

Green Mountain Power

2021

**Renewable Energy Standard
Tier III Annual Plan**



Background

On June 11, 2015, Act 56, the Renewable Energy Standard (RES) was signed into law. RES created three tiers of resources that electric distribution utilities have to comply with: Tier I-Total Renewable Energy, Tier II-Distributed Renewable Energy, and Tier III-Energy Transformation. This Annual Plan is being submitted in compliance with the Public Utility Commission’s (PUC) Rule 4.417. Under this Rule, Distribution Utilities (DUs) are required to submit written plans that describe how they will comply with the Energy Transformation requirements in the RES each year. GMP’s Annual Plan describes how we will meet Tier III-Energy Transformation in calendar year 2021.

The goal of RES Tier III is to reduce the CO2 emissions associated with the use of fossil fuels. From the start of Tier III in 2015 through the end of 2019, GMP-supported projects have offset well over 500 million pounds of CO2. We look forward to continuing this work with customers which we see as critical to the move away from fossil fuels used extensively in heating and transportation, the top two sources of carbon pollution in Vermont. Our 2021 plan adds new programs and expands on existing ones to encourage more customers to transform their energy consumption away from fossil fuels in these key areas. Through these programs, we will continue to demonstrate that carbon reduction can save money, improve comfort, and help the environment and the economy.

2020 was not a typical year, but we saw opportunity in offering enhancements to programs that would help jumpstart the economic recovery and help customers, while also making significant progress on our goals. Customers took action, making 2020 results strong, despite the pandemic. And even though the longer-term effect of the pandemic is still unfolding, GMP’s 2021 Tier III Plan will continue to move aggressively to make progress in the all-important mission of decarbonization, driving down costs, and blunting the economic effects of the pandemic at the same time.

Schedule of 2021 Tier III Filings

This Annual Plan is part of a three-step process that the PUC established for annual Tier III planning & compliance reporting. The following table summarizes these steps and the deadlines for each in the process governing the 2021 Tier III process:

Tier III Planning & Compliance Cycle – 2021 Compliance Year	
Step	Date
File 2021 Tier 3 Annual Plan	Nov 1, 2020
File 2021 Tier 3 Savings Claim	Mar 15, 2022
File 2021 Tier 3 Compliance Filing	Aug 31, 2022

2021 Fossil Fuel Reduction Targets under RES Tier III



In calendar year 2021, RES Tier III requires GMP to obtain Energy Transformation credits in MWHs equal to 4.67% of its retail sales. GMP's forecast retail sales for calendar year 2021 are approximately 4,064,460 MWHs. Based on this, GMP's RES Tier III target for 2021 is 189,675 MWH. This will be adjusted based on actual retail sales when determined in the 2021 Compliance Filing in August 2022.

Summary of Tier III Observations from 2020 Experience:

As of this writing, GMP is ten months into its 2020 Tier III plan. Below are some observations that have helped to shape our 2021 Tier III plan based on this experience:

- GMP/Efficiency Vermont Collaboration – The partnership between GMP and Efficiency Vermont continues to enable greater energy transformation for our customers. Over the past year, GMP has ramped up collaboration with EVT in a number of ways:
 - Cold Climate Heat Pumps (CCHP) Rebate Program - The collaboration on the CCHP rebate program continues to encourage the adoption of CCHPs for efficient residential heating and cooling. In July 2020, GMP's Go Green and Save incentive program was launched with several goals: help to encourage and support the adoption of CCHPs by Vermonters; provide an economic stimulus for the heating and ventilation business sector, which has been impacted by the COVID-19 pandemic; and amplify the conversation about the importance of decarbonization. Starting in July and ending in August, GMP doubled the downstream rebate from \$400 per condenser to \$800 for customers. The rebate was in addition to the midstream incentive already provided by Efficiency Vermont. The combined incentives were stunningly successful, resulting in over 5,000 CCHP condensers sold during the 2-month period.
 - Whole Building Heat Pumps (WBHP) – The WBHP market was nascent in the 3rd quarter of 2019, with just a handful of units installed throughout GMP service territory. Over the course of 2020, the market has gone through an evolution with much more activity, fueled, at least in part, by rebate programs offered through a partnership between EVT and GMP. Given 2020 results, WBHPs will play a larger role in GMP's 2021 Tier III plan.
 - Low Income Customers – We have seen a significant number of custom projects that support the development of low income housing. These buildings tend to be highly efficient, well insulated, and often employ heat pump technology. GMP will continue to seek out these opportunities to help ensure equitable access to our energy transformation work.



