

Climate Action

South Burlington Climate Action Task Force (CATF)

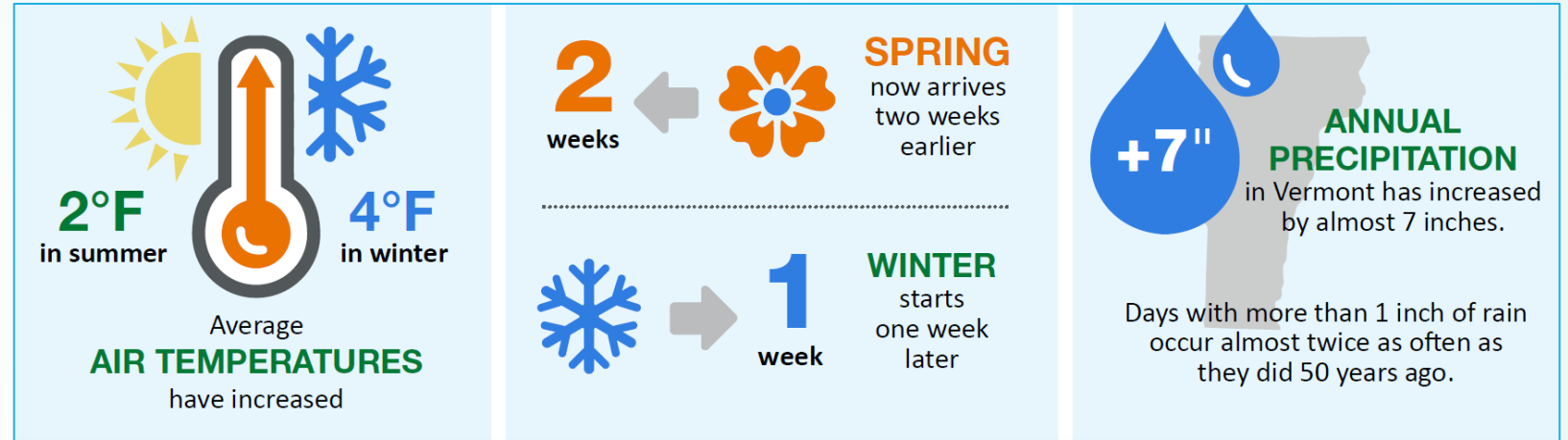
presentation to

South Burlington City Council

**Recommendation to Adopt Ordinance Regulating
Fuels for Heating and Hot Water in New Construction**

Climate Change in Vermont*

- As climate change worsens, 70 bird species of Vermont, including the common loon and hermit thrush, are expected to disappear from the landscape within the next 25 years.
- Combined with warm temperatures, large runoff from heavier precipitation leads to more cyanobacteria blooms.
- Climate change is expected to exacerbate the threats that invasive plants, insects, and diseases already pose to the health of Vermont's forests.
- Climate change will have a negative impacts on fruit-bearing species like apple trees that require a sufficient over-wintering period for success in the next growing season. The maple syrup industry is also at risk due to variations in winter temperatures.
- VT highest per capita rate of Lyme disease in US in 2017, compared to almost none in 1990s



*Vermont Climate Assessment, 2021 (<https://site.uvm.edu/vtclimateassessment/>)

