VERMONT'S ENERGY AND EMISSIONS PICTURE

Getting to 2025 Goals

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ENERGY ACTION NETWORK

Session Goals

- **Take Stock – Energy & Emissions**

  Where we've been, where we are, and especially…what it will take to meet our goals

- **Present 10 of the highest impact drivers to 2025**

- **Lay the groundwork for assessing policy options**

What will it take to bend the curve?

Four Takeaways

1. The Climate Conversation is an Energy Conversation

ENERGY = 80%

2. Paris is Possible (2025 = CEP & Paris milestones)

8 YEARS

3. Two Key Drivers are: Transportation and Heat

4. Energy Transition = Jobs, Health, Affordability & More

A Quick Overview

The Big Picture

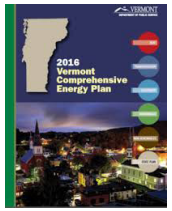
Global annually averaged surface air temperature has increased by about 1.8°F (1.0°C) over the last 115 years (1901–2016). **This period is now the warmest in the history of modern civilization.**

Human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century...**there is no convincing alternative explanation supported by the extent of the observational evidence.**

Key Milestones

Paris Accord

emissions by 26-28% from 2005 levels



VT Comprehensive Energy Plan

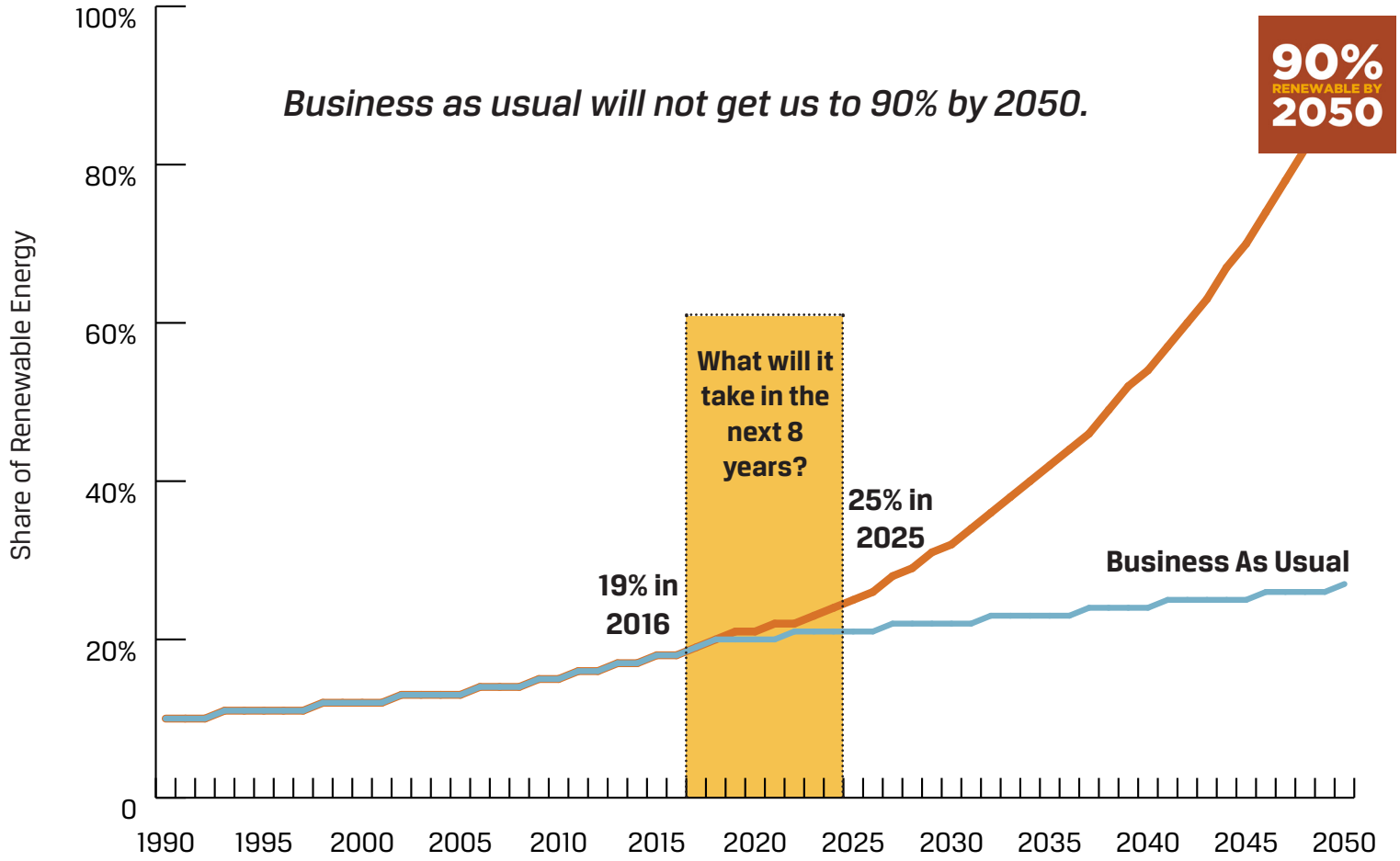
meet 25% of energy via efficiency & renewables (currently 19%)

VT GHG Statute

emissions by 50% by 2028 from 1990 levels

Energy Trajectory 1990-2050

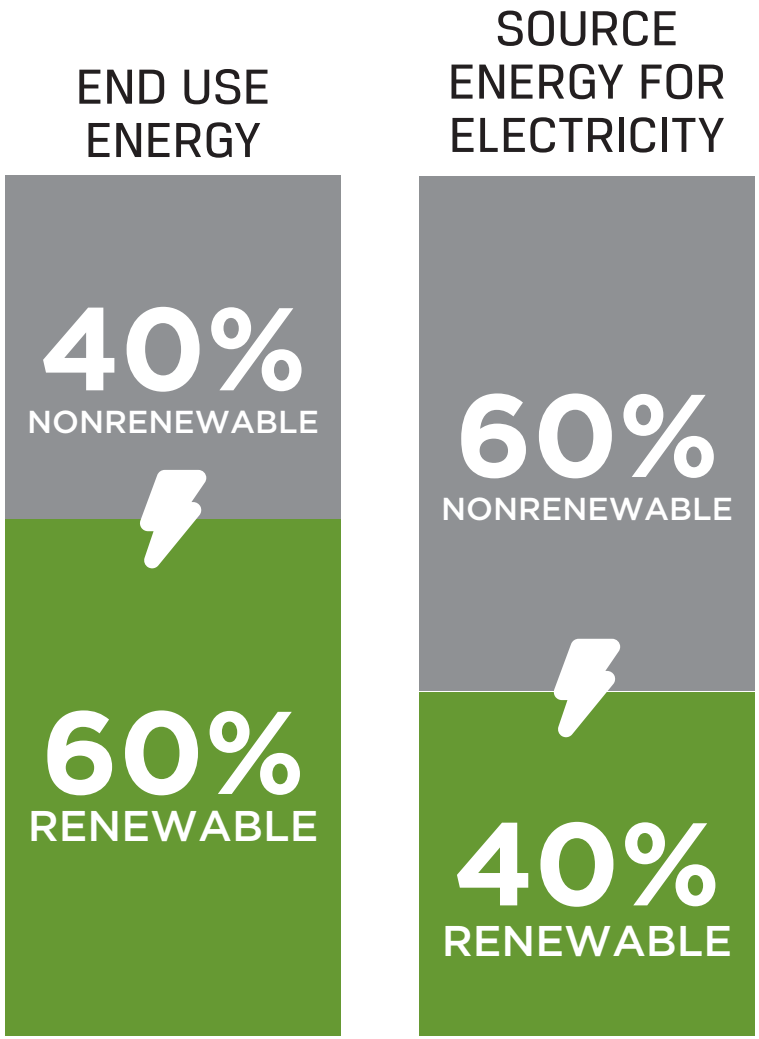
The Long View: Business As Usual Compared to 90% by 2050 Scenario



Source Energy Shows the Full Picture

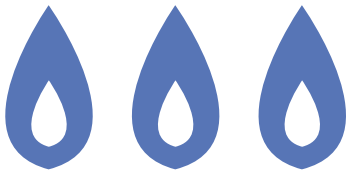
Good news:
Thanks to good policy and collective effort, our electricity is increasingly renewable

But...Source Energy: Although our "end use" is about 60% renewable, our "source energy"—counting all loses incurred in getting our electricity to us, especially from fossil fuel sourced electricity in the region—is only about 40% renewable.

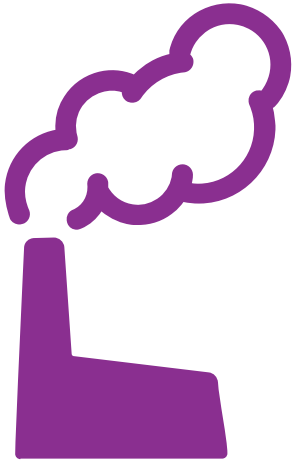


...To Illustrate

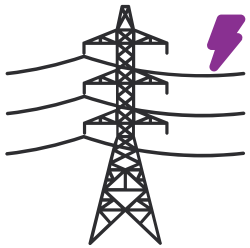
The EPA estimates that it takes



3 units of natural gas



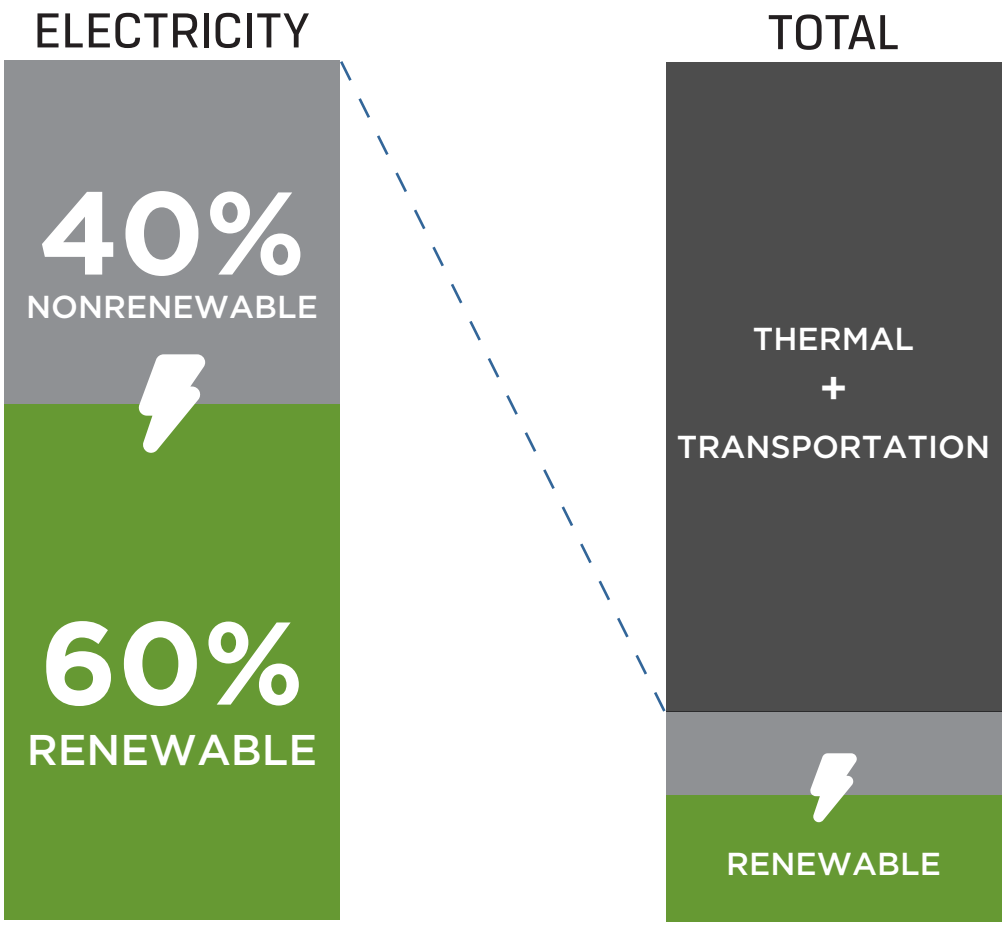
the rest is up in smoke



to produce 1 unit of electricity...