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- Commercial and Industrial (C&I) Customer Project Collaboration – The GMP and Efficiency Vermont C&I teams have worked closely together during 2020 to ensure that customers are able to benefit from both electrical efficiency and fossil fuel offset opportunities. This collaboration not only presents customers with options to consider beneficial electrification, paired with efficiency measures where applicable, but also presents non-electrification options. This collaboration has benefitted customers by bringing expertise on utility and efficiency options in comprehensive and actionable ways, and will be deepened in 2021.
- Demand Response – The GMP/EVT partnership has fostered an ongoing conversation between stakeholders, leading to a deeper, shared understanding of the relationship among demand response, efficiency, customer economics, and carbon reduction. It has also supported innovative collaborations like the Flexible Load Management Pilot, which explores new opportunities for customers to participate in, and benefit from, peak reduction efforts. This new level of engagement has been benefiting customers, the grid system, and the environment and is a key aspect of our 2021 Plan.
- **Relevance of Electric Vehicles** –Electric vehicles (EVs) have continued to play an important, and growing role in achieving GMP’s Tier III goals. Federal, state, and manufacturer incentives coupled with GMP’s financial incentives, free EV chargers, and EV-specific electrical rates, have helped to make both the price and total ownership cost of EVs competitive with conventional vehicles. As manufacturers develop more EV models, and dealerships become more accustomed to selling EVs, we anticipate that the market will continue to expand. The continuation of incentives to support this transition is essential, as transportation is the top source of carbon pollution in Vermont.
- **Fossil Fuel Prices:** Programs that can leverage greater efficiencies can compete best with low fuel prices. Heat pumps are an excellent example – a fossil fuel solution for heating might be 80% efficient, compared to a heat pump, which can readily achieve 250% efficiency. This delta in efficiency can give electricity a competitive advantage over fossil fuel for customers. Similarly, the inefficiency of internal combustion engines compared with power supplied from the grid makes it easier to compete with fossil fuels in diesel-driven generation and compression applications. In fact, total cost of ownership for EVs is demonstrably cheaper over the life of the vehicle. Demand response measures can also help kWh compete with fossil fuels, and GMP has leveraged DR programs to help customers economically transition off of fossil fuels as well. Continued accelerated growth in heating and transportation through beneficial electrification could also be a beneficial factor to offset low fossil fuel prices.
- **Policy Alignment to Technical Advisory Group (TAG) Work:** The TAG established in the RES legislation has worked effectively over the last year to add



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new measures and refine existing ones so that DUs have options for expanding and enhancing Tier III programs for customers. DU-initiated work that have transitioned from pilots or custom measures into TAG characterizations have increased the effectiveness of the TAG.

2021 Fossil Fuel Reductions under Tier III Programming Plan

1. Retail Sales and Number of Customers by Customer Class

Rule 4.413(c)(3) provides that “[a] Provider shall endeavor to provide equitable opportunities to its Customer sectors in rough proportion to each Customer sector’s annual retail sales.” As has been the case since Tier III was initiated in 2017, opportunities to reduce fossil fuel usage through Energy Transformation Projects with customers are not exactly evenly distributed across the classes. While we do not expect perfect equity across those classes to be achievable within any program year, GMP’s programs include offerings that should make energy transformation accessible for all sectors of the economy.

The following table shows what these proportions are forecast to be in 2021, and the corresponding RES MWH targets based on forecasted retail sales. Ideally, GMP will provide savings in rough proportion to these percentages in 2021, however there has been a great deal of variation from year-to-year. In 2017 and 2018, Tier III MWHe volume was heavily weighted towards C&I custom projects, but with the growing popularity of CCHPs, 2019 and 2020 prescribed programs yielded a larger portion of MWHe. The trends in electrification of home heating and transportation suggest that this will continue. Additionally, the patterns of completion of large C&I projects are difficult to predict on timing, and can cause significant changes to those proportions.