Global Climate Change Impacts

-- Vermont is not an Island --

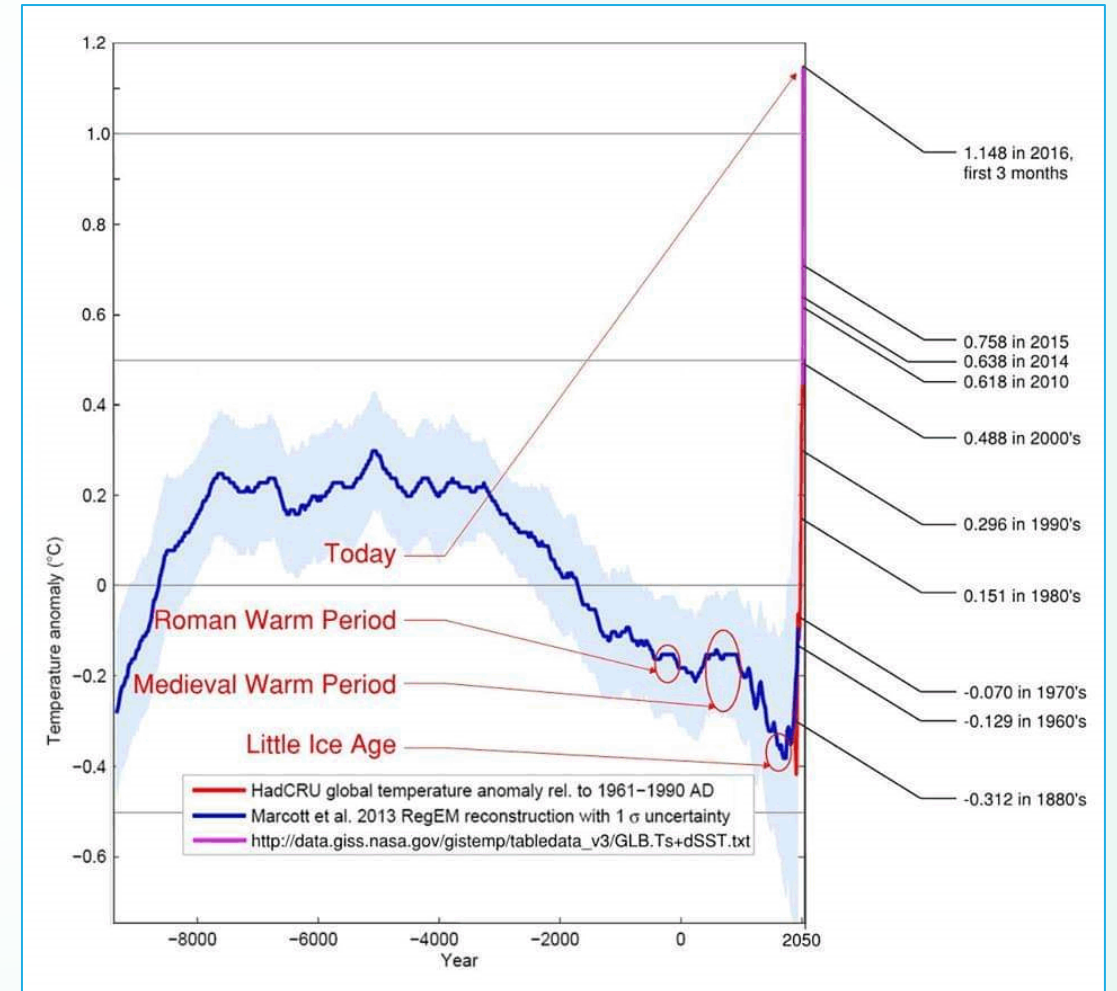
The release of the latest IPCC report “Climate Change 2022: Impacts, Adaptation and Vulnerability”^{*} - approved February 27 2022 by 195 member governments of the IPCC - was a watershed.

- The report warns that without immediate concerted action coral reefs will disappear, coastal cities will flood, drought will deplete the breadbaskets that today feed the world and ecosystems will fail.

- The IPCC Working Group II Co-Chair remarked:

“Climate change is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a livable and sustainable future for all.”

^{*} <https://www.ipcc.ch/report/ar6/wg2/>



SB Climate Change Commitments

- In 2014, the City Council adopted an Energy Efficiency Resolution to reduce energy usage 20% by 2020 (from 2008 baseline), develop an energy efficiency plan and report results to City Council on annual basis.
- In August of 2017, the City Council resolved for the City to join the Vermont Climate Pledge Coalition and commit to meet or exceed the US obligations under the Paris Climate Agreement to reduce GHGs by 26-28% below 2005 levels by 2025.
- In July of 2021, the City Council:
 - acknowledged the “implication of CO2 emissions and their effect on climate change and its consequent effects on its citizens’ quality of life, health, safety and economic well being”
 - resolved that “the reduction of South Burlington’s carbon footprint is an extremely important effort”
 - tasked a committee to “participate in creating a Plan with specific actions for South Burlington that conform to the current science in support of the City’s commitments” and
 - resolved to “take actions based on the Climate Action Plan”.

SB's Climate Action Plan

- The final Climate Action Plan will focus on actions to address the 2 major contributors to GHGs: **Buildings and Transportation**
- Tonight we focus on Buildings, which account for 34% of South Burlington's annual GHGs
- To meet SB's climate change commitments, the draft plan requires all of the following in respect of the Buildings sector by 2030:
 - 360 housing units to be electrified each year
 - 600 homes to be weatherized each year
 - 8% of all commercial space (by square foot) to be electrified each year
 - All new development >12.5 units/acre
 - All new construction - commercial and residential - to be carbon free

SB's Climate Action Plan

- The targets are daunting and illustrate the immense and rapid scale of changes that will be necessary to meet SB's goals. South Burlington has limited ways to make direct and meaningful change.
- If – as contemplated by the plan - new construction in South Burlington is not carbon free, additional reductions of 5048 MT CO₂e would need to be found from other sources (equal to 6.5% of 2030 emissions goal).
- South Burlington can regulate new construction immediately. It is one of the few direct levers that South Burlington has to take a meaningful step toward our climate action goals.
- **We are therefore here tonight to ask that – in advance of receipt of the full climate action plan – South Burlington take advantage of this opportunity and adopt an ordinance that regulates fossil fuels in new construction similar to that passed by our neighboring City of Burlington.**

