



ENERGY ACTION NETWORK

Financing Vermont's Energy Transition

VCRD Climate & Economy Conference

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Andrea Colnes EAN

Executive Director

**90%^B_Y
2050**



Energy Action Network



ENERGY ACTION NETWORK

Mission: *To end Vermont's reliance on fossil fuels and to create clean, affordable and secure electric, heating, and transportation systems for the 21st Century.*

Members: *Businesses, organizations, individuals, government*

Goal: *To meet 90% of Vermont's 2050 energy needs through energy efficiency and renewable energy.*

**90%^B_Y
2050**



EAN Participants

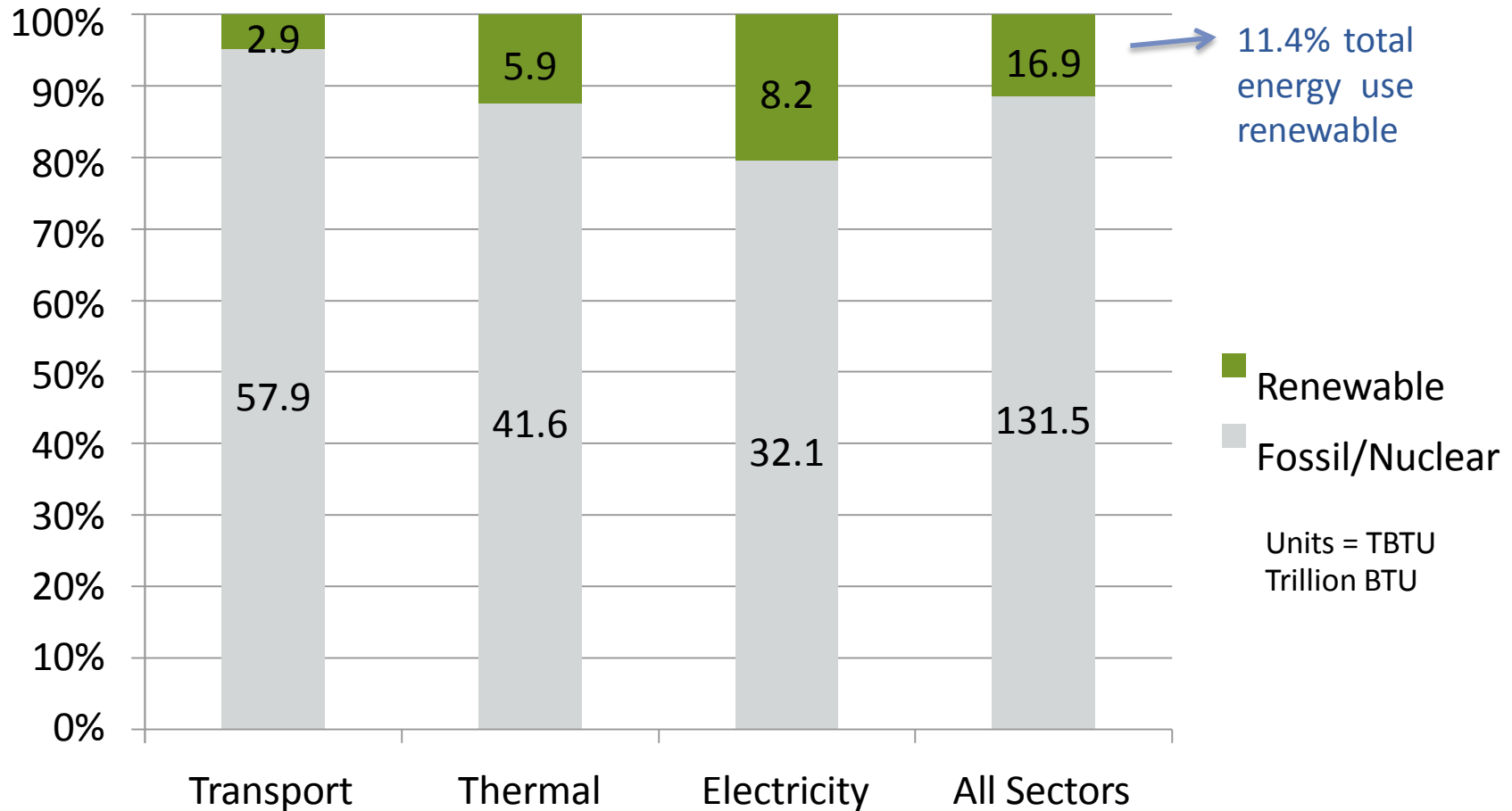


EAN Energy Pathways Report

- Analysis of policy & technology pathways to achieve state's CEP goal of 90% by 2050
- Ranked pathways by impact
- Suggested decade milestones to reach CEP goal
 - 20% by 2020
 - 40% by 2030
 - 70% by 2040
 - 90% by 2050

