Number of Vehicles	Average Mileage	Total Mileage	Average Emissions/ Vehicle	Total Emissions
Paratransit:					
- Gasoline	220	34,590	7,609,870	313.80	69,037
- Propane	34	6,225	212,659	14.79	503
Fleet Total	254	20,408	7,822,529	273.78	69,539
Fixed Route:					
- Diesel	198	36,549	7,236,701	97.95	19,394
- Diesel/Hybrid	30	20,072	602,147	43.35	1,301
Fleet Total	228	34,381	7,838,848	90.77	20,695
Total	482	32,492	15,661,377	187.20	90,234

*Annualized GHG Emissions MTCO₂-eq

DTC Fleet GHG Emissions in 2020*

Service / Vehicle Type	Number of Vehicles	Average Mileage	Total Mileage	Average Emissions/ Vehicle	Total Emissions
Paratransit:					
- Gasoline	51	24,884	1,269,070	225.75	11,513
- Propane	237	27,291	6,467,991	64.52	15,290
Fleet Total	288	26,865	7,737,061	93.07	26,803
Fixed Route:					
- Diesel	202	36,271	7,326,734	97.21	19,636
- Diesel/Hybrid	26	32,824	853,427	70.90	1,843
- ZEB	14	10,147	142,054	10.94	153
Fleet Total	242	34,389	8,322,215	91.39	21,632
Total	530	30,301	16,059,276	92.23	48,436

*Annualized GHG Emissions MTCO₂-eq



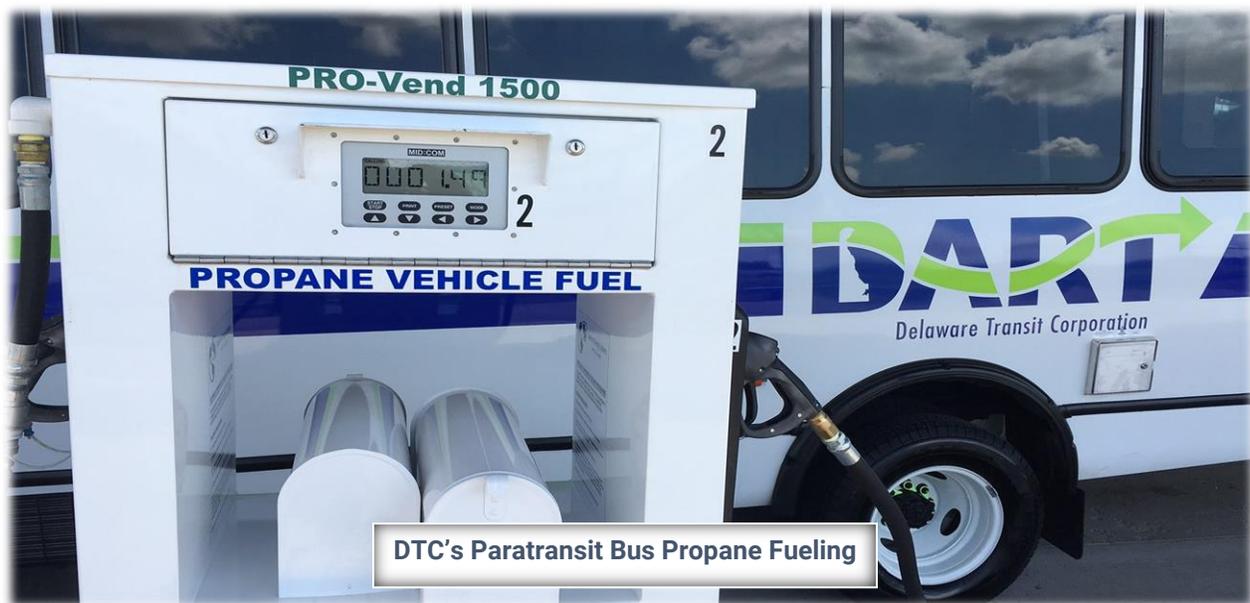
Targeted 2030 reductions in revenue fleet energy consumption assume a 50% replacement of the diesel bus fleet with zero-emission vehicles by 2030 and a 100% phaseout of gasoline paratransit fleet, with the entire fleet converted to cleaner propane gas by 2030.