Burlington's Ordinance

- As of September of 2021, the City of Burlington requires all new buildings (residential and commercial) to utilize a “**renewable primary heating system**”.
- A “**renewable primary heating system**” is a heating system that meets at least eighty-five percent of the buildings design heating load and is fueled by either electricity, wood pellets or other renewable fuel (including renewable gas and biofuels). We expect that most will comply by installing electric “heat pumps”.
- A waiver from this requirement may be granted if an applicant demonstrates that utilizing a renewable primary heating system in a new building would be uneconomical, factoring in a carbon price of \$100 per ton (adjusted for inflation) of carbon emitted.
- The Burlington ordinance can be found here:
<https://www.burlingtonelectric.com/wp-content/uploads/Signed-CC-Ordinance-Chapter-8.-Building-And-Building-Construction-Addition-of-Article-V.-Heating-Systems-Signed.pdf>

Examples of Carbon Free New Construction in Other Communities

- The movement to restrict fossil fuels in new construction began in 2019.
- The first natural gas ban was enacted in Berkeley, California, in July 2019. The ordinance requires all new, single-family homes and small apartment buildings to have all electric infrastructure.
- Since then, **77 cities and towns** across the US have banned or discouraged new natural gas hookups.
- Bans are in effect (or will take effect soon), for instance, in New York City, Ithaca (NY), Boulder and Denver (CO), dozens of Cities in California, Richmond (VA), the State of Washington and Washington, D.C. Montreal requires all-electric new construction by 2024-2025 and Quebec prohibits oil-powered heating in new construction.
- See <https://www.buildingdecarb.org/zeb-ordinances.html> for a current list.
- Burlington's ordinance is short of a full ban.

Recommendations of the CATF

- As such, we recommend that South Burlington adopt, as soon as possible, an **ordinance requiring that all new buildings have a carbon free primary heating system** (consistent with Burlington's ordinance).
 - We recommend that, effective for permits issued on or after Jan 1, 2023, the requirement be a condition to any construction permit.
 - We recommend adopting a waiver from this requirement consistent with what Burlington has adopted.
- We also recommend **requiring new homes to use heat pump hot water heaters** for hot water needs.
 - An exemption could be made to the extent an applicant can demonstrate that a heat pump hot water heater cannot reasonably service the needs of the relevant building (for instance, possibly, in the case of a hotel) or is not feasible for a particular structure.

Other Important Considerations

- From our research, it does not appear that compliance with the ordinance would raise the cost to construct or operate buildings, and it may well reduce costs (see Appendix)
- The City's attorney has opined that the City has the authority to adopt an ordinance similar to Burlington's.
- We recommend that the City begin a process to adopt an inspection/compliance system to ensure full compliance with the ordinance.
 - However, implementation of an inspection/compliance system **should not** delay adoption of the ordinance.
 - In the interim, a self-certification process (similar to the residential building energy stretch code certification) should be adopted
 - The CATF notes that the City – like most other communities in Vermont - currently does not have an inspection system for many items relevant to new owner occupied single family homes, including, for instance, with the residential building energy stretch code that the City has adopted.
 - An inspection/compliance system should encompass, at least, the stretch code and the new ordinance
- The City may wish to consider developing some expertise in carbon free heating systems to help builders who may have questions about this requirement. Consultants could be utilized while that expertise is being developed.

Climate Action

*...making South Burlington cleaner,
more affordable,
healthier,
and better prepared for the future.*

Appendix

Electric Heat – Definitions*

- What is a **heat pump**?
 - Heat pumps are an energy-efficient alternative to furnaces and air conditioners for all climates, including Vermont's. Like your refrigerator, heat pumps use electricity to transfer heat from a cool space to a warm space, making the cool space cooler and the warm space warmer. Because they transfer heat rather than generate heat, heat pumps can efficiently provide comfortable temperatures year round.
- There are two main types of heat pumps: air-to-air and geothermal (ground or water).
 - **Air Source Heat Pumps.** The most common type of heat pump is the air-source heat pump, which transfers heat between a house and the outside air. Today's heat pumps can reduce electricity used for heating by approximately 50% compared to electric resistance heating. For homes without ducts, air-source heat pumps are available in a ductless version called a mini-split heat pump. **Cold climate air source heat pumps** available today work efficiently down to -20F.
 - **Geothermal Heat Pumps.** Geothermal (ground-source or water-source) heat pumps achieve higher efficiencies by transferring heat between a house and the ground or nearby water source. Although they cost more to install, geothermal heat pumps have lower operating costs because they take advantage of relatively constant ground or water temperatures.