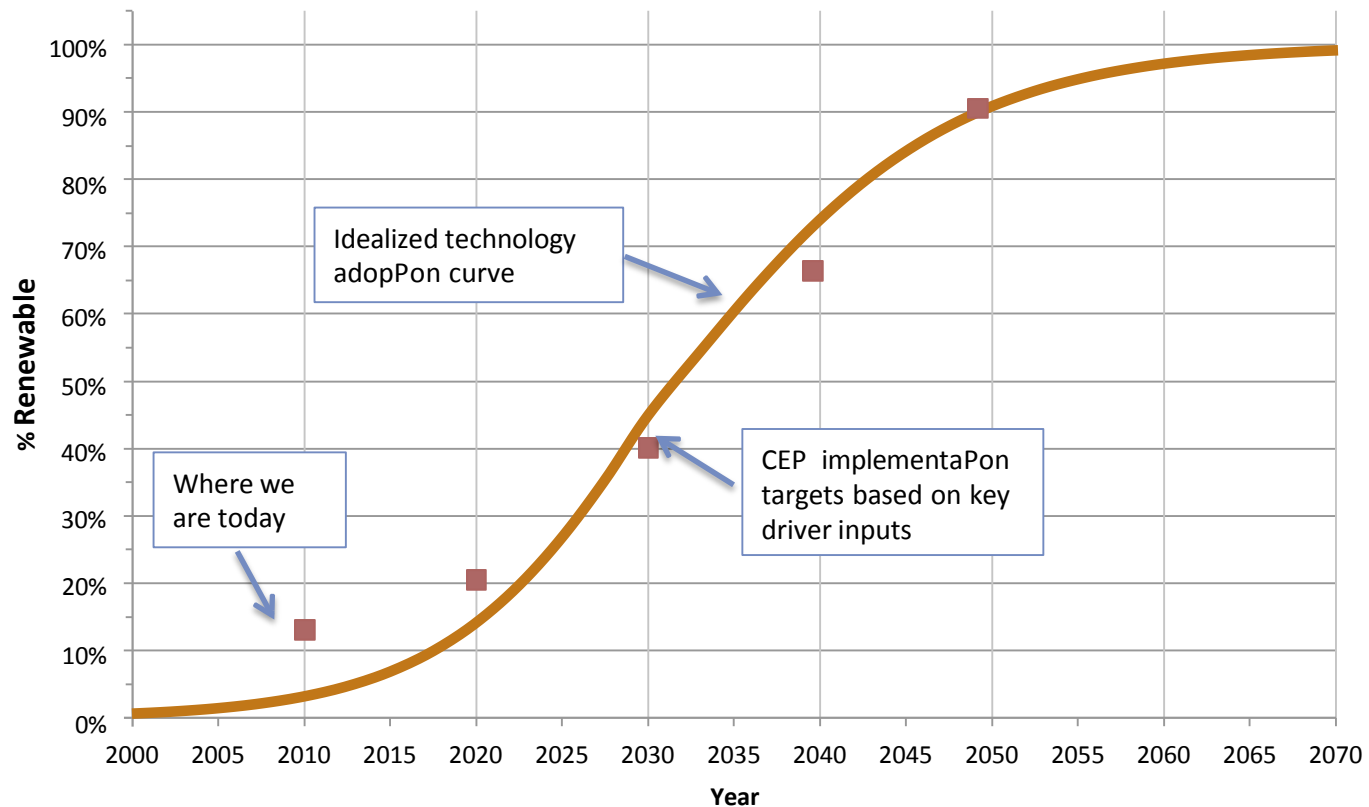


Strategic Context: Our Current Energy Mix



Transformation S-Curve

90 by 2050: Tech Adop3on Curve & Milestones



Our First Milestone: 20% x 2020

For the 2020 milestone, EAN set a target goal of 20% renewable across all sectors. Given available technology, Vermont's current energy programs, and where the state should be on the transformation S-curve (see page 2), achieving 20% (roughly a doubling of our 2010 renewable %) appears achievable and cost-effective. To illustrate the actions that might allow Vermont to reach this goal, EAN has compiled a list of specific targets for each of the key technology pathways.