GMP’s 2021 Forecast Retail Sales and RES Tier III Targets by Class

Class	Forecast 2021 Load	% of Sales	2021 RES Target
Residential	1,464,198	36.0%	68,321
Small Commercial and Industrial	1,473,841	36.3%	68,776
Large Commercial and Industrial	1,122,600	27.6%	52,388
Other	3,821	0.1%	171
Total MWH	4,064,460	100%	189,675

2. GMP Tier III Program Summary

The Tier III TAG maintains a list of measures that are defined and characterized for Tier III MWHe value, based on new and established research and observation. GMP promotes these prescribed energy transformation measures, primarily among its residential and small commercial customers, through a variety of channels:



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- Direct community engagement – During COVID GMP kept safety at the front of everything, and reduced in-person community outreach opportunities such as EV Ride and Drives and energy committee meetings. Instead, we went virtual for a lot of engagement, and also drove significant customer engagement in our enhanced rebates during the summer. We look forward to more opportunities to meet with customers and talk about energy, our programs, and how we can help reduce carbon footprints, virtually or in person as soon as it is safe to do so.
- Energy Innovation Center (EIC)/Call Center – GMP’s EIC and Call Center are well prepared to support customer questions about energy transformation and GMP programs. This year there was more cross training between the EIC and Call Center. Our call center is now an integral part of our innovation work with customers, and is well equipped to respond to many of their questions.
- On-line resources – GMP’s website and other on-line tools were updated and are great resources for customers to learn about their specific energy use, and to learn about program offerings. GMP is also active on social media, both for promoting programs, and to provide opportunities for real-time discussions with customers. GMP also launched live chat to help customers.
- Targeted press releases – New GMP programs and innovation ideas are announced through press releases. This is a cost-effective way of educating the public about energy transformations.
- Vendor Channels – The mid-stream rebate programs offer solution providers with a mechanism to help their energy transformation-related product offerings compete with fossil fuel alternatives.
- Special Events – GMP offered increased incentives over the summer and saw dramatic volume increases, showing that customers want to take action and will respond to enhanced value propositions.

For 2021, GMP will continue offering an array of flexible, prescriptive programs that allow customers to select their specific steps and path toward energy transformation. Tier III is all about encouraging customers to take action in their energy transformation journey, be it a single, small step or a large transformational decision. We are learning that fewer customers are prepared for a holistic, “all at once” approach where a comprehensive transformation program resonates with their desire for change. From our Tier III experience, many customers prefer an incremental, “one step at a time” approach where a series of smaller, individual transformation measures are undertaken over a period of time to achieve their goals. For these customers, GMP prescriptive programs will continue to focus on supporting reductions in fossil fuel consumption for space and domestic hot water heating within the home and business; helping customers transition from the use of internal combustion engines for transportation and other applications; and deploying energy storage to reduce carbon emissions associated with grid generation during peaks.

Low Income Customer Programs – In 2020, GMP offered enhancements to residential program offerings, specifically focused on EVs, with the intention of putting these energy transformation measures in reach for low income customers. In 2021, GMP will continue



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to work with stakeholders to explore how residential offerings can be enhanced and crafted to offer opportunity to more low income customers.

3. GMP Tier III Programs

Building Program

GMP will continue to support measures, projects, and initiatives that transition the heating of air and water to condition and/or serve buildings to non-fossil fuel alternatives. This support will continue in the form of mid-stream discounts and down-stream rebates provided to customers in collaboration between GMP and EVT.

Building Program – Cold Climate Heat Pumps (CCHP) - 2020 was an extraordinary year, and state-wide heat pump volumes were very high. Volume increases can be explained by limited time promotions offered by GMP and other Vermont utilities to help counterbalance the economic contraction caused by the pandemic. A mid-October 2020 update from EVT forecasts that over 10,000 mini-split heat pumps will be processed through the mid-stream rebate program state-wide – 75% higher than forecast. This represented a significant increase above EVT’s previous 2020 state-wide volume forecasts of 7000 units. While some of this diversion from forecast might be attributed to the early impacts of the pandemic, 2019 results were also much better than had been forecast – about 35% higher.