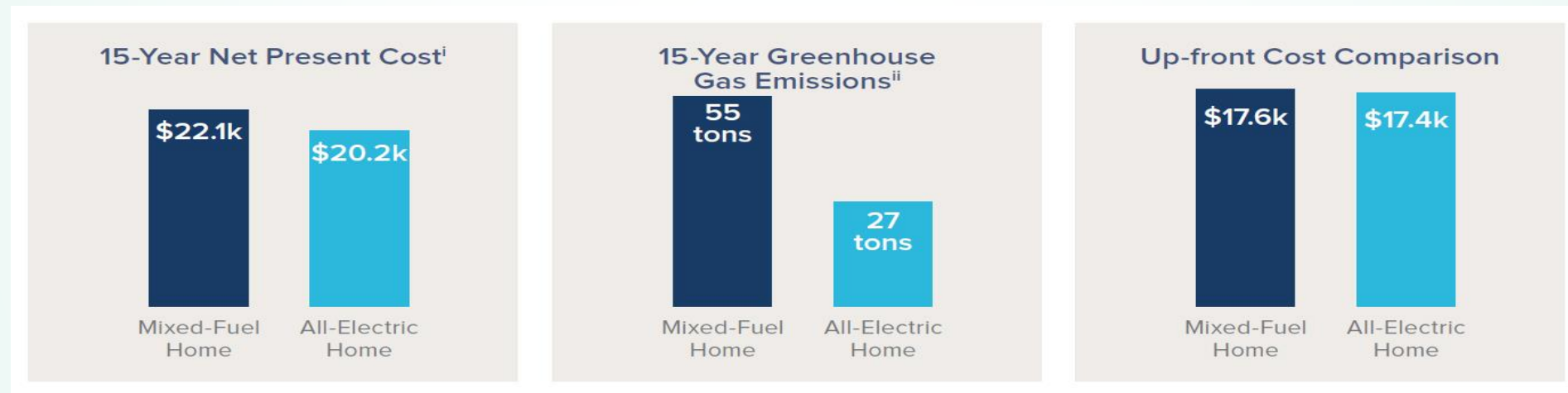
*<https://www.energy.gov/energysaver/heat-pump-systems>

Heat Pumps in Vermont

- Heat pumps are a well understood technology and are becoming more common across Vermont.
 - The Cambrian Rise in Burlington has 30 affordable all-electric condominiums
 - A 24-unit all-electric apartment building in Morrisville for low and moderate income households had been expected to open this fall
 - We know of several all electric net-zero single family homes in South Burlington.
 - A South Burlington developer has signaled an intent to build 36 net zero homes at 600 Spear Street. The developer stated at a City Council meeting:
"It's more than an intention [to be net zero]. Designing a project with those goals in mind makes it much easier to achieve the goal than trying to retrofit later... We think we can generate enough power on site to serve all of the electrical needs. That means heating systems that are air to air heat pumps, on demand hot water heaters that are located near the fixtures."
- GMP has generous incentive programs for the installation of heat pumps and heat pump hot water heaters that can be found at <https://greenmountainpower.com/rebates-programs/home-and-yard/>

Economics of Electrification

- In 2020 the Rocky Mountain Institute (RMI) analyzed the economics of fossil-fuel free homes in cities across the US. One of those cities – Minneapolis – has a colder climate than Vermont. For Minneapolis, RMI concluded that – compared to a home that relies on natural gas - the average all-electric home has 9% lower annual utility costs resulting in net savings of \$1,900 over a 15-year period. Note that fossil fuel costs have risen dramatically since the study.



- The RMI study modeled ducted multi-zone **air source heat pumps, heat pump hot water heaters** and **induction cooktop stoves**.
- The study can be found here: <https://rmi.org/insight/the-new-economics-of-electrifying-buildings?submitted=1983dhtw8>

Economics of Electrification

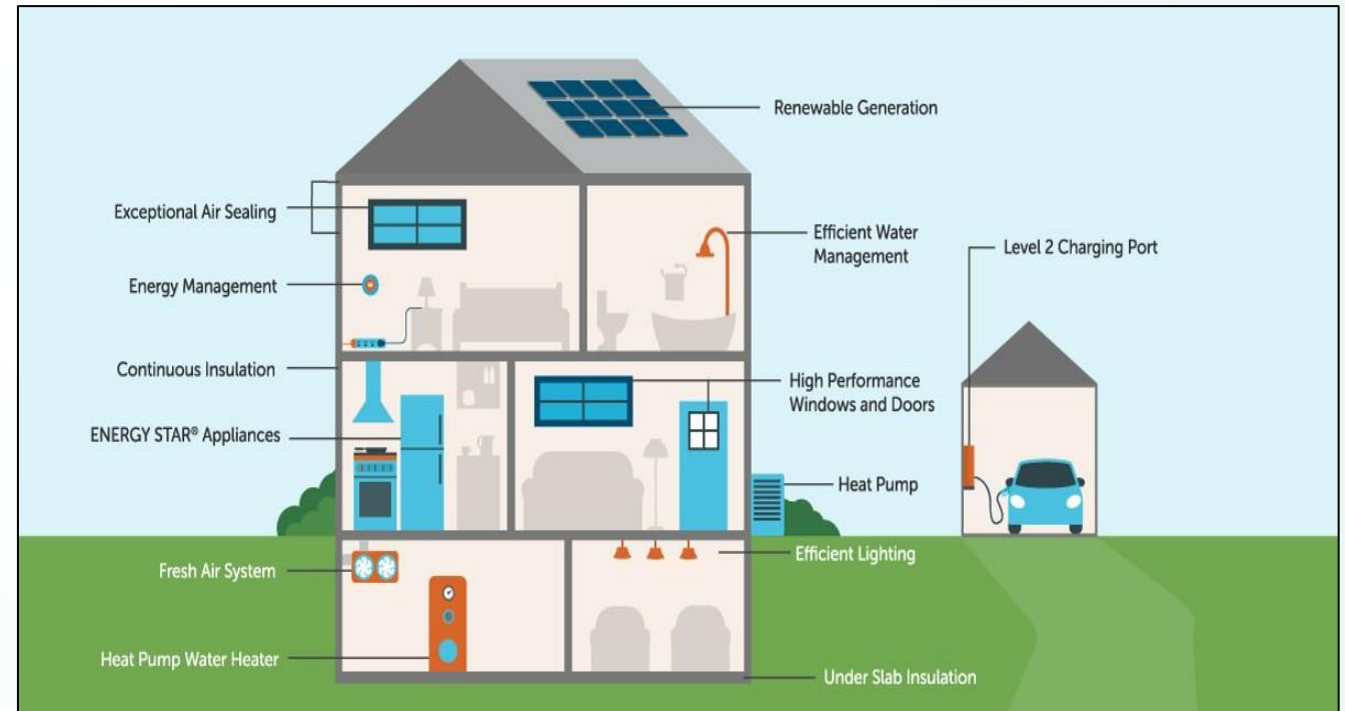
Findings of the **Building Electrification Institute** – Burlington New Construction Customer Economics Analysis (<https://www.beocities.org/Burlington>)