NOTE: The EPA has determined that source energy is the most equitable unit of evaluation. Source energy represents the total amount of raw fuel that is required to generate heat or electricity. It incorporates all transmission, delivery, and production losses. By taking all energy use into account, the score provides a complete assessment of energy consumption.

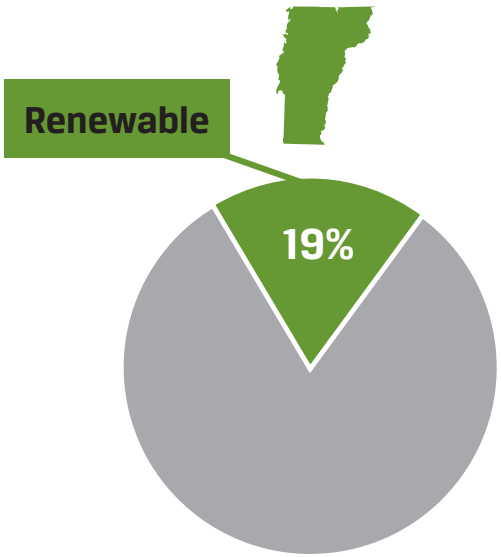
And...Renewable Energy is More Than Electricity



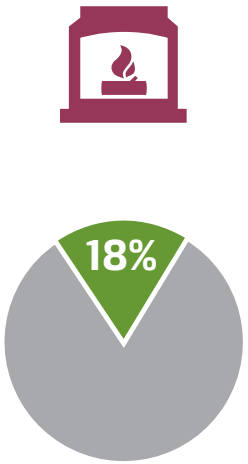
Good news:
Electricty now around 60% renewable with some utilities at 100%

But: since electricity is only 21% of TOTAL energy (including heat and transportation), Vermont is only around 19% renewable

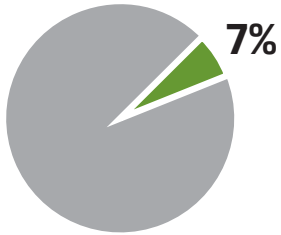
Total Source Energy by Sector



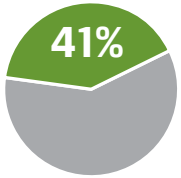
TOTAL
154,651 billion BTU



THERMAL
64,361
billion BTU
42% of Total

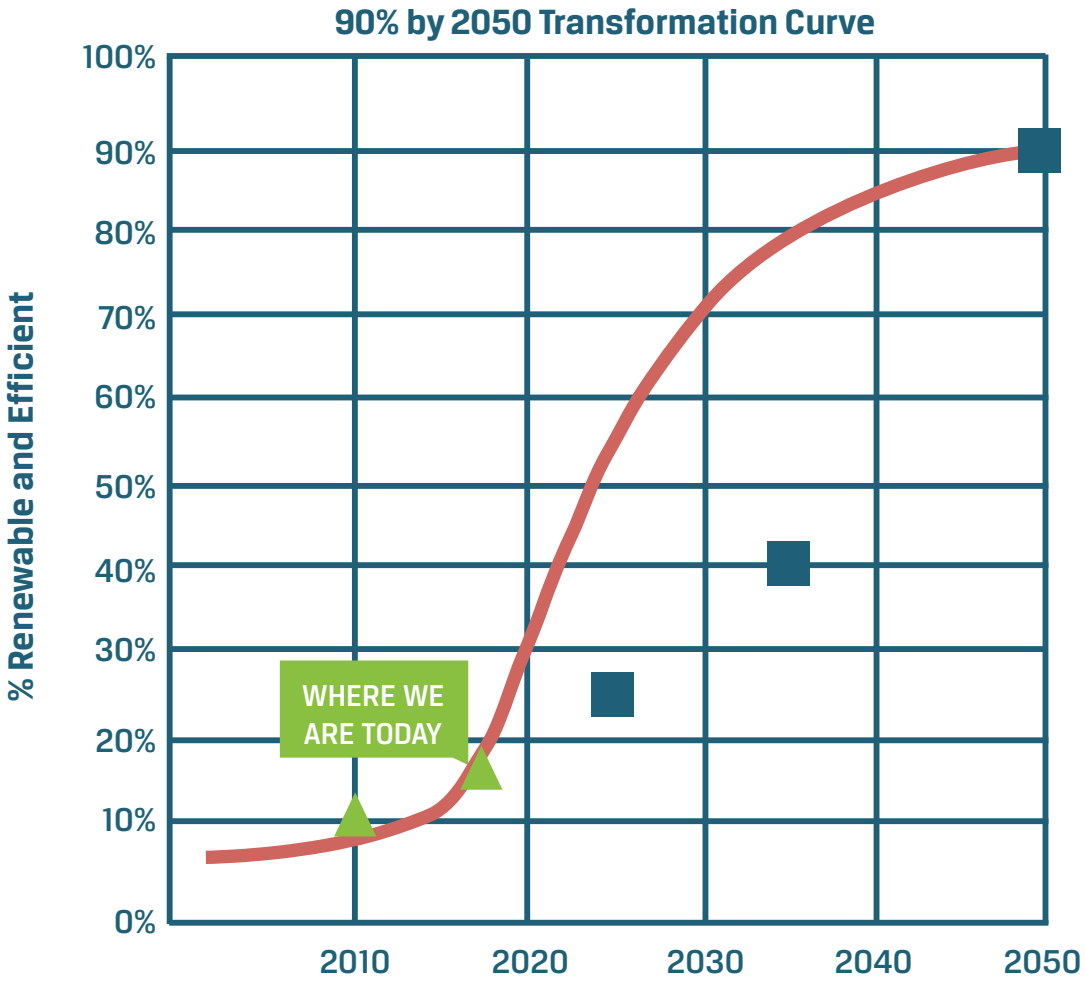


TRANSPORTATION
57,414
billion BTU
37% of Total



ELECTRICITY
32,876
billion BTU
21% of Total

The Long View: Renewable Energy Goals (1990-2050)



Comprehensive Energy Plan

Goals

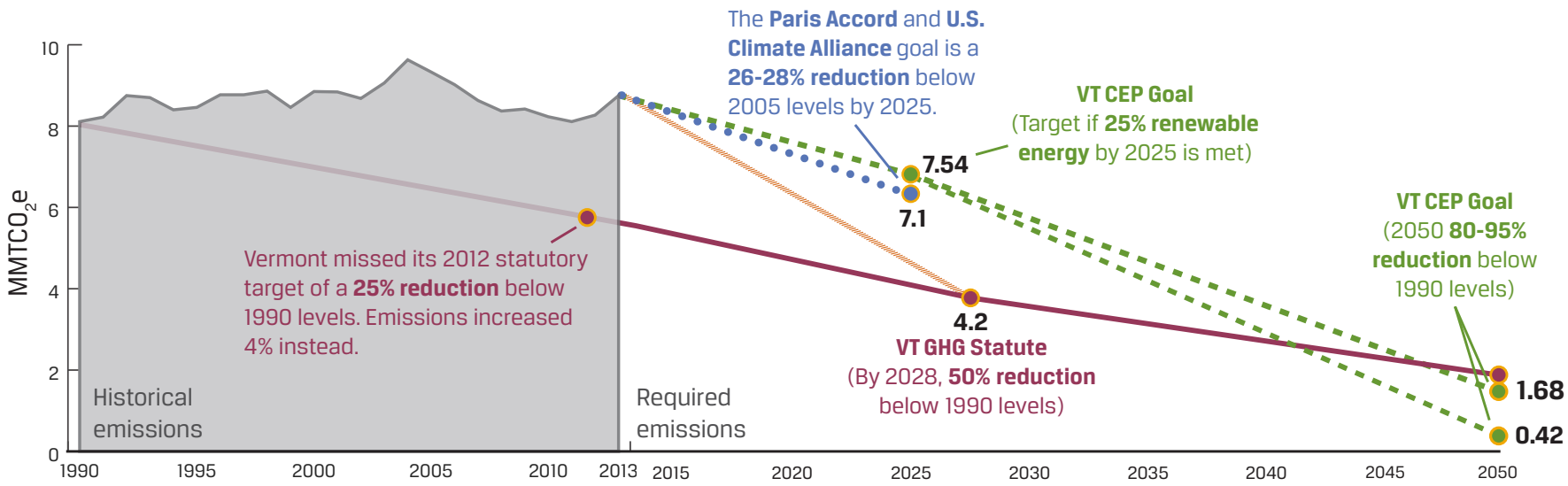
- 90% by 2050
- 40% by 2035
- 25% by 2025

Past 8 Years =
5% increase to 19%

Next 8 Years =
6% increase to 25%

The Long View: GHG Goals (1990-2050)