These planned improvements are expected to decrease our fleet GHG emissions to **37,036** metric tons of CO₂ equivalent annually by 2030. Compared to our 2016 baseline, this is a 58% decrease in MTCO₂-eq when using the same emissions factors.

DTC anticipates meeting or exceeding its “**50X30**” GHG emissions decrease target through the continued greening of the fleet and climate friendly strategies to increase operational climate sustainability.

DTC’s path to “50X30”

Zero-emissions fixed route buses and propane paratransit fleet will decrease annual GHG emissions from revenue service **58% by 2030.**



In addition to propane and electric buses currently operating and to be added to the fleet, DTC is actively investigating hydrogen as a viable zero emission vehicle power source. Hydrogen fueled vehicles provide benefits over their electric counterparts by offering travel ranges comparable to diesel buses; thereby eliminating an electric bus drawback. Electric bus travel ranges on a single charge limit the routes the bus can handle without more than one (1) charge which increases energy use. DTC is in the process of expanding its Mid-County Bus facility and has included provisions in the design to accommodate a future implementation of a hydrogen fleet program. Mid-County’s facility expansion is scheduled to be completed in 2024.

DTC Fleet GHG Emissions in 2030 [Expected]*

Service / Vehicle Type	Number of Vehicles	Average Mileage	Total Mileage	Average Emissions/ Vehicle	Total Emissions
Paratransit:					
- Gasoline	-	-	-	--	-
- Propane	332	29,968	9,949,446	70.84	23,520
Fleet Total	332	29,968	9,949,446	70.84	23,520
Fixed Route:					
- Diesel	122	34,942	4,262,939	93.64	11,425
- Diesel/Hybrid	-	-	-	-	-
- ZEB	129	15,032	1,939,156	16.20	2,090
Fleet Total	251	24,710	6,202,095	53.84	13,515
Total	583	30,475	16,151,541	63.53	37,036

*Annualized GHG Emissions MTCO₂-eq

Assumptions:

- ❖ For 2016 and 2020:
 - FY 2020 ratio and number of light and medium vehicles, use, and mileage was used.
 - Propane vehicle quantity is based on the average number of daily vehicles in use in 2020.
 - Gasoline vehicle quantity is calculated using the total 2020 paratransit vehicle quantities from 2020 TAM Report: Number of 2020 Propane Vehicles.
- ❖ For 2030:
 - Moving average fleet percentage increase between 2016 and 2020 is used to estimate vehicle quantities by 2030.
 - Paratransit vehicle quantities assume full conversion from gasoline to propane by 2030.
 - DTC assumes 50% of fixed route diesel-powered fleet scheduled for replacement converted to ZEBs [likely electric or hydrogen].
- ❖ Miles per Gallon (MPG) rates should increase as efficiency increases but are not considered in the estimates.

Support Vehicles Emissions

As of 2020, DTC's support vehicle fleet included 103 vehicles, including 75 light-duty and 28 medium-duty vehicles. These vehicles have a total annual VMT of 614,558. Using FTA and EPA's emissions factors to estimate GHG emissions, these VMT result in 789 MTCO₂-eq.

Compared to 2016, it is a 13% increase MTCO₂-eq, using the same emissions factors. This was expected because despite decreases in VMT, medium-duty vehicles, which can run on diesel fuel or gasoline and generally have a lower MPG efficiency, represented a higher percentage of total vehicle usage by DTC in 2020 – and impacted the overall magnitude of support vehicles' GHG emissions.