- 1. Building all-electric multifamily buildings in Burlington is technologically possible, even with its cold climate.** This analysis identified four technology combinations that would meet the heating demand in multifamily buildings.
- 2. All-electric multifamily new construction can significantly reduce energy use** relative to mixed fuel construction, and this can lead to dramatic carbon reductions due to Burlington's clean electric grid.
- 3. All-electric and mixed fuel multifamily new construction have similar construction costs**, and in some cases all-electric construction is less expensive.
- 4. All-electric buildings may have higher energy costs than some types of newly constructed mixed fuel buildings.** This is particularly true when compared to master-metered buildings, although **all-electric construction is more likely to reduce costs compared to tenant-metered buildings** because of the removal of the gas fixed charges.*
- 5. All-electric multifamily construction will result in energy cost savings relative to a typical mixed fuel existing multifamily building in Burlington.** This means that many existing residents who move to a new all-electric building will see lower energy costs.

* For purposes of the study natural gas was priced at \$0.80/therm. Current rates in South Burlington are ~\$1.20/therm.

Economics of Electrification

- The Vermont Public Service Department prepared an extensive study of clean heating and cooling (CH&C) in Vermont. The study can be found here:
<https://publicservice.vermont.gov/sites/dps/files/documents/A%20Vermont%27s%20Guide%20to%20Residential%20Clean%20Heating%20and%20Cooling%20%282021%29.pdf>
- The DPS concluded that
 - new homes in Vermont can be constructed to require relatively little heat with high levels of insulation, passive solar gain and air, exchange/ventilation systems
 - CH&C technologies can meet the low heat needs of these building
 - air source heat pumps are especially well suited for meeting these heating demands.

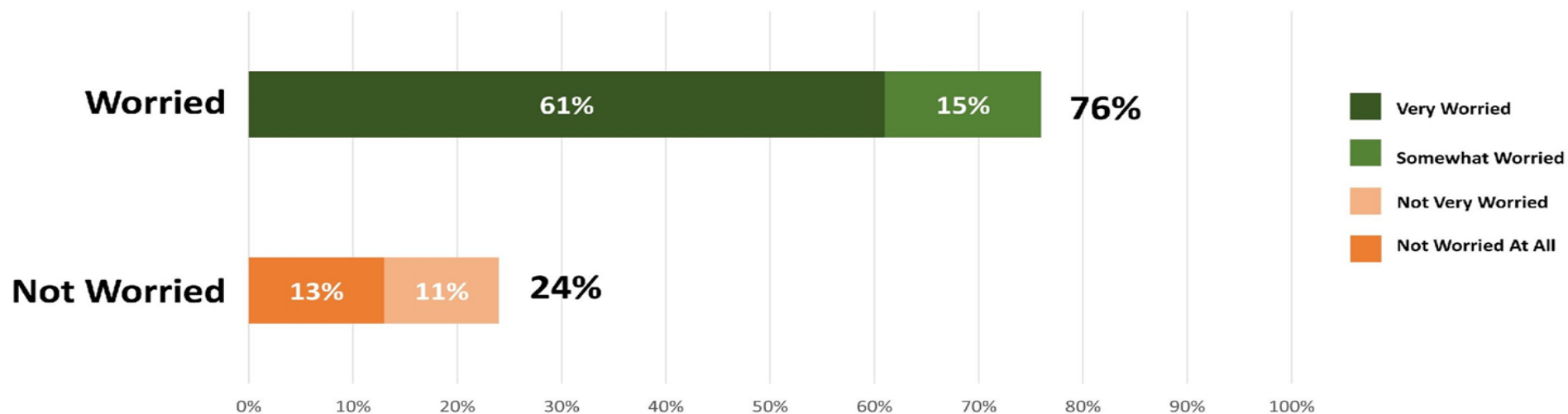


Climate Polling Results – Survey of 786 Vermont Voters

Conducted by Vermont Conservation Voters and Vermont Public Interest Research Group