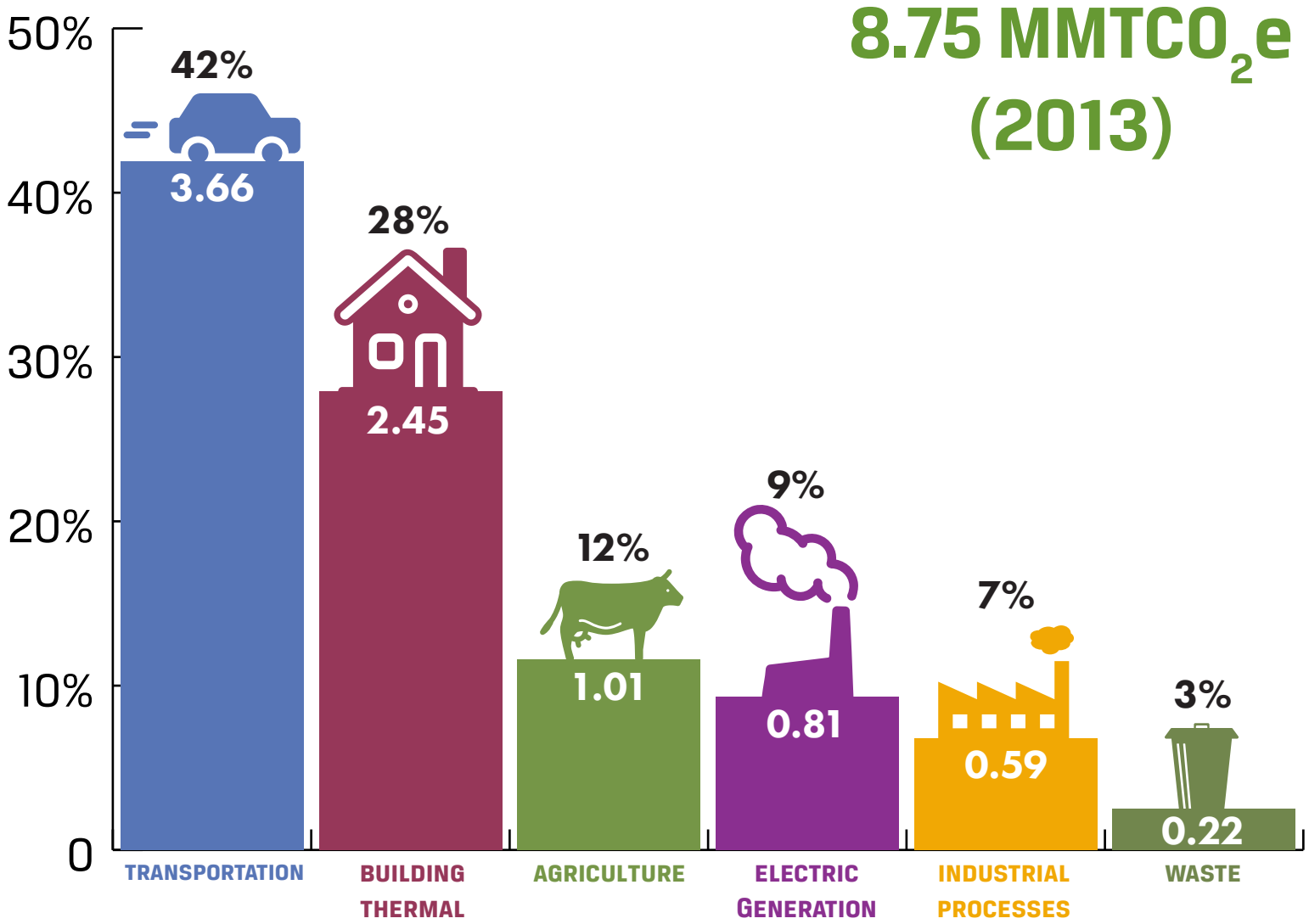
Vermont's GHG Reduction Goals (CEP, Paris, Statute) Compared to Actuals



Historical emissions from Vermont Agency of Natural Resources, http://climatechange.vermont.gov

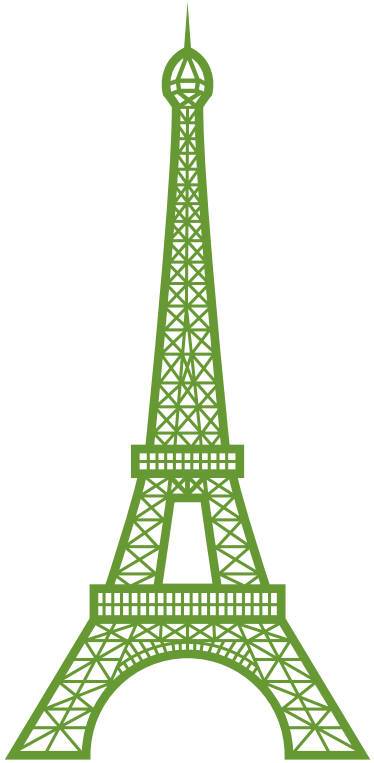
The Climate Conversation *IS* an Energy Conversation

Vermont Greenhouse Gas Contributors

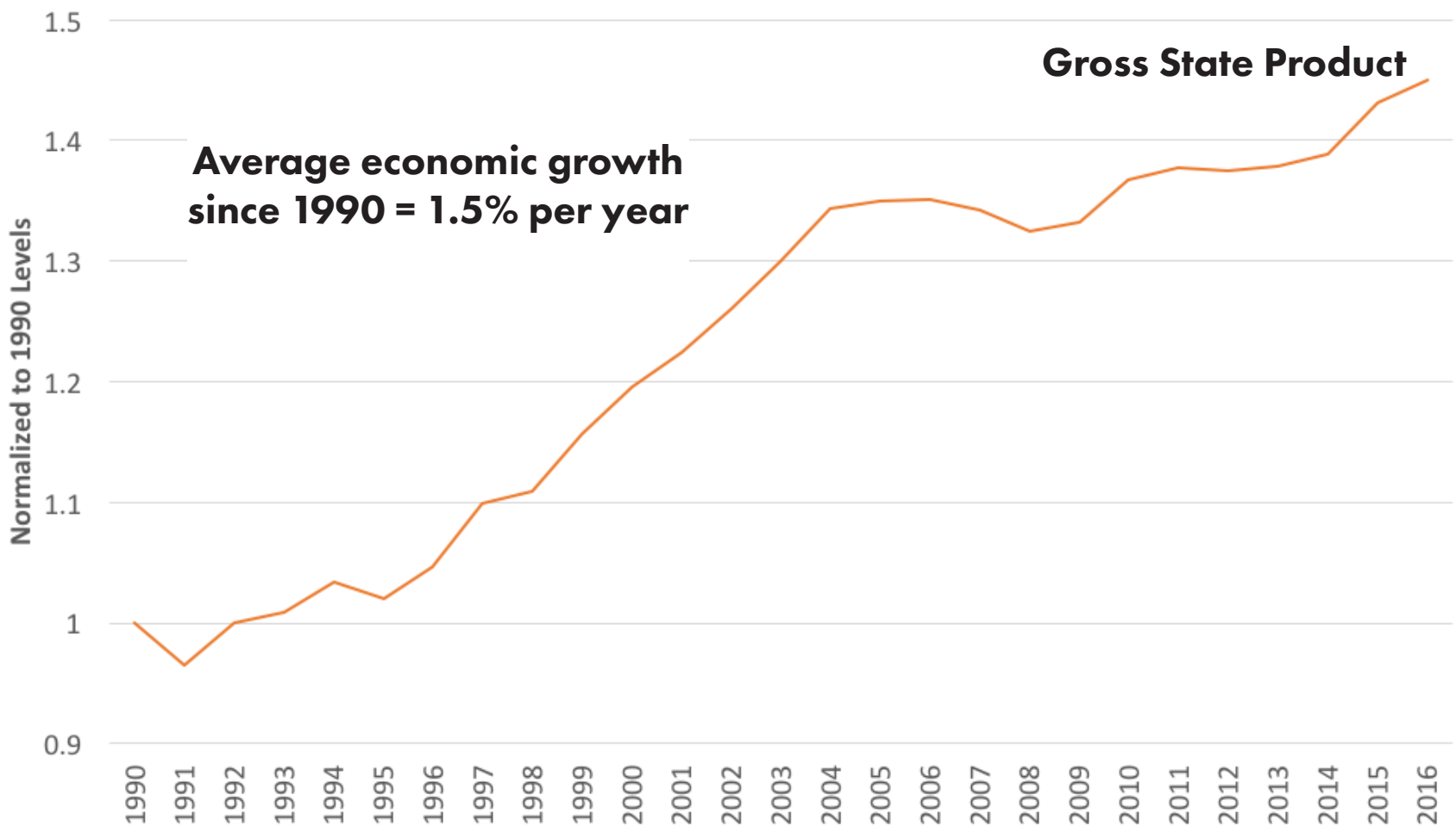


Paris is Possible

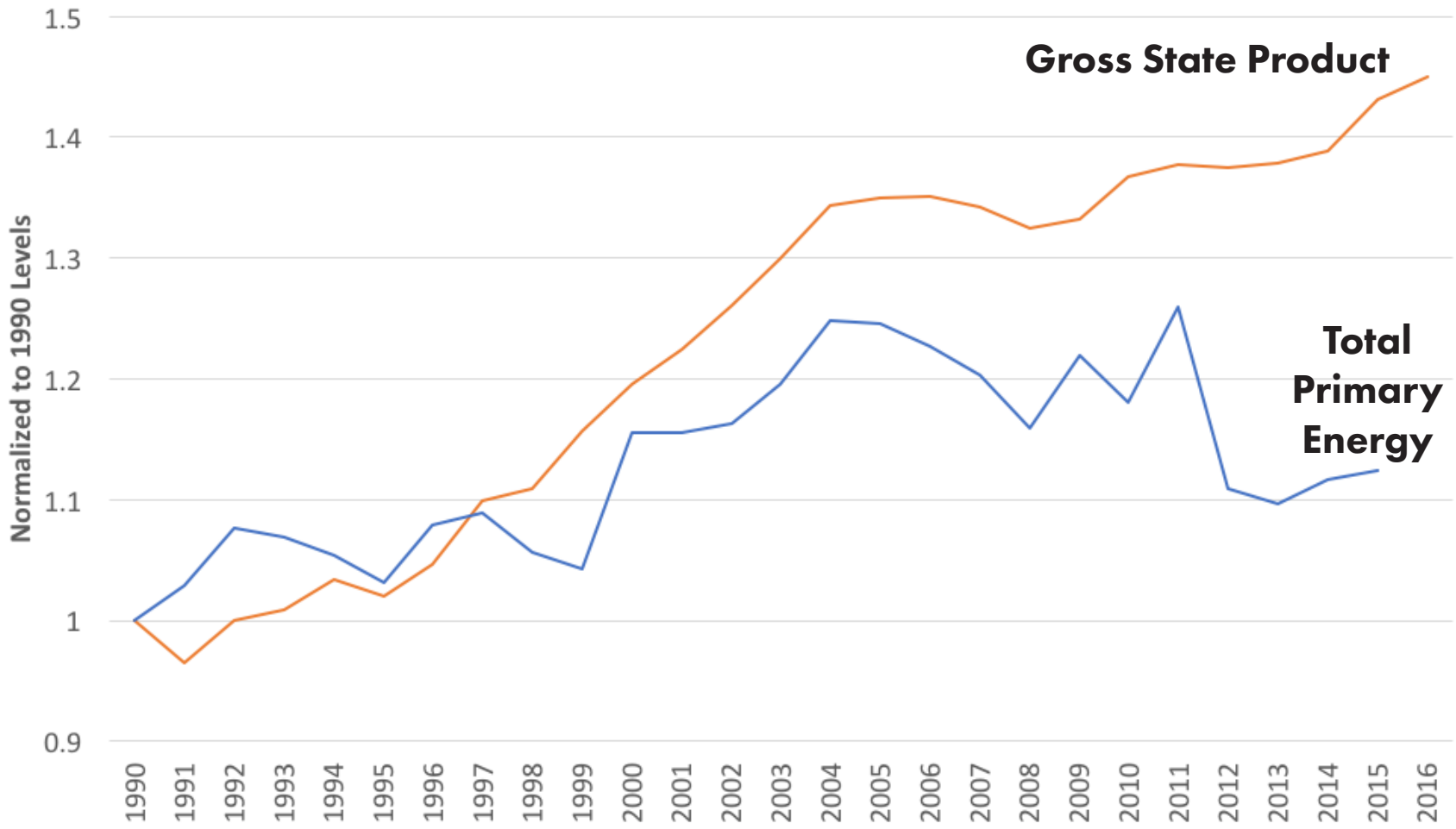
Improving our economy while lowering emissions