DTC Support Vehicle GHG Emissions in 2016 [Baseline]*

Vehicle Type	Number of Vehicles	Average Mileage	Total Mileage	Average Emissions/ Vehicle	Total Emissions
Light	78	6,585	513,637	7.97	621.50
Medium	19	5,791	110,035	8.28	157.35
Total	97	6,430	623,672	8.03	778.85

*Annualized GHG Emissions MTCO₂-eq8.03

DTC Support Vehicle GHG Emissions in 2020*

Vehicle Type	Number of Vehicles	Average Mileage	Total Mileage	Average Emissions/ Vehicle	Total Emissions
Light	75	5,455	409,144	6.60	495.06
Medium	28	7,336	205,414	10.49	293.74
Total	103	5,967	614,558	7.66	788.80

*Annualized GHG Emissions MTCO₂-eq

DTC plans to convert 20% of its support vehicle fleet to propane or zero-emissions by 2030. Electric vehicles produce far less emissions per mile traveled compared to gasoline- and diesel-powered vehicles. This conversion will produce a decrease in emissions compared to 2020. For this calculation, it is assumed the same number and ratio of vehicles in use in 2030, as well as the same respective use and mileage rates.

The 20% of the converted fleet will follow the replacement schedule for light duty support propane vehicles only. And, though MPGs continue to improve as efficiency improves over time, these factors are not considered in calculations for 2016 and 2020 and are not factors in predicting future estimations. Compared to 2016, 20% zero-emissions support vehicles will decrease annual reduction of MTCO₂-eq annually from that fleet segment 13% by 2030.

DTC's path to "50X30"

20% zero-emissions support vehicles will decrease GHG emissions from that segment 13% by 2030.



DTC Non-Revenue Support Vehicle

©DART First State

DTC Support Vehicle GHG Emissions in 2030 [Expected]*

Vehicle Type	Number of Vehicles	Average Mileage	Total Mileage	Average Emissions/ Vehicle	Total Emissions
Light:	75	5,455	409,144	5.08	380.94
-Zero-Emissions	20	5,455	109,105	0.89	17.89
-Gasoline	55	5,455	300,038	6.60	363.05
Medium	28	7,336	205,414	10.49	293.74
Total	103	5,926	614,558	6.55	674.68

*Annualized GHG Emissions MTCO₂-eq

Assumptions:

- ❖ Same ratio and amount of light and medium vehicles, usage, and mileage as in 2020.
- ❖ 20% vehicle replacement to zero-emissions [likely electric].
- ❖ MPG rates should increase as efficiency increases but are not considered in the estimates presented herein.

Facilities Emissions

As a public transit agency, when considering the emissions generated, revenue fleet is the main source of GHG emissions. However, facilities are also a source for indirect emissions generated through purchased electricity needed to energize the facilities. **With a total of 26 facilities located throughout the state, DTC’s facilities play a key role in the operation, administration, and access to public transportation services daily.**

These facilities include 2 administration, 7 maintenance, 8 passenger facilities, and 9 DTC owned park and rides. Although all facilities vary in size and location, all are powered by purchased electricity, with the Dover, Mid-County and DART III facilities energy needs subsidized by roof-mounted solar grids.

Existing DTC Facilities

Asset	Type	Name	Opening Year
Facility	Administration	Beech Street	2006
	Administration	Dover	2001
	Operations & Maintenance	Monroe Street	1974, 2004
	Operations	Beech Street	2006, 2018
	Operations & Maintenance	Mid-County	2005
	Operations & Maintenance	Dover	2001
	Operations & Maintenance	Georgetown	1999
	Operations & Maintenance	Rehoboth	1990
Passenger Facilities	Rail Station	Claymont	1990
	Rail Station	Fairplay	2000
	Rail Station	Newark	2021
	Transit Center	Dover	2011
	Transit Center	Lewes	2017
	Transit Center	Wilmington	2020
	Transit Hub	Newark	2008
Parking	Park and Ride	Multiple Sites	Varies

DTC facility emissions were generated using the EPA Power Profiler model. The emission rates in the model are calculated based on a specific eGRID subregion. The emission rates based on the mix of fuel sources in that specific region used to generate electricity as defined by the EPA and DTC is located within the RFC East / Eastern Power Grid (RFCE) eGRID subregion.