However, we must also anticipate an on-going impact from COVID, and continued uncertainty of how it will affect our customers and the economy in 2021. In light of this, for purposes of this plan, GMP will incorporate a sensitivity range that takes these factors into account. At the high end, CCHP volume could reflect the current trend and EVT forecasts, resulting in the addition of 7,000 units in GMP service territory. However, the on-going economic impact from COVID justifies the consideration of a low-end forecast of 5,000 units. For purposes of 2021 Tier III projections, GMP will use this 5000 estimate, given uncertainty.

Our Tier III value uses a weighted average of 22.92 MWH based on 2020 year-to-date installed units.

Enhanced CCHP Offerings - Heat pumps equipped with controls create the opportunity to manage demand through thermostat adjustments and by leveraging fuel switching. As the population of heat pumps grows in Vermont, demand management capability can become more important. GMP is working with stakeholders to identify ways to tie enhanced incentives for heat pumps to the combination of weatherization and controls. These programs will include features to enable low income Vermonters to benefit as well.

Building Program – Heat Pump Water Heater (HPWH) – GMP, along with other utilities, is collaborating with EVT on supporting HPWH installations that are claimed through the EVT mid-stream/down-stream program which specifically offset fossil fuels. Again, thanks to enhanced limited time rebates tied to the pandemic,



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 2020 volumes are significantly outpacing the original forecasts. GMP’s 2021 Tier III plan includes a forecast of 300 units, an increase from prior year forecasts. We have based the Tier III value for this program on an assumption of 50-gallon, high-efficiency units.

Building Program - Whole Building Heat Pumps (WBHP) – WBHPs include centrally ducted (CDHP), air-to-water (A2WHP), and ground source (GSHP) technologies. This is a nascent market in Vermont. As of October 2020, WBHP volume through EVT’s downstream rebate program has been robust, with a forecast of 457 new units in GMP service territory by year end. Forecast GMP volumes of 400 units for 2021 are based on a midline view of 2020 year-to-date performance. Our Tier III value uses a weighted average of 115 MWH based on 2020 year-to-date installed units.

2021 Building Program Volume Projections

Heating Type	Forecast Quantity	Avg Unit Tier III MWh	Est 2021 MWh Projection	Avg Unit kWh Load Add	Load Add mWh Projection	Average Carbon Offset/Unit	Measure Lifetime Carbon Offset (Metric Tons)
CCHP	5,000	23	114,600	2,231	11,155	35,678	80,916
HPWH	300	16	4,878	1,276	383	24,012	3,267
WBHP (CDHP, A2W, GSHP)	400	115	46,000	6,254	2,502	154,357	28,006
TOTALS	5,700		165,478		14,039		112,190

Exploration of non-electrification alternatives – The CCHP, HPWH, and WBHP measures are administered through EVT’s rebate programs. Alongside those incentives, EVT offers support to customers for a comprehensive set of non-electrification alternatives, including biomass heating and weatherization. In 2021, GMP will also be exploring ways to support weatherization in conjunction with heat pump offerings

Demand Response Measures –

- CCHP – Customers who install a CCHP are eligible for, and encouraged to install, a free Sensibo for each head unit. The Sensibo offers the customer internet-connected control of the head units’ main functions. The customer shares access to the Sensibo with GMP. During anticipated peak demand periods, GMP manages the Sensibos by adjusting temperature set points – slightly higher temperatures in the summer, and slightly lower temperatures in the winter. In 2020, over 1000 customers claiming the CCHP rebate opted for the free Sensibo unit. GMP will continue to evaluate solutions and methods for cost-effective management of residential heat pumps.
- HPWH – GMP continues to investigate mechanisms for cost-effectively managing demand from HPWHs. While some units offer internet connectivity for the owner, a manageable and cost-effective method of sharing control has not yet been identified. Additionally, because HPWH units consume a relatively small amount of energy relative to resistance electric and fossil fuel alternatives, there is less of a cost impact due to



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electric peak contribution, and therefore less financial leverage to support investment in additional infrastructure and operating costs. The cost of control solutions outweighs any benefit of demand reduction at this time.

Transportation Program

GMP plans to deepen its support of the transition to Electric Vehicles through continued incentives, EV charging infrastructure, EV rates, and through support for an expanded variety of modes of electric transportation.