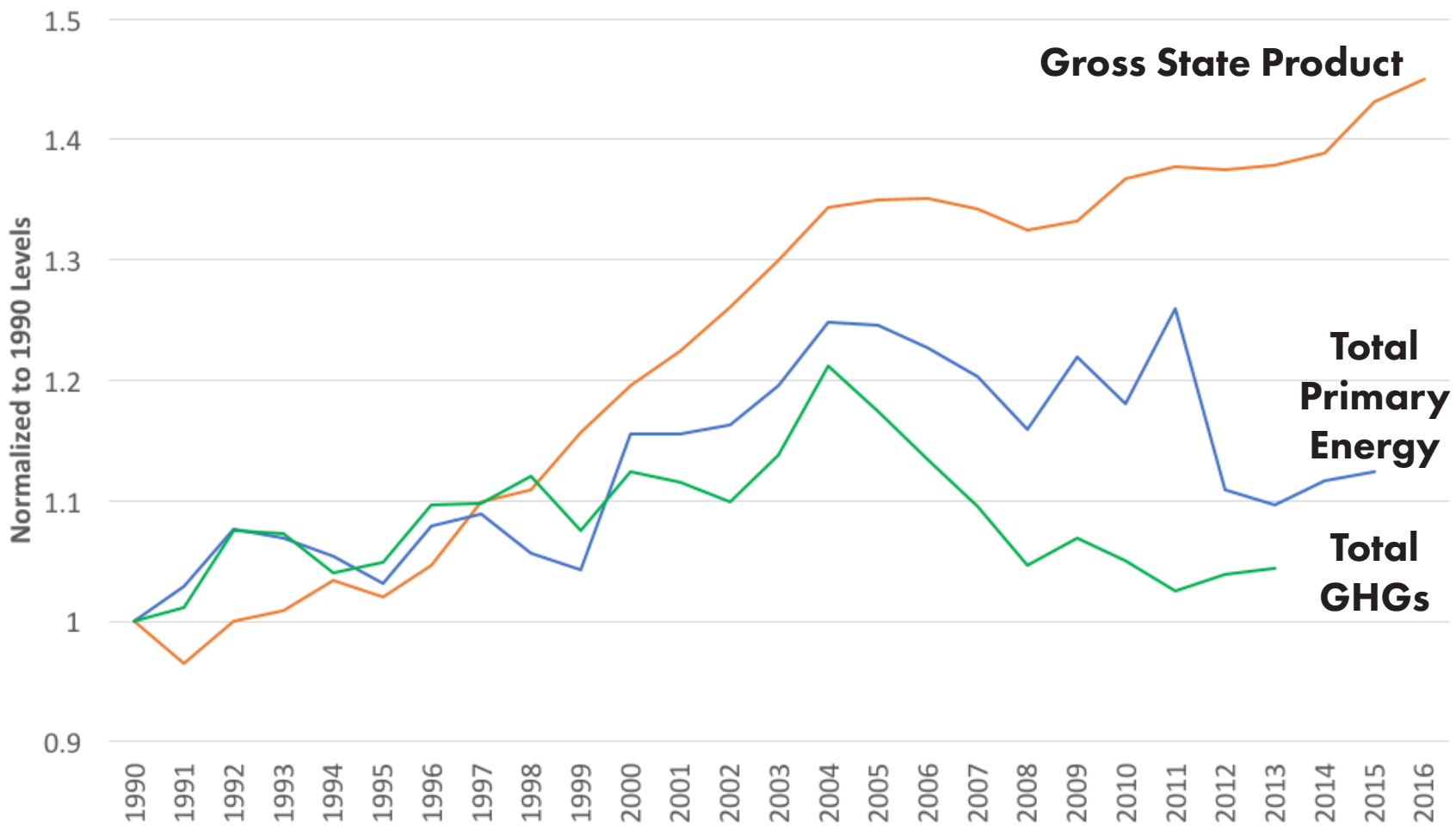
VT Gross State Product



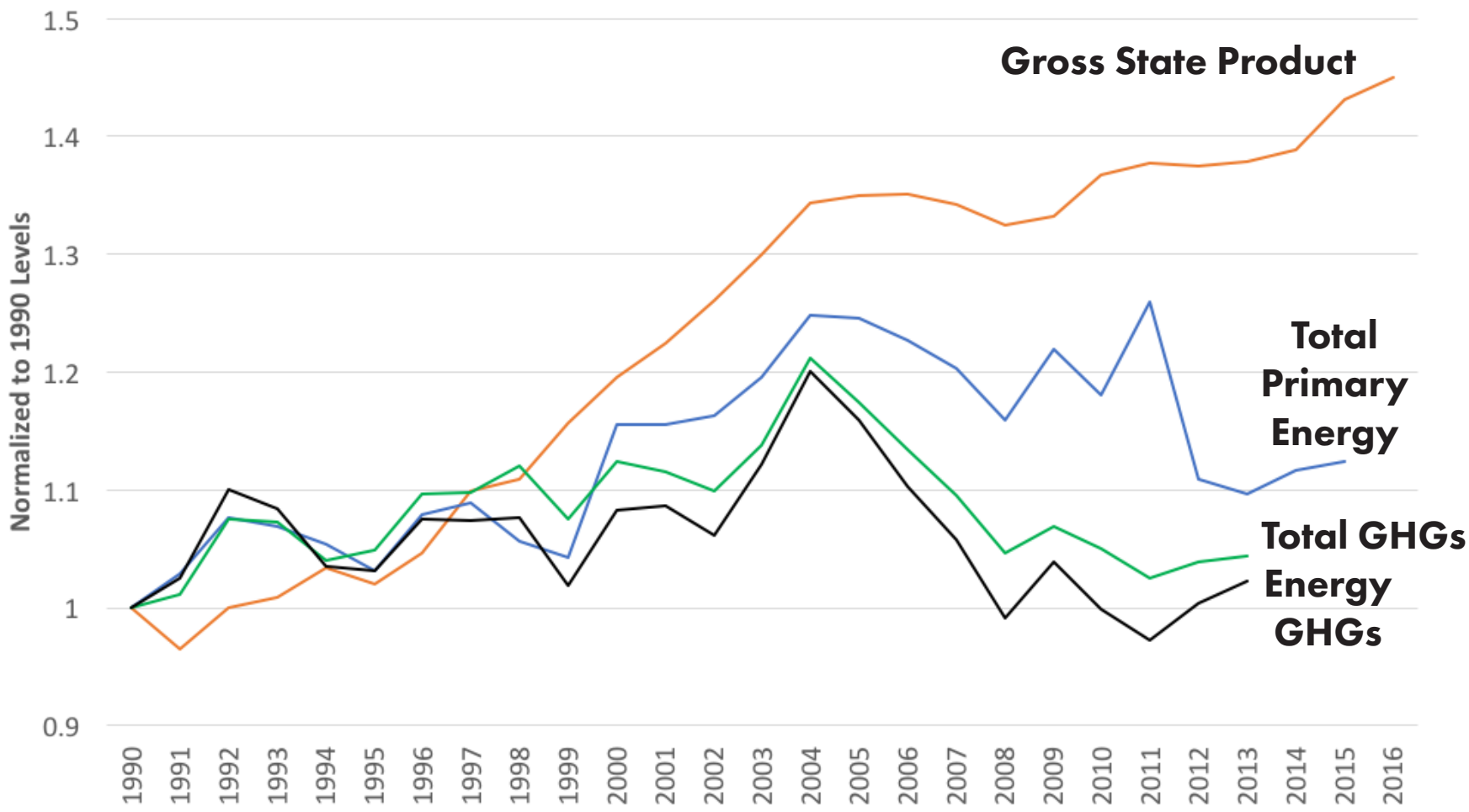
Gross State Product + Total Primary Energy



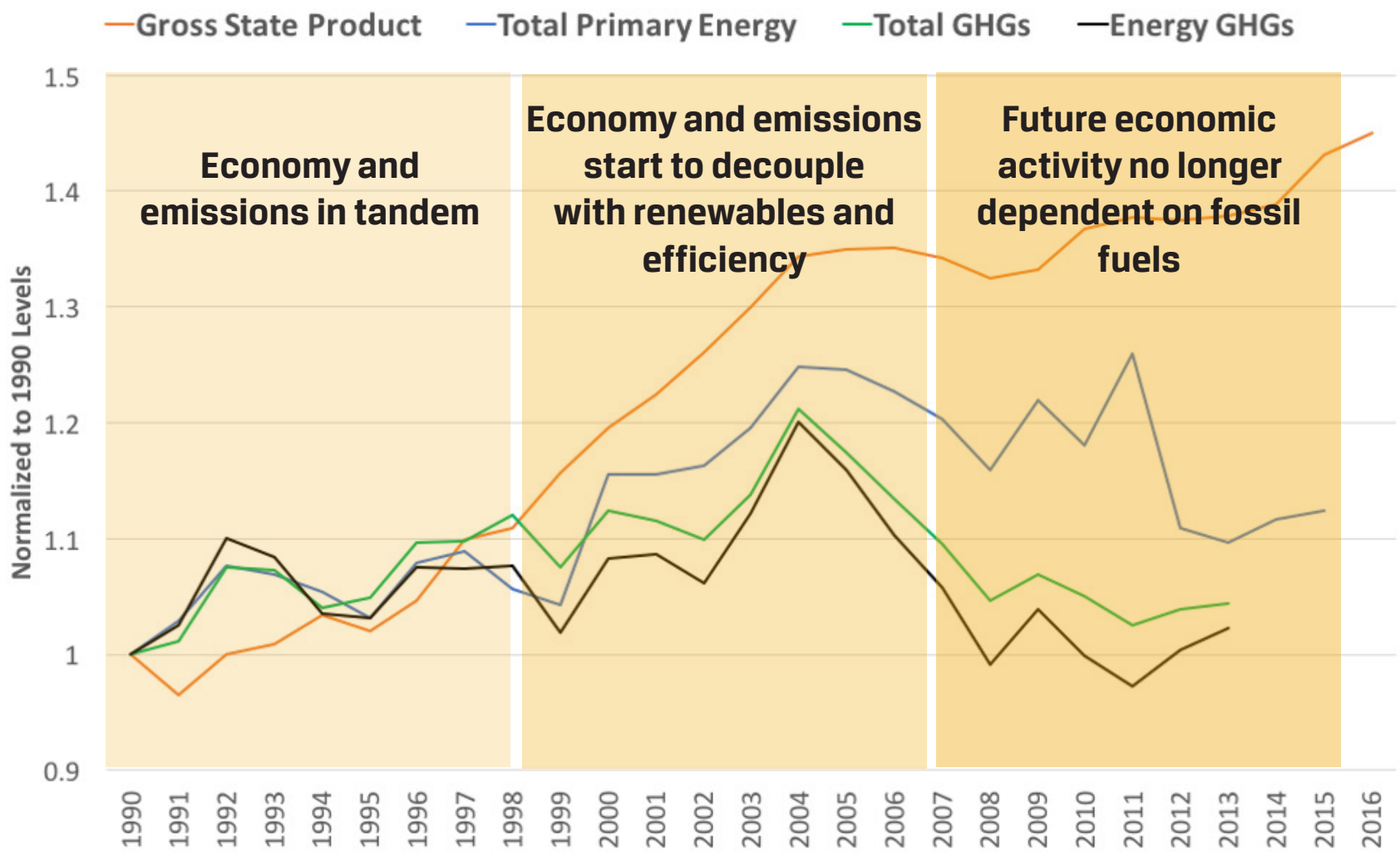
GSP + TPE + Total GHGs



GSP + TPE + Total GHGs + Energy GHGs



Decoupling?