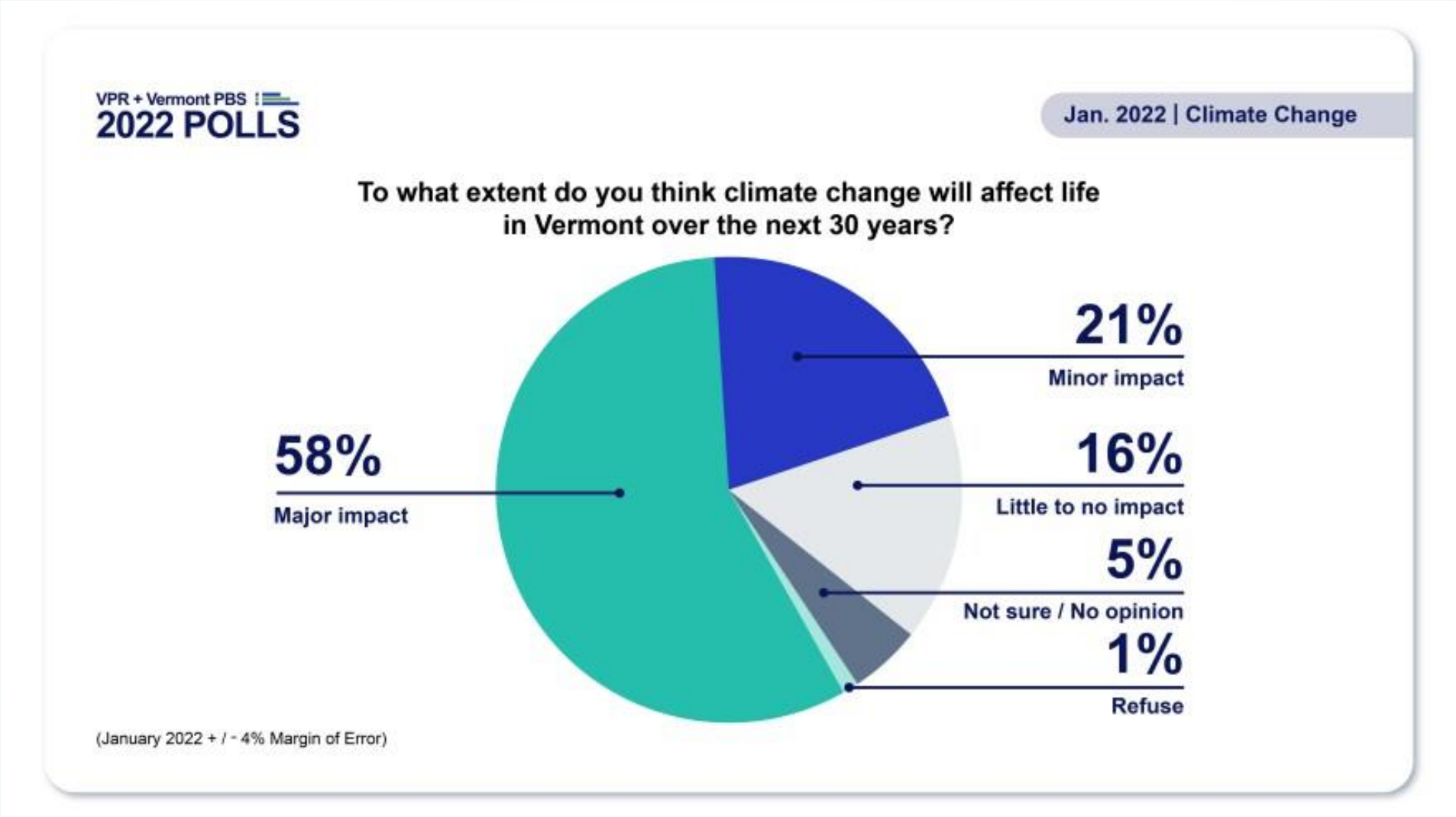
More than three-quarters are worried about global warming, with 61% “very worried” ...

How worried are you about global warming?