Transportation Programs – Electric Vehicles (EVs)

The focus of GMP’s EV program is to help every customer drive electric. This program, in combination with state incentives, dealer incentives, and federal tax credits, creates strong reasons for customers to make the switch and drive an EV.

The GMP program supports both new and used vehicles, and incentives include an adder for customers who identify as low-income, paid for through GMP’s charitable contributions. Every purchaser is eligible to receive a level-2 home charger at no additional cost, with the provision that the charger is connected to the customer’s home internet, and that GMP may access it to control during peak periods. Customers also have the opportunity to enroll in one of two discounted rates for residential off-peak EV charging.

GMP is supporting electrified transportation through custom measures as well. With the recent availability of options to replace heavy duty vehicles, GMP is supporting multiple applications for VW Settlement Grant funding for transit buses and school buses. GMP is also in the process of applying for one of these grants to replace several heavy-duty vehicles in our fleet. We also have supported a number of grant applications through the federal No Emissions/Low Emissions grant program, that have been awarded to transit companies around the state.

In addition, GMP employs a combination of partnerships with the local network of EV dealers to encourage support through sales channels. The 2021 characterized measures adds electric scooters and motorcycles to the list of supported offerings – both have been added to GMP’s 2021 Plan.

2021 Transportation EV Projections

EV Type	Forecast Quantity	Avg Unit Tier III MWHe	Est 2021 MWHe Projection	Avg Unit kWh Load Add	Load Add mWh Projection	Measure LT Carbon Offset/Unit (lbs)	Measure Lifetime Carbon Offset (Metric Tons)
AEV	360	37.83	13,620	2,757.84	993	52,440	8,563
PHEV	144	28.26	4,070	1,697.81	244	39,764	2,597
Used AEV	52	18.92	984	2,757.84	143	26,220	618
Used PHEV	30	14.13	424	1,697.81	51	19,882	271
eScooter	50	2.25	112	90.12	5	3,235	73
eMotorcycle	50	8.64	432	231.89	12	12,384	281
eBike	615	5.40	3,321	30.00	18	7,742	2,160
Forklift	5	118.89	594	13,885.51	69	121,009	274
TOTALS	1,306		23,558		1,536		14,838



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- Exploration of non-electrification alternatives – Non-electrification alternatives for transportation, apart from combustion engine fossil fuel vehicles that would maintain the status quo, are not robust. While hydrogen and some other nascent technologies are in development for vehicles, GMP believes strongly that the imperative in Vermont should be to transition its transportation options as quickly as possible to EVs. Tier III support for increased ridership on mass transit, and increases in mass transit offerings, could provide an option for non-electrification transportation alternatives. This topic was developed during the 2020 TAG sessions. GMP plans to work with Vermont transit agencies to explore this exciting option during 2021.
- Demand Response Measures – The GMP EV program includes the offer of a free level 2 EV charger for all customers who purchase EVs. The chargers that are offered are internet-connected devices and compatible with GMP’s device management platform. The customer shares access to the charger with GMP. During potential peak periods, GMP sends curtailment commands that delay charging until the curtailment period expires. This program has proven highly successful, with well over 90% measured compliance with demand response events from the full population of EV chargers. GMP believes shared access for EV charging is a key part of Vermont’s energy transition, to enhance efficient use of the grid, lower costs for all customers, and avoid upgrades to infrastructure. In 2020 GMP received approval for two EV-specific charging tariff rates which discount the price of electricity for charging an EV in exchange for managing the charging. This is just one more tool to make switching to an EV more attractive.

Transportation Program – Charging Infrastructure

GMP will continue to offer incentives for customers that deploy Level 2 and Level 3 chargers in public and workplace settings. Additionally, GMP plans to offer support for multiple-family dwellings as a way to facilitate the adoption of electric transportation options for renters. While multi-family units have a negligible Tier III value, GMP plans to offer an incentive comparable to Public and Workplace chargers. The relatively low volume of these will keep the transportation program costs well below the ACP.