Gross State Product
Total Primary Energy
Total GHGs
Energy GHGs
Normalized to 1990 Levels
1.5
1.4
1.3
1.2
1.1
1
0.9
Economy and emissions in tandem
Economy and emissions start to decouple with renewables and efficiency
Future economic activity no longer dependent on fossil fuels
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016

From 2004 to 2013

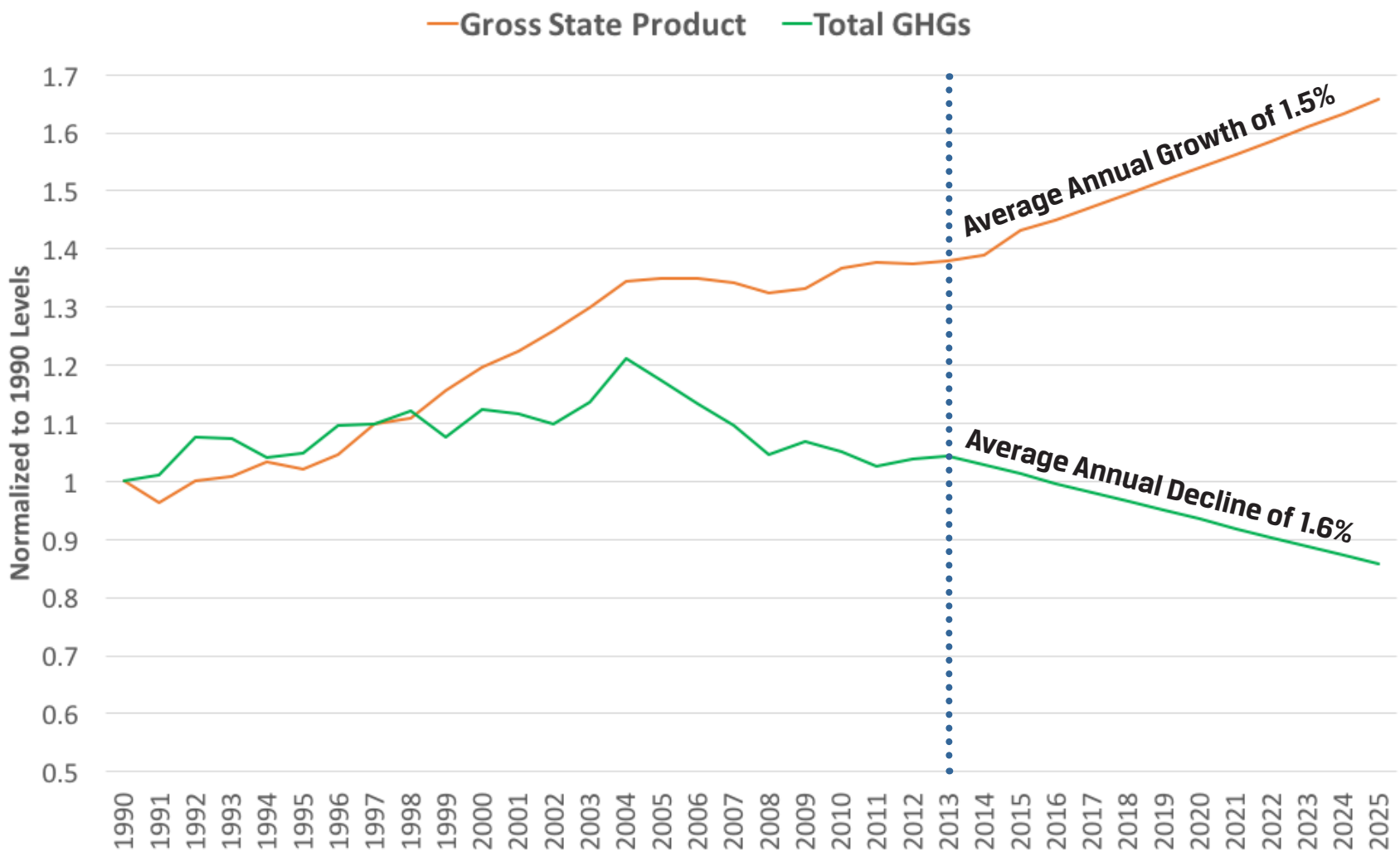
Decoupling

- Economy ***grew*** modestly by 2.6% total (average 0.3%/year)
- Total GHGs ***fell*** by 13.9% total (average -1.6%/year)

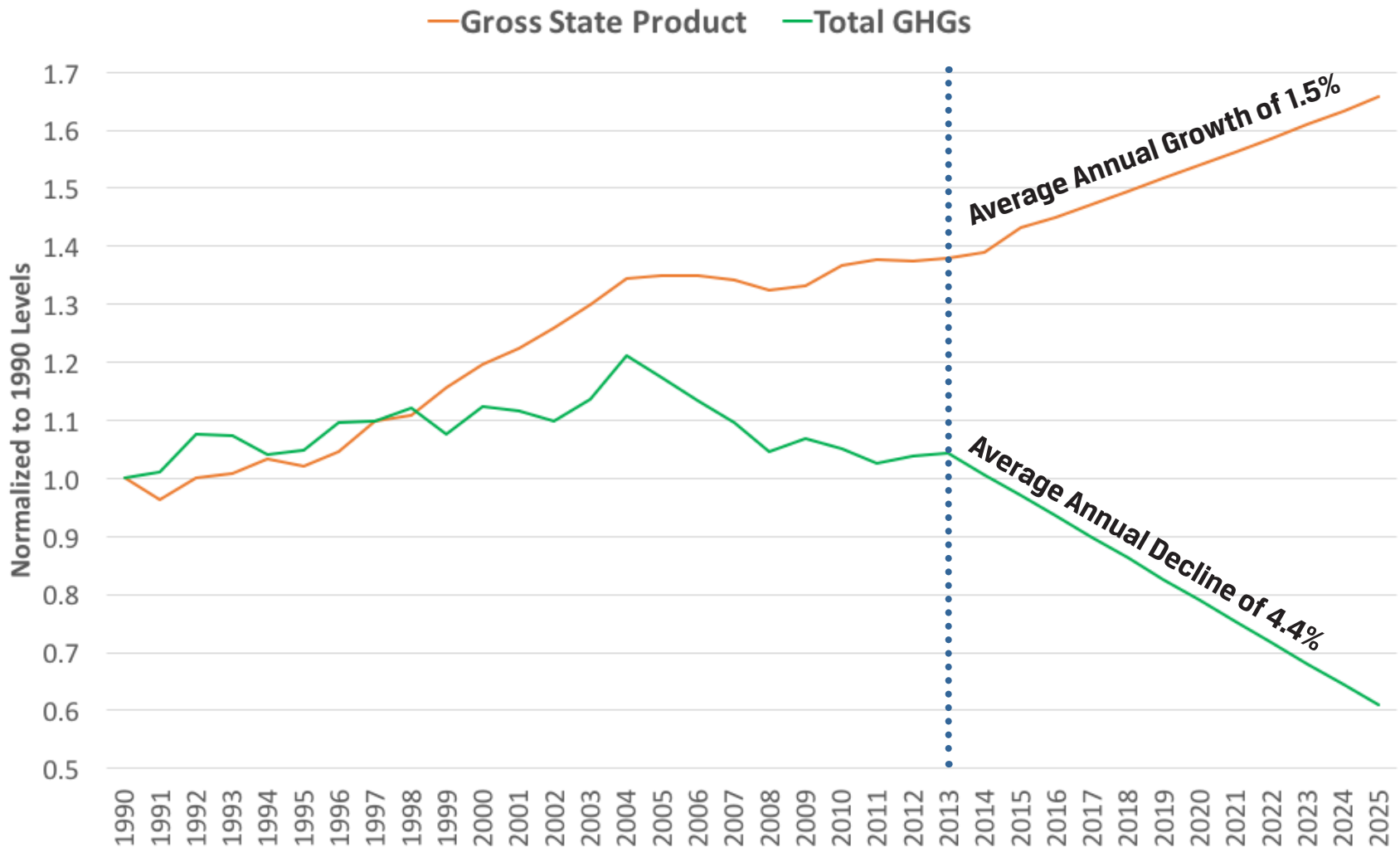
Key Reasons

- Total primary energy ***fell*** by -12.2%
- Renewable energy ***increased*** +105%

To meet Paris Goals of 26-28% reduction



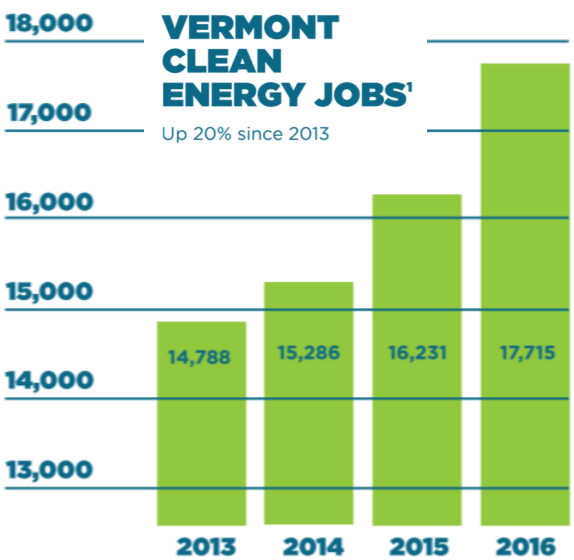
To meet VT Goals of 50% below 1990 by '28

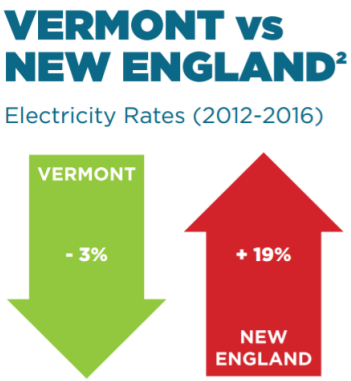


This is not just about energy

...it's about the future of Vermont's economy

VT Jobs, Costs, Predictability





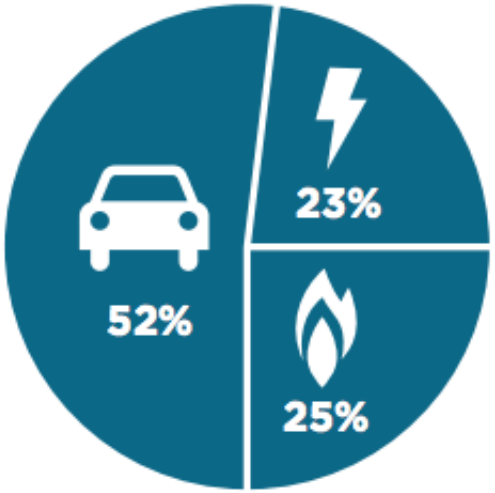
Jobs: VT = national leader in clean energy jobs, now the fastest growing sector of Vermont's economy

Rates: VT electricity rates are the second lowest in New England (down from the highest in 2012). This helps keep our businesses competitive

Reduced Costs: Efficiency improvements helped hundreds of businesses reduce O&M expenditures ($50m/year since 2010)