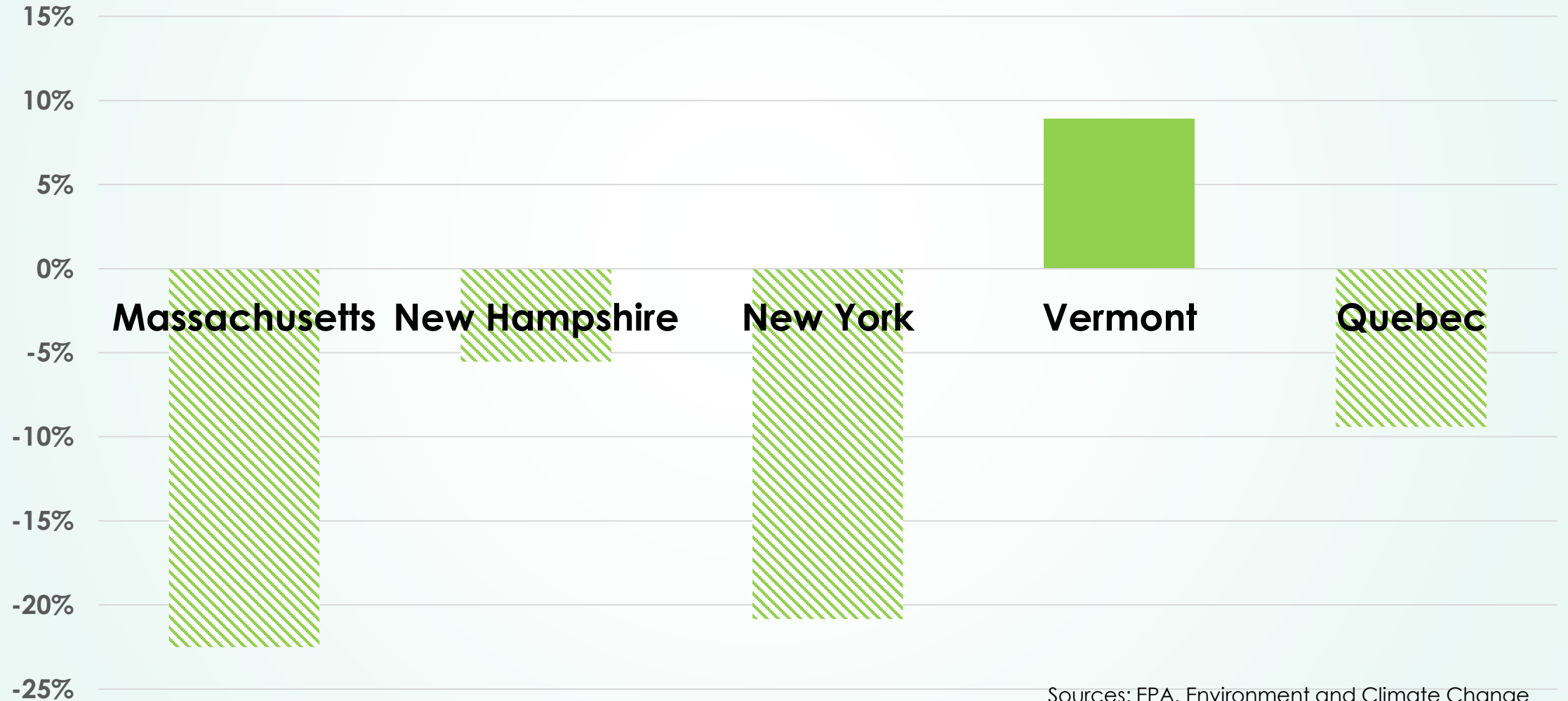
Climate Polling Results – VPR-Vermont PBS

58% of Vermonters think climate change will have a major impact on life here in 30 years