2021 Transportation Program Charging Infrastructure Projections

Charger Type	Quantity	Unit Tier III MWh	Total 2021 MWh Projection	Average Carbon Offset/Unit	Measure Lifetime Carbon Offset (Metric Tons)
Level 2 Public	20	21.39	428	30,348	275
Level 2 Workplace	40	27.54	1,102	38,868	705
Level 2 Multifamily	10	0.99	10	1,597	7
Level 3 Charger	10	92.34	923	124,140	563
Public/Wkplc Chargers	80		2,463		1,551



Transportation Program - EV Public/Workplace Charging Network

GMP has maintained a network of public and workplace level 2 and level 3 EV charging stations throughout the service territory. There has been a distinct increase in utilization during the past year. 2021 projections assume a 20% increase in utilization over 2019 actual results. Furthermore, GMP plans to launch a new innovative pilot to facilitate the deployment of Level 2 stations at workplaces and points of interest through a simple “charging as a service” offering. Because this program will likely overlap with the Level 2 Tier III incentives, we have not modeled it separately.

2021 Transportation Program – Charging Network Activity Projection

Charging Type	Charging Activity (kWh)	Tier III MWHe Projection
Level 2 Charging	120,000	155
DC Fast Charging	100,000	151
GMP EV Charging Network		306

Demand Response Program – Energy Storage

Storage is a demand response resource. When offsetting the import of energy from ISO grid resources outside Vermont with local supply during peak hours, there is a measurable fossil fuel offset. This has been characterized by the Tier III TAG.

GMP supports several storage offerings through tariffs and pilots for customers, both directly from GMP and through other energy services companies.

Ultimately, the carbon offset associated with battery energy storage is derived by comparing the high carbon content of the power supply from the regional grid during battery discharge, to the low carbon content of GMP’s power supply during non-peak conditions, when the batteries are recharged. The 2021 Tier III Plan’s MWHe calculation for batteries uses an assumption of 1000 PowerWalls installed through the ESS Tariff program.

In addition, GMP manages a variety of assets to reduce demand during key periods. These assets are diverse in terms of their specific capacities, and discharge/recharge characteristics. The TAG characterization for energy storage may be used to describe the beneficial carbon reduction resulting from these types of resources, however their Tier III value is not yet forecast. For purposes of establishing Tier III value for these assets, GMP will quantify the offset in the 2021 claim for offsets that actually occurred in 2021, using the TAG worksheet for battery quantification, and a 1-year measure life.



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2021 Energy Storage System Projections

Storage	Quantity	MWHe/ Unit	Program MWHe	Average Carbon Offset/Unit	Measure Lifetime Carbon Offset (Metric Tons)
ESS Tariff Program	1000	7.49	7,490	9,500	4,309
TOTAL	1000		7,490		4,309

Land Care Equipment Program

In 2021, GMP will continue to offer incentives for customers to transition from fossil fuel-powered commercial and residential land care equipment. Previously, this only applied to electric mowers. With new characterizations added to the list of prescribed measures during the 2020 Tier III TAG sessions, GMP will include incentives for electric trimmers, chainsaws, leaf blowers, and lawn and garden tractors, as this represents a great way for customers to decarbonize land care and maintenance.

2021 Land Care Equipment Program Projections

Measure	Forecast Quantity	Avg Unit Tier III MWHe	Est 2021 MWHe Projection	Avg Unit kWh Load Add	Load Add MWh Projection	Average Carbon Offset/Unit
Residential Trimmer	100	1.21	121	0.71	0.07	1,740
Commercial Trimmer	25	3.03	76	58.98	1.47	4,339
Residential Chainsaw	100	1.21	121	1.02	0.10	1,740
Commercial Chainsaw	25	3.02	76	130.44	3.26	4,327
Residential Leaf Blower	100	1.21	121	0.78	0.08	1,740
Commercial Leaf Blower	10	3.02	30	121.40	1.21	4,328
Residential Mower	300	1.90	569	217.90	65.37	2,741
Commercial Electric Lawn Mower	5	82.20	411	9,533.60	47.67	99,789
Residential Garden Tractor	100	2.60	260	81.00	8.10	3,740
Commercial Garden Tractor	10	24.80	248	2,595.60	25.96	34,124
Other Measures			2,034		153	

- Exploration of non-electrification alternatives – No non-electrification measures are considered through these programs, as noted above.
- Demand Response Measures – Currently, these loads are not directly managed. In commercial settings, GMP discusses the potential value of Curtailable Load Rider and other options to benefit from demand reductions coincident with peak for our commercial customers on time-of-use rates.