Predictability: Renewable energy provides predictability in energy costs compared to historically volatile fossil fuel prices

Reducing the Energy Burden in VT

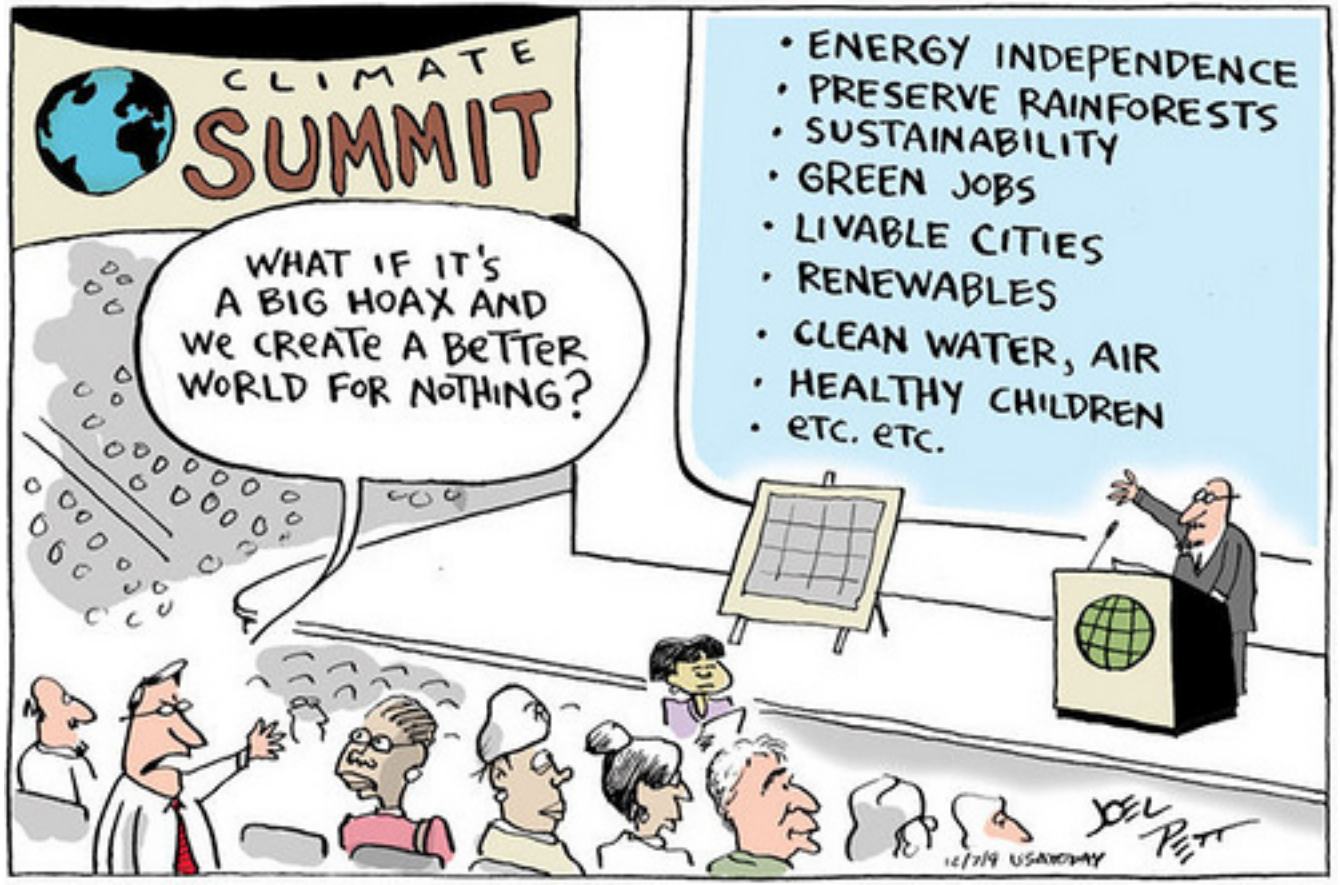


Energy Burden: Low income households spend up to 27% of their household income on electricity and heating. Transportation can make that much higher.

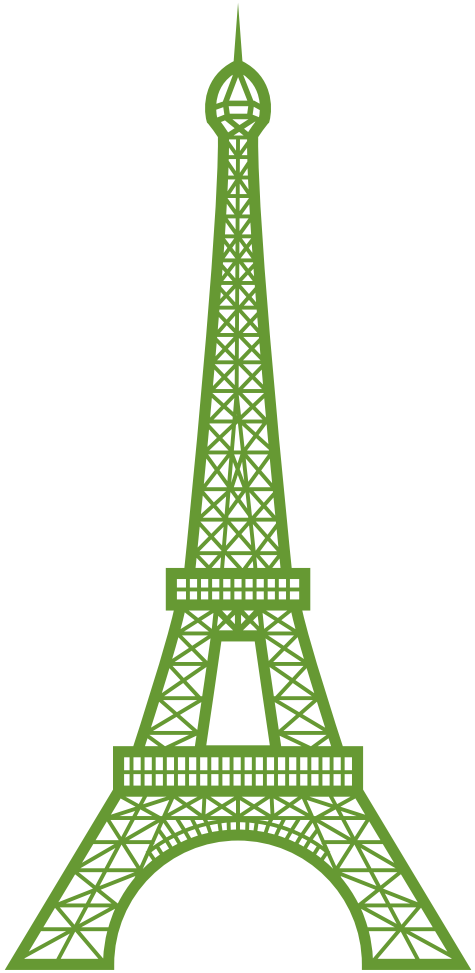
Efficiency = Savings: is the cheapest energy source we have. Every $1 invested in efficiency is yielding $2 in savings in Vermont.

Renewables = Savings: switching to more efficient equipment and transportation that is renewably sourced generates savings ***every year***.

It's ALSO about social, environmental, and health benefits

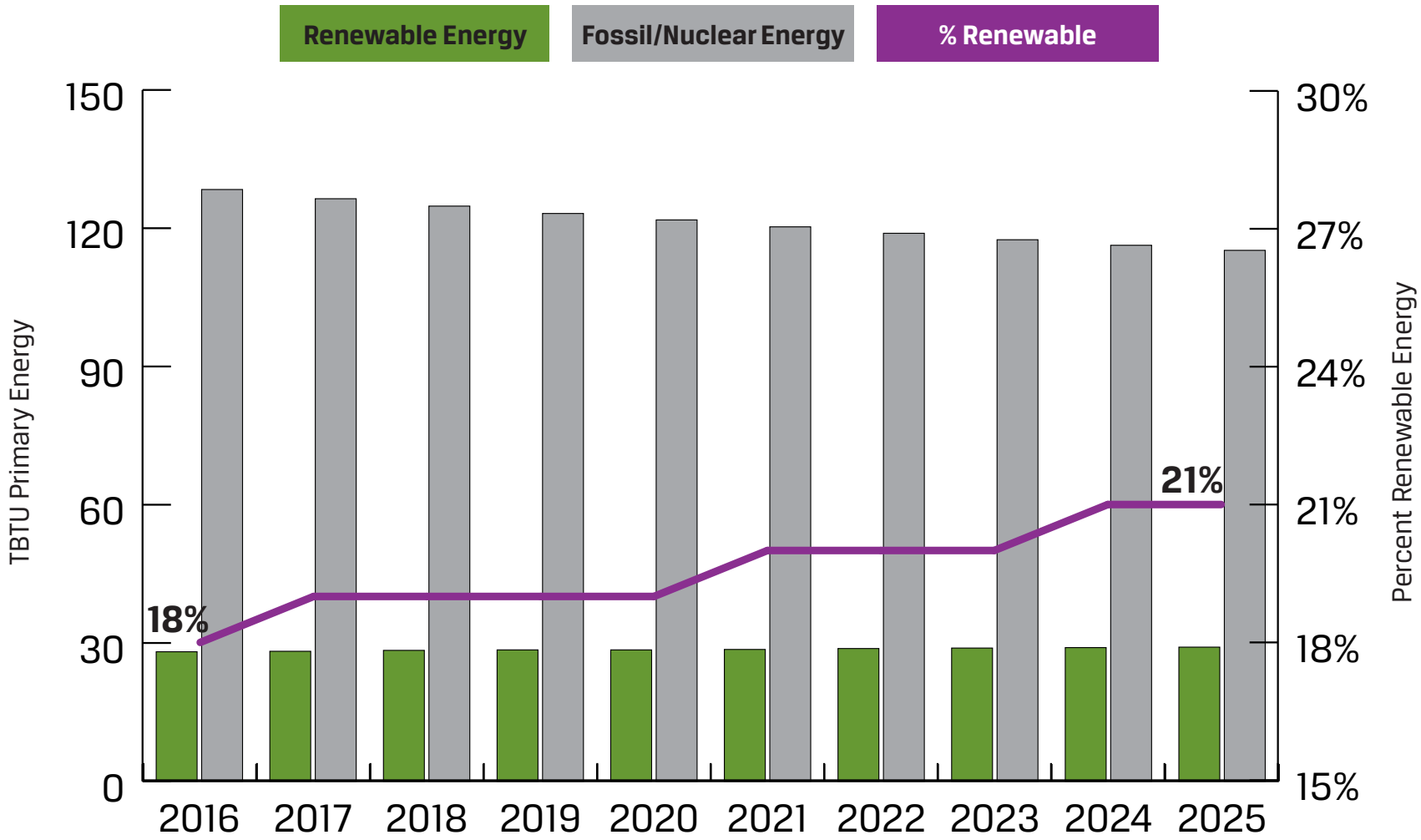

CLIMATE
SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?
• ENERGY INDEPENDENCE
• PRESERVE RAINFORESTS
• SUSTAINABILITY
• GREEN JOBS
• LIVABLE CITIES
• RENEWABLES
• CLEAN WATER, AIR
• HEALTHY CHILDREN
• ETC. ETC.