To calculate the emissions produced, it is important to know how the electricity is generated. The Emissions & Generation Resource Integrated Database (eGRID) calculates emission rates based on the mix of fuel sources used to generate electricity in the region. For the RFCE eGRID region, the two key fuel sources used to generate electricity are natural gas at 50.3% and nuclear at 36.8%. The remaining 12.9% is a combination of coal (8.6%), solar (.7%), hydro (1.2%), wind (1.1%), biomass (1.6%) and oil (.1%) The estimated RFCE rate for the region is 655.4 (pounds/MWh). Emission estimates for DTC facilities to support DTC’s goal of reducing facility emissions by 10% by 2030 are all on the same eGRID.

DTC's path to "50X30"

Introducing self-sustaining facilities and expanded LED facility conversion will reduce annual indirect emissions 10% by 2030.

DTC's estimated 2016 and 2020 emissions for its facilities were developed using actual energy use, as reported by the utility company. The facility emissions estimates were based on kWh generated then converted to MTCO₂eq to calculate the indirect emissions generated by each facility. For the baseline year of 2016, the total emissions generated was 1,204 metric tons of CO₂eq from 3,845,484 annual kWh consumed.

In 2020, the total metric tons of CO₂eq produced was 1,627 from 5,215,248 annual kWh consumed. When compared to the estimated 2016 emissions, there was a notable increase of 423 MTCO₂-eq. Several factors contributed to the increase:

- ❖ DTC added four new facilities: Beech Street Paratransit Operations, New Newark Rail Station, Lewes Transit Center, and Wilmington Transit Center.
- ❖ DTC also added electric bus charging switchgear and chargers at the Wilmington and Dover facilities.

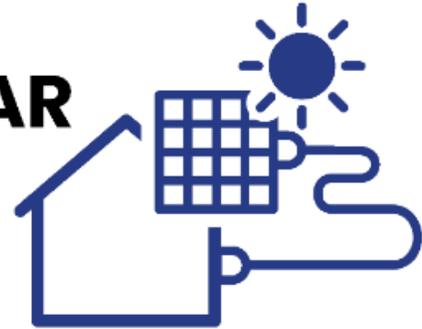
The roof mounted solar power facilities at Dover, DART III and Mid-County have produced significant benefits in reducing energy consumption needs. From the baseline year of FY2011 FY 2012 to FY2020, the total energy produced was 3,352,630 kWh. When measured against the baseline the total kWh saved with the use of the solar panels is 4,140,152 kWh. With the use of solar DTC has reduced the total emissions produced by 1,300 metric tons of CO₂eq.

With the conversion of LED lighting at the Dover Administration building, the estimated annual kWhs decreased from 890,880 in 2016 to 725,760 in 2020, resulting in a reduction of emissions from 279 to 227 MTCO₂-eq

By 2030, DTC expects to reduce the emitted metric tons of CO₂eq from 1,627 in 2020 (kWh) to 1,472 by implementing the current initiatives and expanding LED conversion to additional facilities. Beech Street Administration, Monroe Streets DART I and DART III operations/maintenance, Mid-County Operations and Georgetown Operations will convert to LED lighting. Estimates for energy savings is based on EPA's National Weighted Average LED energy savings factor considering a 60W bulb on for 10 hours/day.



FACILITY TOTAL SOLAR POWER SAVINGS FY12-FY20



4,140,152 kWh saved
from solar usage



Decrease of
1,300 MTCO₂eq
from solar usage



Estimates were prepared for each of those facilities and subtracted from 2020 results. DTC's Monroe Street, DART II, facility is now inactive and expected to be removed as a DTC facility by 2030, eliminating its energy consumption. A new Rehoboth Transit Center facility will be a solar powered facility that will reduce the current facility's energy consumption levels.