Custom Commercial & Industrial Transformation Program

In 2021, GMP will continue to partner with our commercial and industrial customers to develop custom energy transformation projects that can improve the performance of their operations while reducing fossil fuel usage.

In this work, GMP C&I Energy Specialists work closely with customers, alongside EVT’s substantial network of consultants. Together, they identify sources of carbon emissions as well as efficiency opportunities, and non-electrification alternatives.



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This collaboration provides our C&I customers with a seamless and comprehensive approach to reducing their carbon footprints, while optimizing their energy consumption profiles to reduce operating costs.

As was the case in 2020, these customers are very diverse and operate in business sectors such as manufacturing, agriculture, quarries, grocery stores, large retailers, large office buildings, and hospitals, among others. Based on our 2020 experience, these projects require tight collaboration among GMP, EVT, and each customer. The focus of each project can differ, for example reducing fossil fuels and switching fuels for specific operational processes, or switching air and water heating to alternative sources of energy – all to minimize or eliminate carbon emissions.

Custom C&I Tier III projects depend on customer timelines and can take years to develop and launch. As such, the MWHe contribution from C&I projects can vary greatly from year to year. The Tier III target for C&I is developed using an average of C&I project performance over the past 3 years. Likewise, the added load associated with projects can vary widely. GMP also supports projects with significant carbon savings that result in no additional electrical load. In some cases, Tier III projects supported in collaboration with EVT can include efficiency measures that mitigate added electric load. Efficiency conversions between fossil fuel applications can also have an impact on added load. Because of this, only a rough estimate of added load from C&I projects can be supplied. In order to establish a reasonable basis to estimate load from custom projects for 2021, the annual load added per Tier III MWHe is based on 0.05MWh per Tier III MWHe.

2021 C&I Custom Projects

	Est 2021 MWHe Projection	Load Add mWh Projection*
C&I Custom Projects	50,000	2,500

Demand Response Measures – Demand response is a central component in all discussions with C&I customers considering custom energy transformation projects. The anticipated load for projects is calculated, and potential bill impacts are discussed. Participation in DR programs is a key tool to help customers financially manage the energy transformation work where a project will result in beneficial electrification. Among the tools discussed are participation in the Curtailable Load Rider program, Critical Peak Pricing, storage, and pilot programs like the Flexible Load Management Pilot. GMP, with EVT, provide customers with a comprehensive understanding of the demand implications of their projects, and strategies to mitigate any associated costs.

Non-Electrification Alternatives – The portfolio of Tier III custom projects that GMP supports often includes projects that do not involve electrification. These projects have included insulation, #6 oil replacement, and burner replacements in industrial



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4. Tier II Credits

GMP is forecasting a Tier II surplus in 2021. However, the size of the surplus depends heavily on the pace of net-metered project development. GMP prepares for the possibility that it will be necessary to retire surplus net-metered Tier II credits for compliance with Tier III, should volume fall short of the RES Tier III target. As such, Tier II represents a supplemental source of Tier III-compliant MWH, to meet annual targets at a lower cost to customers than the ACP.

5. 2020 Tier III MWH

As of October 0f 2020, GMP has exceeded its Tier III target with a combination of prescribed measures and energy transformation projects. As such, we anticipate adding to GMP's banked Tier III MWH.



6. 2021 Tier III Program Forecast:

GMP forecasts that our 2021 Tier III savings targets will be achieved through the delivery of the following customer programming. These forecast numbers include low-income participation in residential programs:

2021 Tier III Program Forecast

Measure	Forecast Quantity	Avg Unit Tier III MWHe	Est 2021 MWHe Projection	Avg Unit kWh Load Add	Annual Load Add mWh Projection
Building Program - CCHP	5,000	22.92	114,600	2,231	11,155
Building Program - HPWH	300	16.26	4,878	1,276	383
Building Program - WBHP	400	115.00	46,000	6,254	2,502
Transportation Program - AEV*	360	37.83	13,620	2,758	993
Transportation Program - PHEV*	144	28.26	4,070	1,698	244
Transportation Program - Used AEV*	52	18.92	984	2,758	143
Transportation Program - Used PHEV*	30	14.13	424	1,698	51
Transportation Program - eScooter	50	2.25	112	90	5
Transportation Program - eMotorcycle	50	8.64	432	232	12
Transportation Program - eBike	615	5.40	3,321	30	18
Transportation Program - Forklift	5	118.89	594	13,886	69
Transportation Program - Res. EV Charger*	352	-	-	-	-
Transportation Program - Level 2 Public	20	21.39	428	NA	NA
Transportation Program - Level 2 Workplace	40	27.54	1,102	NA	NA
Transportation Program - Multi-Family	10	0.99	10		
Transportation Program - Level 3 Charger	10	92.34	923	NA	NA
Transportation Program - Level 2 Charging (kWh)	120,000	0.00	155	NA	NA
Transportation Program - DC Fast Charging (kWh)	100,000	0.00	151	NA	NA
Demand Response Program - PowerWall 2-Equivalent	1000	7.49	7,490	NA	NA
Land Care Program - Residential Trimmer	100	1.21	121	1	0
Land Care Program - Commercial Trimmer	25	3.03	76	59	1
Land Care Program - Residential Chainsaw	100	1.21	121	1	0
Land Care Program - Commercial Chainsaw	25	3.02	76	130	3
Land Care Program - Residential Leaf Blower	100	1.21	121	1	0
Land Care Program - Commercial Leaf Blower	10	3.02	30	121	1
Land Care Program - Residential Mower	300	1.90	569	218	65
Land Care Program - Commercial Electric Lawn Mower	5	82.20	411	9,534	48
Land Care Program - Residential Garden Tractor	100	2.60	260	81	8
Land Care Program - Commercial Garden Tractor	10	24.80	248	2,596	26
C&I Custom Projects*	20	2,500.00	50,000	125	2,500
TOTAL PROJECT 2020 TIER III PERFORMANCE			251,328		18,228

7. 2021 Estimated Program Cost Forecast:

Much of the cost in the 2021 Plan is driven by the substantial growth of heat pump adoption in Vermont. 2019 represented a significant growth in the volume of installed heat pumps over the prior year, and 2020 has again shown a trend that suggests continued growth in demand. This program, which helps customers cost-effectively reduce the carbon footprint of their homes and businesses, directly leverages the successful decarbonization of the electrical grid to enable large-scale decarbonization of building heating.

Based on 2019 and 2020 experience, incentives that encourage adoption of certain products, like EVs, are needed to motivate customers to invest in the transition. In the



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case of EVs, for example, electricity is quite competitive, at approximately \$1.13/gallon equivalent on GMP’s Rate 72 and \$1.09/gallon equivalent on Rate 74) assuming an EV of typical efficiency. For customers interested in going electric, it is often the up-front investment that represents the main obstacle, so the combination of GMP rebates, Vermont incentives, and federal tax credits, is critical to continuing to ensure adoption.

In other energy transformation applications, low fossil fuel prices continue to create a competitive challenge, as with some types of heating projects, particularly in natural gas territory, and where there is not a substantial difference in efficiency between the fossil fuel application and the electrical alternative.

For 2021, GMP estimates a total cost of \$25.77 per MWH inclusive of incentives, labor, and non-labor administrative costs. Individual projects or measures may be delivered at a cost higher or lower than \$25.77/MWH.

This cost per MWH does not take into account the beneficial revenue that will come from increased electrical sales over the lives of these measures and projects, and drive down costs for customers. While the diversity of measure lives makes it difficult to characterize a gross measure of resulting revenue, the annual revenue from forecast 2021 measures and projects are forecast to realize nearly \$1.6 million annually, assuming 22,690MWH at an estimated revenue of \$70/MWH.

8. Carbon Impacts

As the goal of the RES Tier III program is to reduce carbon emissions in Vermont, we track this metric annually. While our annual targets are established in MWH, it is these carbon goals that we focus on when we engage with customers and the public about the benefits of energy transformation. The estimated lifetime emission reduction that will result from 2021 projects included in this plan, is almost 364 million pounds of CO2.

Program-Level Lifetime CO2 Offset

Program Level Carbon Summary	Metric Tons CO2	LBS CO2
Building Program	112,190	247,335,904
Transportation Program	16,389	36,130,895
Demand Response Program	4,309	9,499,981
Land Care Program	1,278	2,818,239
Custom Projects	30,844	67,999,864
	165,010	363,784,883