What will it take to get to



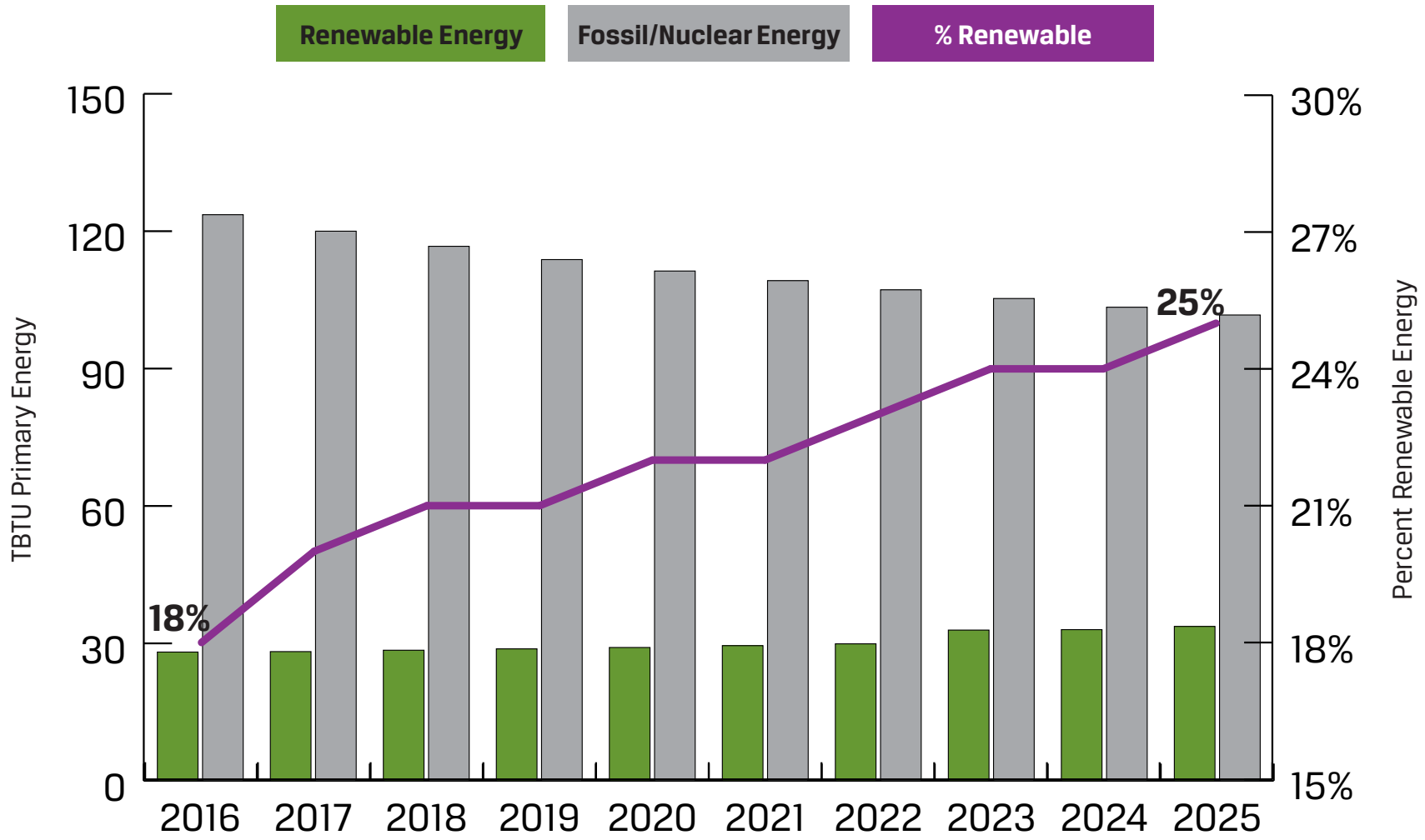
Business as Usual Scenario

Vermont Primary Energy – EAN Projection



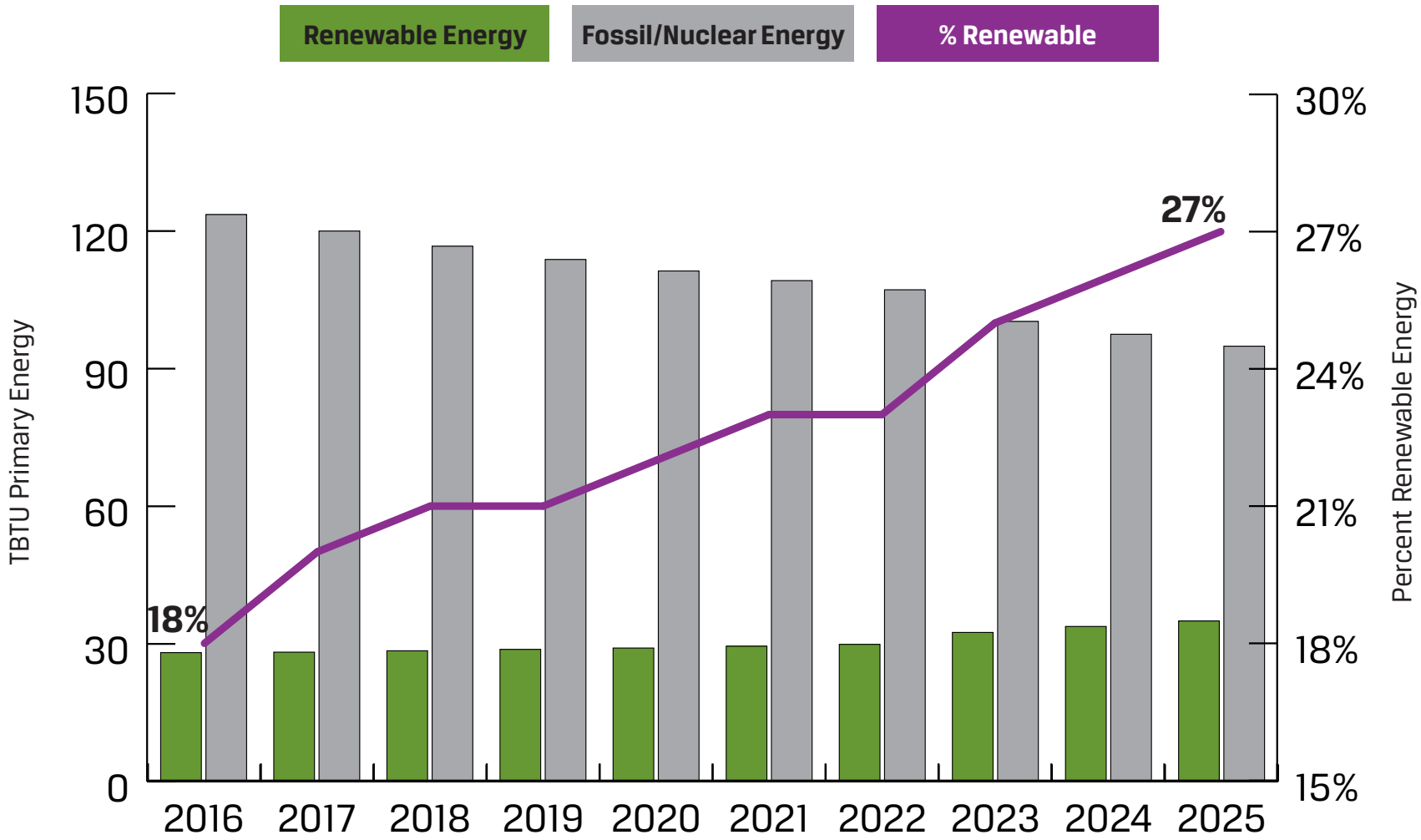
25% by 2025 Scenario

Vermont Primary Energy – EAN Projection



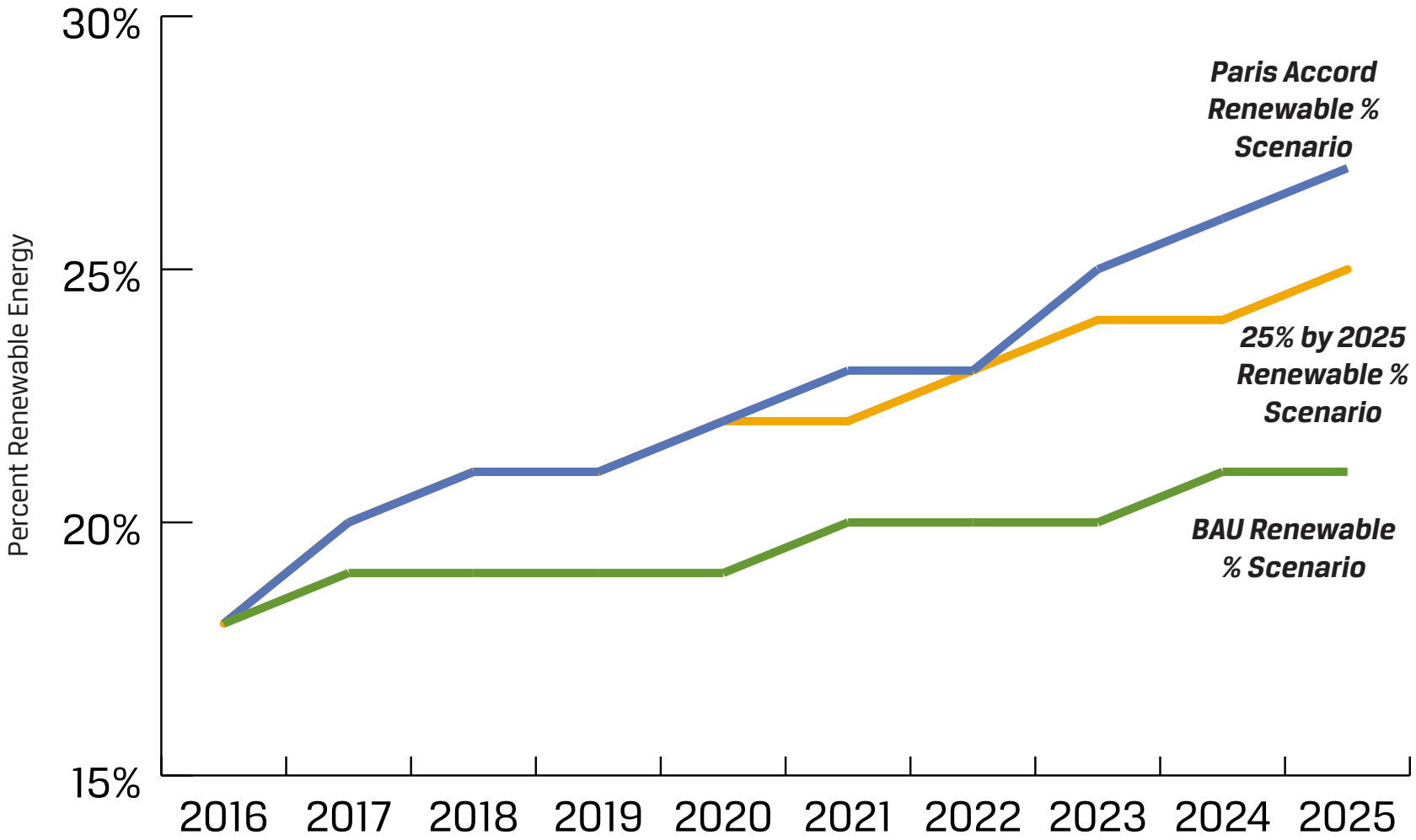
Getting to Paris

Vermont Primary Energy – EAN Projection



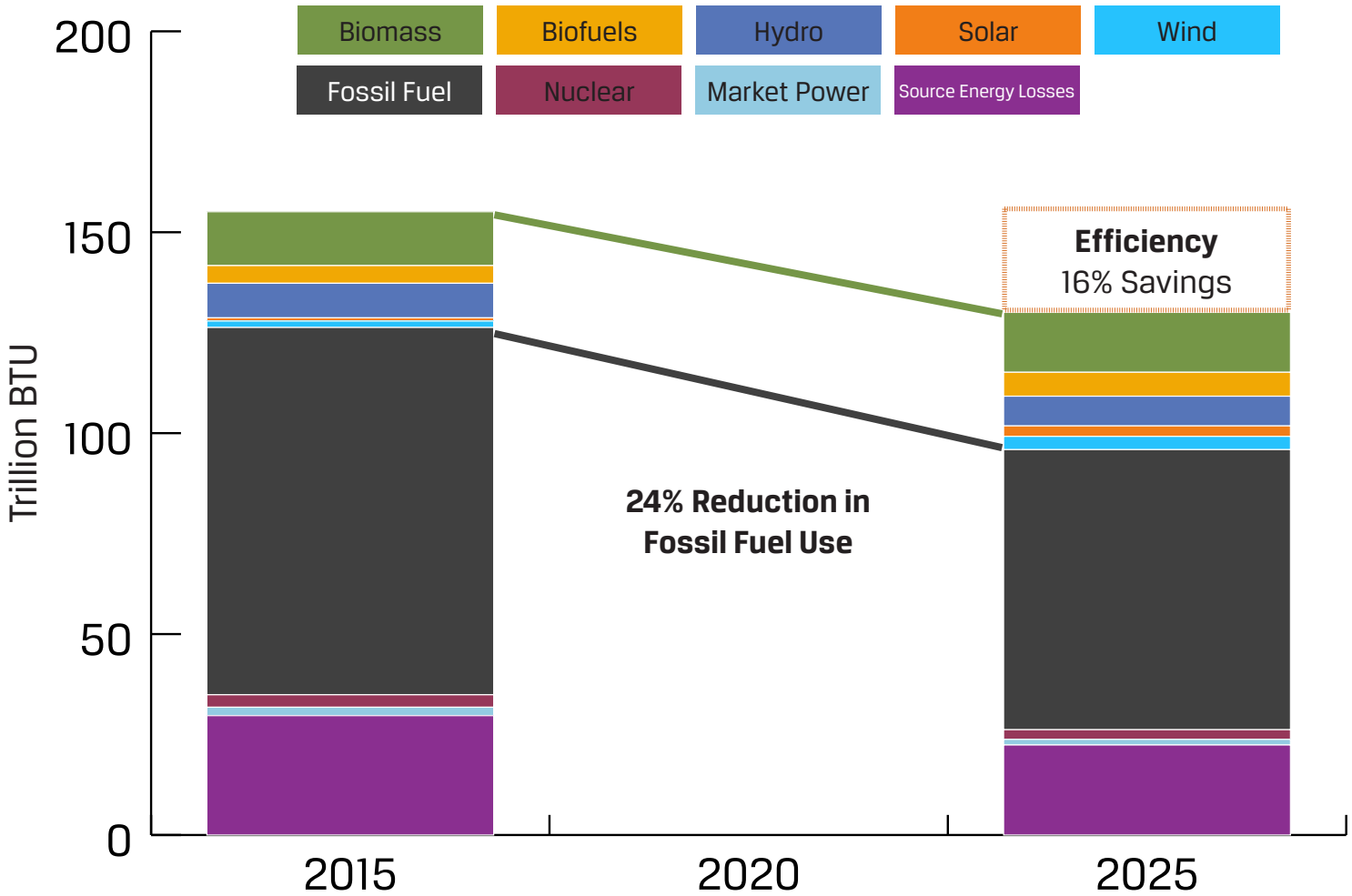
Paris Means Bending the Curve

Percent of Primary Energy Use – EAN Projection



The Role of Efficiency and Renewables

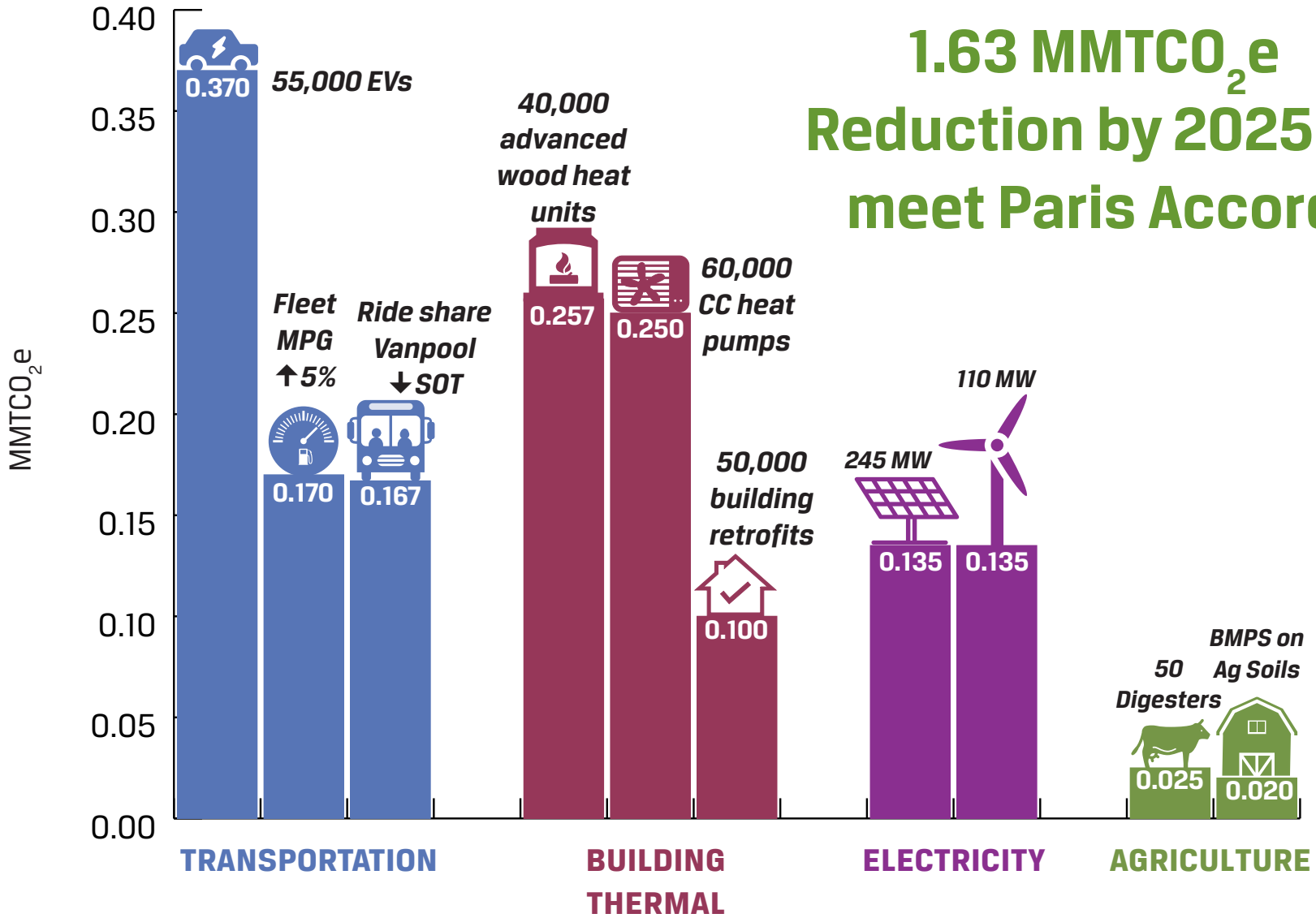
EAN "Paris 2025" Scenario



Source Energy Losses footnote: Source energy losses represent the total amount of raw fuel that is required to generate heat or electricity. It incorporates all transmission, delivery, and production losses.