1990-2016: CO2 Emissions from Fossil Fuel Combustion

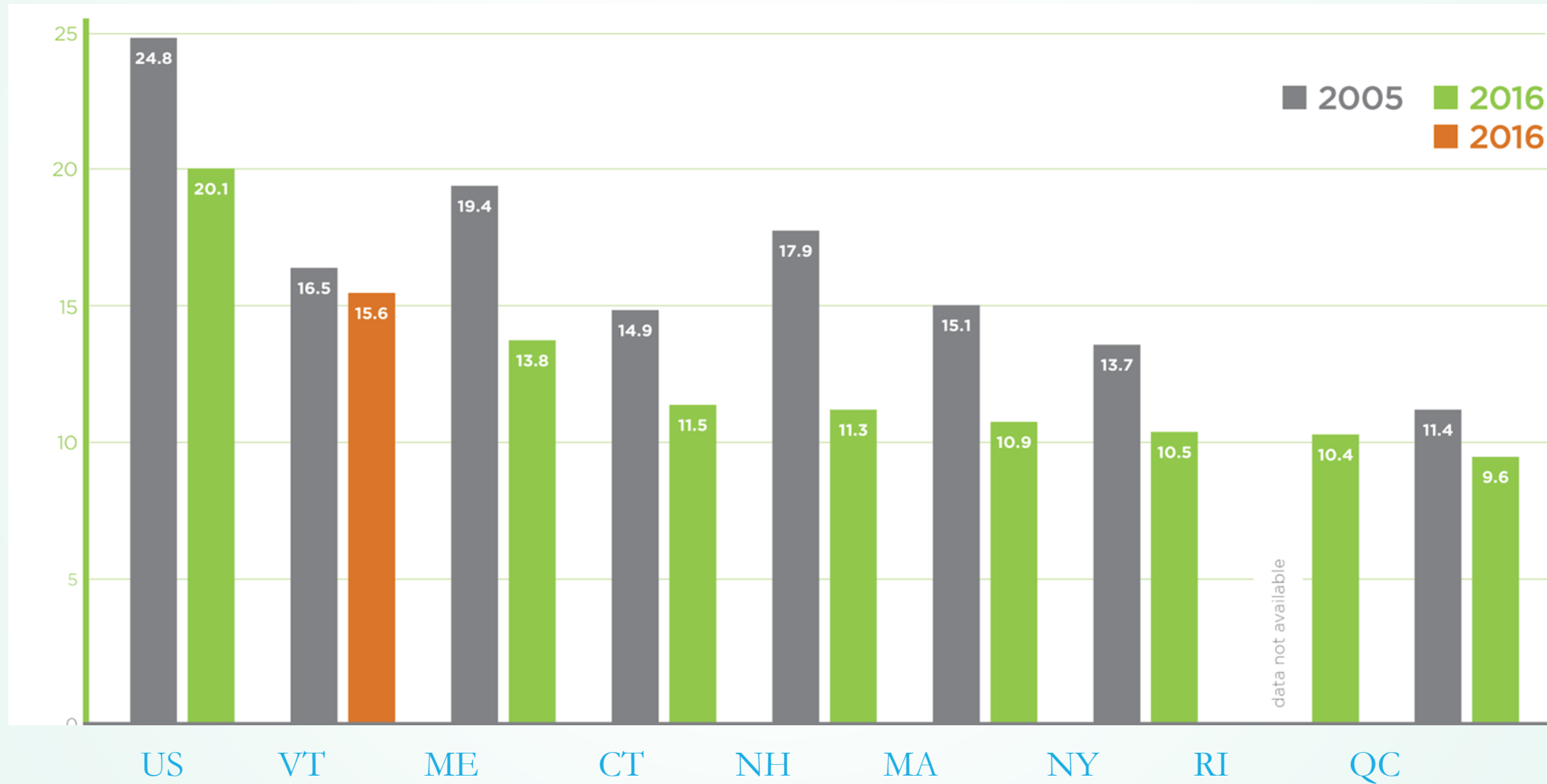
Million Metric Tons CO2 (MMTCO2)



Sources: EPA, Environment and Climate Change

VT now has highest per capita emissions in the region

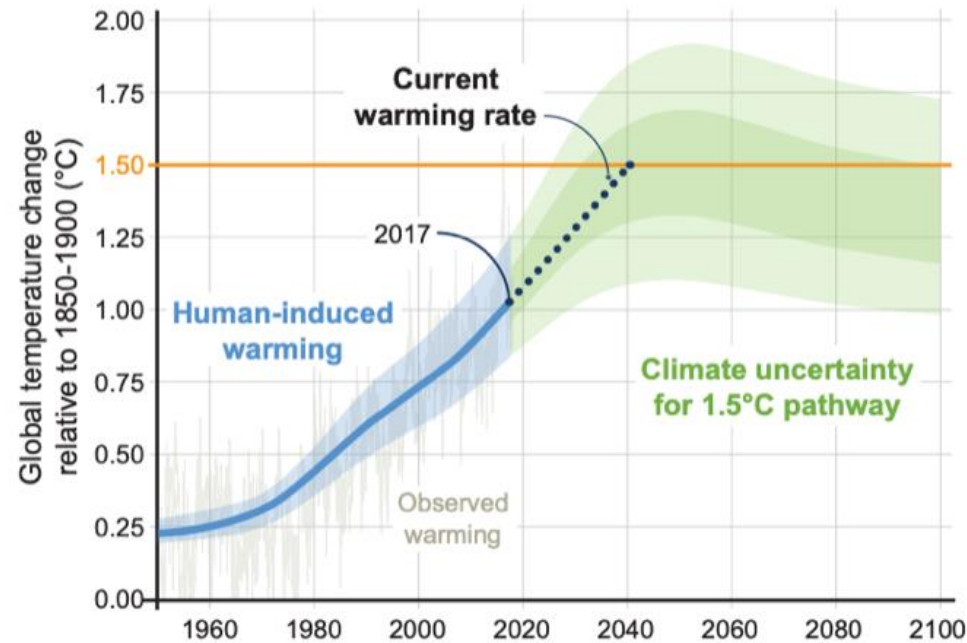
(metric tons CO2e per person)



The IPCC: How close we are to 1.5 C?

FAQ1.2: How close are we to 1.5°C?

Human-induced warming reached approximately 1°C above pre-industrial levels in 2017



FAQ 1.2, Figure 1 | Human-induced warming reached approximately 1°C above pre-industrial levels in 2017. At the present rate, global temperatures would reach 1.5°C around 2040. Stylized 1.5°C pathway shown here involves emission reductions beginning immediately, and CO₂ emissions reaching zero by 2055.