DTC Facility GHG Emissions [2016-2030] *

Asset Category	Facility Name	2016 Total Emissions	2020 Total Emissions	2030 Total Emissions
Facility	Beech Street Admin	556.02	827.61	748.61
	Beech Street Operations	-	4.16	4.16
	Dover Admin & Operations	278.91	227.22	227.22
	Monroe Street (DART I, II, & III)	232.95	192.29	173.47
	Mid-County	25.40	35.77	29.77
	Georgetown	19.33	19.76	15.76
	Rehoboth	39.69	47.67	0
	Wilmington Bus Charging	-	81.00	81.00
	Dover Bus Charging	-	46.96	46.96
Passenger Facilities	Claymont Station	7.02	7.67	7.67
	Fairplay Station	21.38	42.85	42.85
	Newark Station	6.67	39.67	39.67
	Dover Transit Ctr	5.26	6.43	6.43
	Lewes Transit Ctr	1.29	42.12	42.12
	Georgetown Transit Ctr	2.12	.06	.06
	Wilmington Transit Ctr	-	2.94	2.94
Parking**	Prices Corner P&R	5.73	.41	.41
	Newark P&R	2.33	2.78	2.78
TOTALS		1,204.1	1,627.4	1,471.9

*Annualized GHG Emissions MTCO₂-eq

**Available energy consumption data for select DTC maintained Park & Ride's

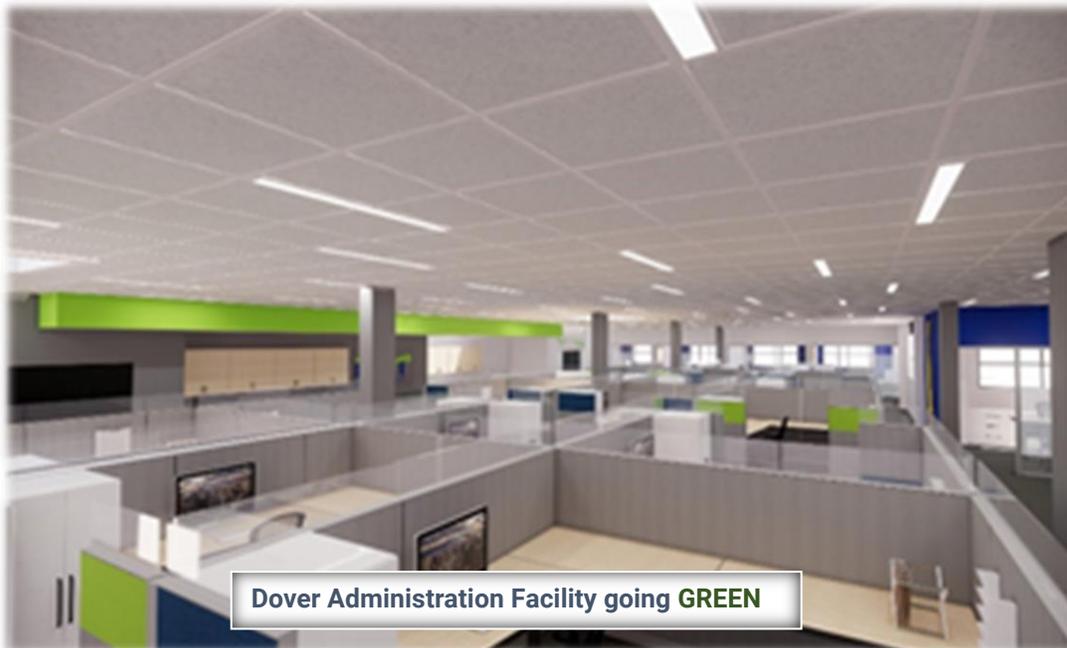
DTC is also analyzing the addition of a solar powered microgrid for bus charging. The charging system will be able to support the additional ZEB fleet in addition to the existing charging infrastructure. DTC will ensure it maintains energy efficiency for all facilities, so energy consumption does not increase measurably beyond the 2020 levels.