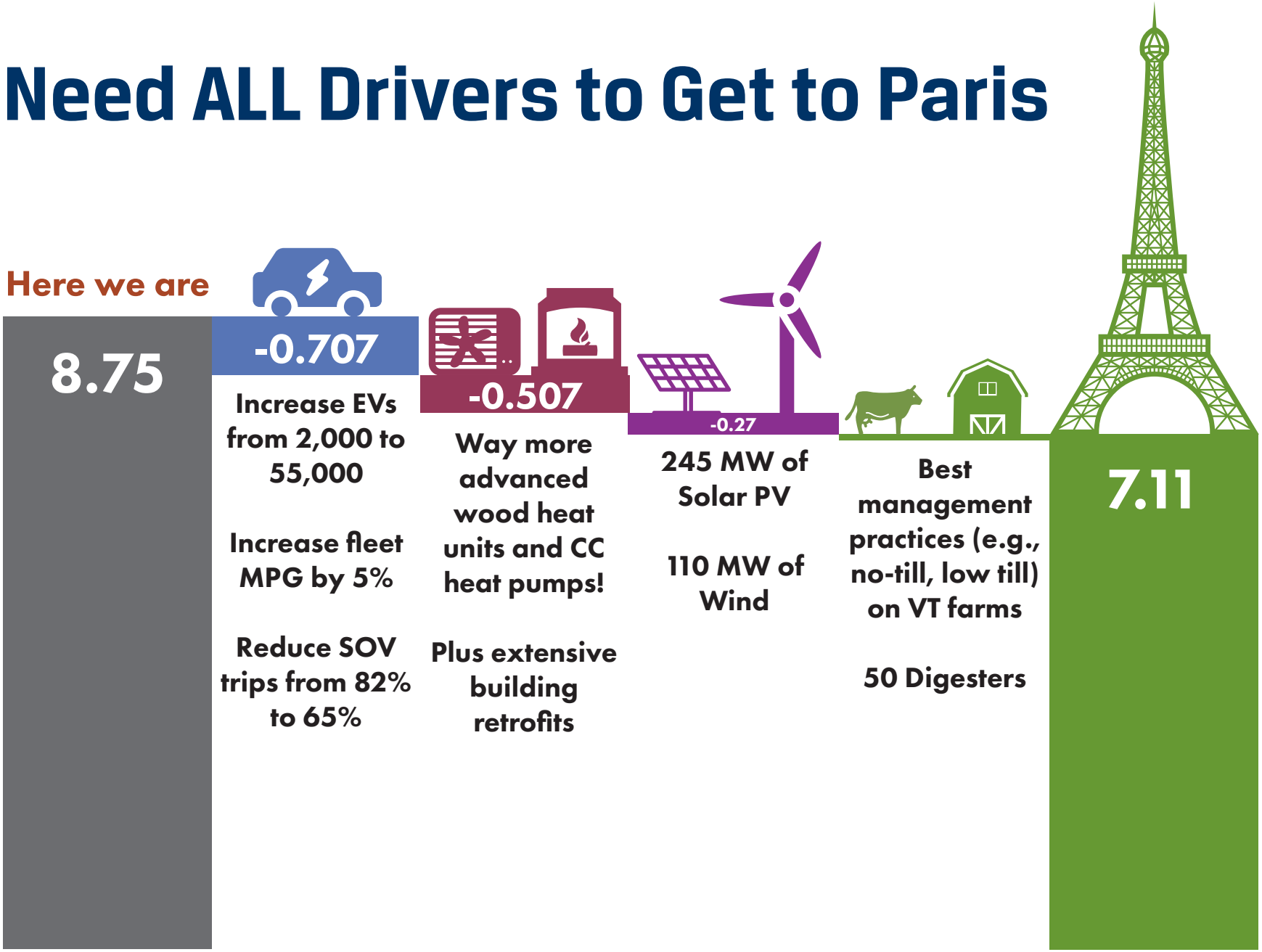
What are key drivers?

10 of Highest Impact Drivers for Reaching 2025 Goals



1.63 MMTCO$_2$e Reduction by 2025 to meet Paris Accord

Need ALL Drivers to Get to Paris



Our goals are achievable technologically, but to bend the curve we need...

Policy and Leadership

The role of State policy is to help our markets work by providing:

Accurate Information
Access to Capital
Accountable Price Signals

This will build a sustainable economy that creates jobs, keeps energy affordable, and protects our environment

Questions & Discussion

Website: **sli.do**

Event Code: **2025**