Employee Commutes

DTC has 1,006 active employees. Virtually all employees were located at one of DTC's facilities in 2016. Since COVID-19, employees that are able to perform their work from home will be permitted to telecommute two (2) days per week. Depending upon a few factors that include but are not limited to climate sustainability initiatives and strategies, state hiring policies, nationwide hiring practices, and changing commuting practices, the number of telecommuting days allowed for an employee may increase at the start of FY23. DTC's facility power use will decrease as a result of its telecommuting policy thereby reducing climate emissions.

While all DTC employees have access to free public transit, most drive to work. Additionally, each DTC employee is provided with one dependent transit pass to allow a family member free access to public transit. According to the American Association of State Highway and Transportation Official's 2021 report titled, "Commuting in America: The National Report on Commuting Patterns and Trends," the average one-way commuter trip is 7.6 miles. Assuming 255 working days in a year, 1,006 employees will travel a combined total of 3.9 million miles every year for work. If all 1,006 employees commute to work by passenger vehicle, based on emissions factors from the EPA Center for Corporate Climate Leadership, employees will produce 1,435 metric tons of emissions from commuting. With some DTC employees' ability to work from home one (1) day per week there will be a reduction of 1.42 metric tons of CO₂ annually per person. Currently, DTC has 46 employees telecommuting at least one day a week equating to a reduction of CO₂ annually of 65.32 metric tons.

Due to the nature of bus operations, DTC understands the challenges with employee commute options. DTC will continue to educate staff on sustainability best practices and the benefits of 'greening' commutes. DTC works closely with the Delaware Commute Solutions to promote public transit use, carpooling, vanpooling and other non-solo drive means of commuting.



5. PAST AND CURRENT INITIATIVES

DTC has been and continues to be a leader in implementing actions to reduce GHG emissions. To date, a lot has been accomplished, but DTC is tirelessly working to continue to improve.

Revenue Fleet

Fixed-Route Bus

Since 2018, DTC has received \$9.1 million in FTA grants to purchase ZEBs to reduce GHGs produced by its fixed route bus fleet. ZEBs are key technology to combat climate change because they eliminate downstream emissions, thus emitting less CO₂, nitrogen oxide, and 90% of particulate matter, as compared to conventional buses. DTC currently operates 14 electric buses. The buses are currently deployed as follows: New Castle County (10) and Sussex County (4).

As of December 2021, DTC's electric buses have logged a total of 427,344 miles. Over these miles, the electric fleet reduced CO₂ emissions by 685 metric tons compared to a diesel fixed route fleet operating the same distance. To expand the positive environmental impact of the ZEB vehicles, DTC is purchasing twelve (12) more fixed route electric buses which are expected to be delivered in early 2023. With these purchases, electric buses will comprise 10% of the fixed route fleet.



Paratransit

Propane powered buses emit lower levels of GHG emissions and are less costly to run than their gasoline counterparts. In 2016, DTC initiated a program to replace existing gasoline fueled paratransit buses with propane. As of December 2021, DTC has replaced 274 out of 303 paratransit buses with propane fueled cutaway buses; the ongoing replacement of DTC's paratransit fleet with propane powered vehicles represents 90% of the total paratransit fleet.

As additional gasoline paratransit buses reach their ULB, DTC will replace them with a propane fueled vehicle to reach the goal of 100% propane paratransit fleet by 2030. Through 2020, due to the transition to propane fueled paratransit buses began, DTC has reduced the annual GHG emissions for the paratransit fleet by 42,736 MTCO₂-eq.



Support Vehicles (Non-Revenue Fleet)

In 2020, DTC replaced two existing gasoline powered non-revenue light duty vehicles with three (3) EVs. DTC is invested in growing its non-revenue EV fleet as gasoline vehicles require replacement and EVs are available. DTC will replace existing other fossil fueled vehicles as alternative fueled medium and heavy-duty non-revenue vehicles become available.

DTC is currently operating two (2) electric autonomous vehicles (AV) as a part of a pilot program. The AVs operate on DelDOT/DTC's Dover Campus displacing non-revenue fleet vehicle emissions that would have been emitted for travel throughout the campus facilities. DTC is planning to move the AV shuttles to the Newark Regional Transportation Center where they can shuttle rail commuters from the station to the University of Delaware's STAR science and technology campus. The shuttles would provide quick, easy, and green access from the station to STAR campus facilities.

Facilities

A successful plan to reduce GHG emissions should not only focus on fleet vehicles, but also facilities. In concert with the on-going and planned improvements in revenue and non-revenue fleets to reduce GHG emissions, DTC continues to improve the energy efficiency and sustainability of all its facilities across the state.

Administration and Operations/Maintenance

In 2012, under the American Recovery and Reinvestment Act (ARRA) DTC installed an array of roof mounted solar panels at the Dover Administration and Maintenance, DART III Maintenance and Mid-County Maintenance facilities to reduce the energy consumption needs at those. DTC has also added variable airflow and high-capacity HVAC units were installed to increase the facilities climate control efficiencies. Recently, the Dover facility underwent a renovation to replace existing LED lighting to reduce wattage use. The renovations also included water usage reduction measures such as low flow plumbing and water filling stations to decrease water usage impact on the environment.

DTC has received a federal grant to design and construct solar panel bus charging canopies at the Dover facility which is anticipated to begin in 2024. The solar panel canopies will be a self-sustaining microgrid allowing EVs and electric buses to charge off the standard electric grid as much as possible, thereby reducing energy consumption. The canopies will also regulate the internal bus temperature by removing them from direct weather conditions. Overall, these solar bus canopies will maximize charging efficiencies and minimize kWh energy consumption.

A total of four (4) electric vehicle chargers have been added to the Beech Street and Dover Administration buildings combined. The chargers are available for DTC non-revenue support vehicles. DTC staff is encouraged to use an EV during work hours for business purposes when public transit cannot be used.

DTC's paratransit maintenance facility, DART III, was renovated in 2012 and roof solar panels were added to reduce energy needs at the facility. DTC's Mid-County operations and maintenance facility that opened in 2005 also includes solar film.



Passenger Facilities

The new Newark Regional Rail Station core building and parking lots were completed in 2020 and features an environmentally friendly green roof, rain chains and an undercover bike storage and repair area that promotes cycling to and from the station. The enclosed passenger waiting area includes high efficiency HVAC system providing enhanced environmental efficiencies over the previous Newark Station. The station has a waiting area for DART and rail passenger use. The waiting area promotes public transportation use over private vehicles. The station has five dual port electric vehicle charging plugs capable of charging 10 cars, located directly adjacent to the rail platforms to encourage passenger use of electric transportation.



EV Charger in use at Newark Rail Station

The Rehoboth Park & Ride - that includes a passenger facility and operations/maintenance offices - plays an important role in helping to reduce congestion and emissions in the oceanside resort area. With the receipt of a recent FTA grant, DTC plans to expand its role in reducing emissions by replacing the existing facility with a new passenger facility that will be a self-sustaining microgrid powered by on-site solar generation. When completed, it will be DTC's first full self-sustaining facility and—more importantly—eliminate GHG emissions produced by the previous facility.



Scheduling/Operations

Understanding that reducing revenue miles can play an important role in reducing fleet emissions, DTC has initiated an aggressive “Block to Bus” program analyzing bus operations and block assignments. The analysis considers the trip distance of the bus routes and patterns, trip time and ridership to determine where electric buses would be most appropriate. The goal of the operations analysis is to maximize the use of the ZEBs with service levels the buses are most suitable for.

6. STRATEGIES AND ACTIONS

“50X30” targets use industry-proven tools to set in motion or continue a sensible program of actions to meaningfully reduce DTC’s carbon footprint on the environment.

When implemented, these low-carbon and sustainability practices will reduce energy use, cut costs, and promote the achieving the Biden Administration’s call to reduce GHG emissions by 50% by 2030. DTC’s practices will also help achieve the Governor of Delaware’s statewide goal to reduce transportation-related emissions of 30% by 2030. DTC already has multiple strategies and actions in place - with more initiatives beginning by late 2022 and 2023 - to reach the goal of a 50% reduction in GHG emissions by 2030.

Target

Actions

Revenue Fleet



- Complete transition of paratransit fleet to 100% propane fueling
- Continue to transition of fixed-route fleet to ZEB and clean fuel-efficient diesel
- Investigate use of additional alternative fueled vehicles
- Implement DTC’s “Block to Bus” initiative for bus assignments to maximize use of DTC’s alternative fueled vehicles

Support Fleet



- Continue to replace non-revenue fleet with zero emissions vehicles
- Implement use of autonomous vehicles for shuttle services

Facilities



- Implement solar powered canopy microgrid for electric bus charging at the Dover facility
- Implement additional electric vehicle chargers at all DTC facilities and at all DTC park & rides
- Replace Rehoboth Park & Ride with a new microgrid transit center that is fed by on-site solar generation
- Install solar panels at additional DTC facilities where feasible
- Implement additional facility energy reduction measures such as LED lighting, motion sensors, timers, at all DTC facilities

To continue ‘greening fleet’ initiatives, DTC will advocate for increased funding to support major upgrades needed for electrical infrastructure associated with maintaining and operating ZEBs, more resilient power sources, including electricity sourced from renewables and with electricity rates and power purchasing agreement more competitive with diesel fuel, sound and affordable battery pricing and storage, and developing smart charging technology that minimize costs and impacts to the grid, while providing better longevity and operating range.

DTC will lead the effort to include climate friendly equipment, systems, and designs in new construction. DTC will coordinate with building engineers and architects on existing facility building upgrades to include the most climate efficient equipment and systems in each plan. This coordination will also apply to new building construction.

7. IMPLEMENTATION AND MONITORING

DTC’s Climate Action Plan is a living document that will be updated regularly to identify and assess new emission reduction opportunities, respond to new trends and challenges, and reconsider how relevant DTC’s vision, goals, and measurable improvement targets for reimagined, sustainable, greener public transportation across Delaware continue to be.

DTC maintains a robust Key Performance Indicators (KPI) process to help accomplish the GHG emissions reduction targets in this sustainability blueprint. The collaborative KPI process will be instrumental in implementing and monitoring the success of this 2022 Climate Action Plan. DTC collects information daily on all aspects of department performance and with this data, DTC can assess department performance in accordance with department and company goals. As part of the KPI process, performance evaluations are reported to department heads and supervisors through a dedicated performance management intranet site. This site is updated monthly and, in part, allows DTC to identify positive trends that can be capitalized, as well as negative trends that can be corrected. Subject matter meetings will be held to analyze KPI data and trends. The meetings are comprised of all DTC departments that are involved with the subject matter. The subject matter “team” develops strategies to address negative trends or goal shortfalls.

DTC is keenly aware that the technology, science, and products that drive CO₂ emissions reduction are constantly evolving. The most cost-effective and viable alternatives and requirements for reducing CO₂ emissions considered today may differ a few years from now. This can happen due to the dynamic nature of technology, changes in funding stream, legislation, and macro and micro economic forces. But the path to “50X30” abounds in worthwhile opportunities, even if they are challenging.