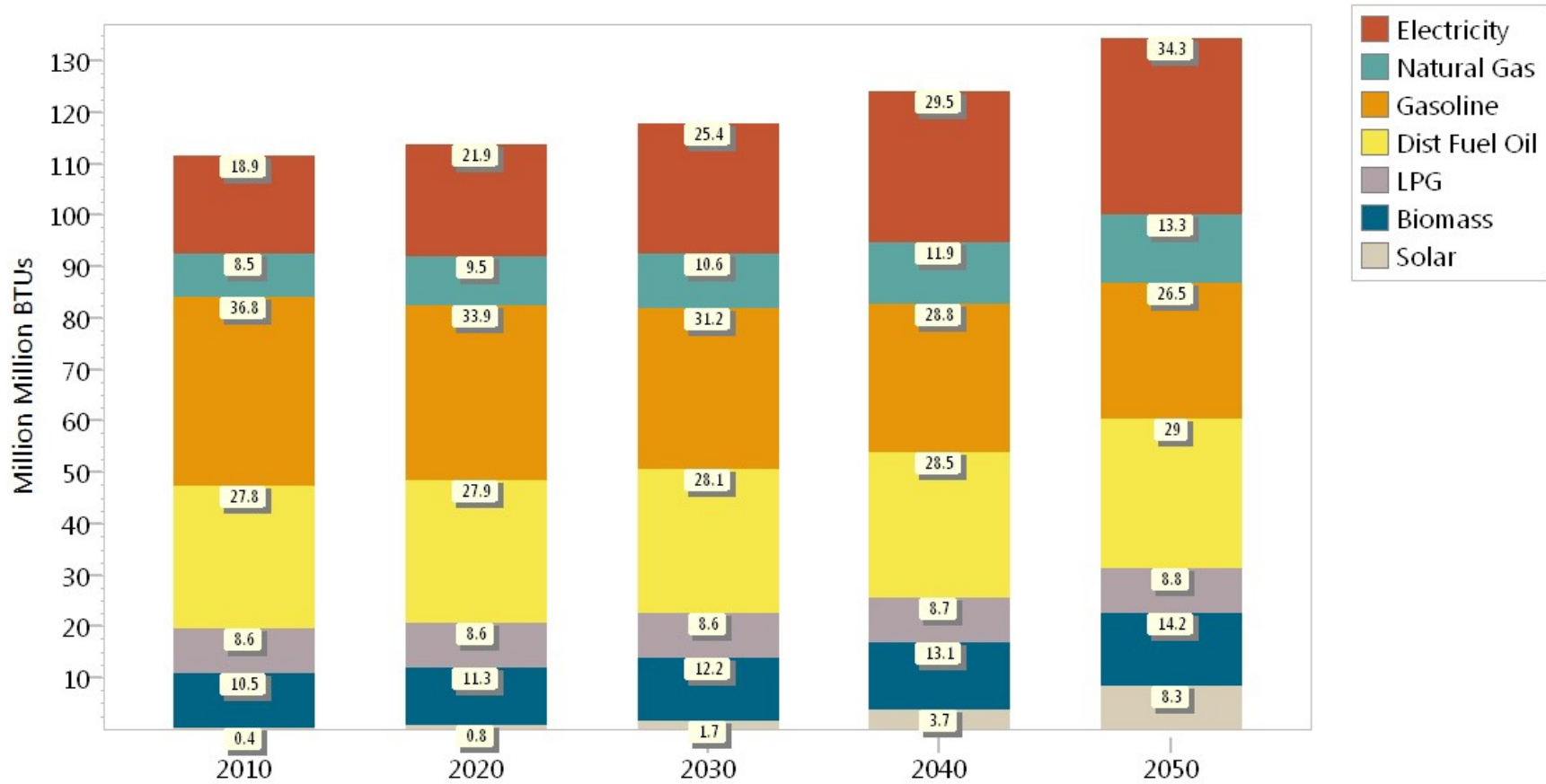
SECTOR	2020 EAN TARGET		2010	2014	2020
		unit	baseline	achieved	target
TRANSPORT					
Electric Vehicles	Increase EVs and PHEVs to 5% of light vehicle fleet	# of vehicles	94*	867	28,000
Biofuels	Increase consumption to 10 million gallons annually	million gallons	1.2	?	10
Efficiency	Increase Vermont fleet fuel efficiency by 5% over 2010 (saves 17 million gallons annually)	fleet MPG	21.6	?	22.7
THERMAL					
Building Efficiency	Reduce building fossil fuel use by 5% from 2010 (Act 92 goals, enacted 2008)	trillion BTUs	33.5	33.1	31.8
Biomass	Increase use of biomass heating to offset 7% of 2010 building fossil fuel use	trillion BTUs	4.5	?	6.8
Heat Pumps	Cut fossil fuel use by 5% over 2010 through cold climate heat pumps	# of retrofits	---	5,000	23,000
ELECTRIC					
Wind	300 MW capacity from in-state and regional plants	megawatts	7.4	220	300
Solar	150 MW of photovoltaic capacity	megawatts	11	87	150
Hydro	35 MW of small-scale hydro	megawatts	5.5	29	35
Methane	20 MW of farm and landfill digesters	megawatts	15.1	17	20

Notes: This table, compiled from E.I.A. and State Reports, appears in EAN's 2014 Annual Report. Electric generation includes Net Metering, Standby Offer, and SPEED projects reported through September 2014. "?" indicates incomplete data. * 94 EVs registered in VT in 2009.



Vermont Energy End Use Demand by Fuel Type

Scenario: Reference Case, EIA "Business As Usual"

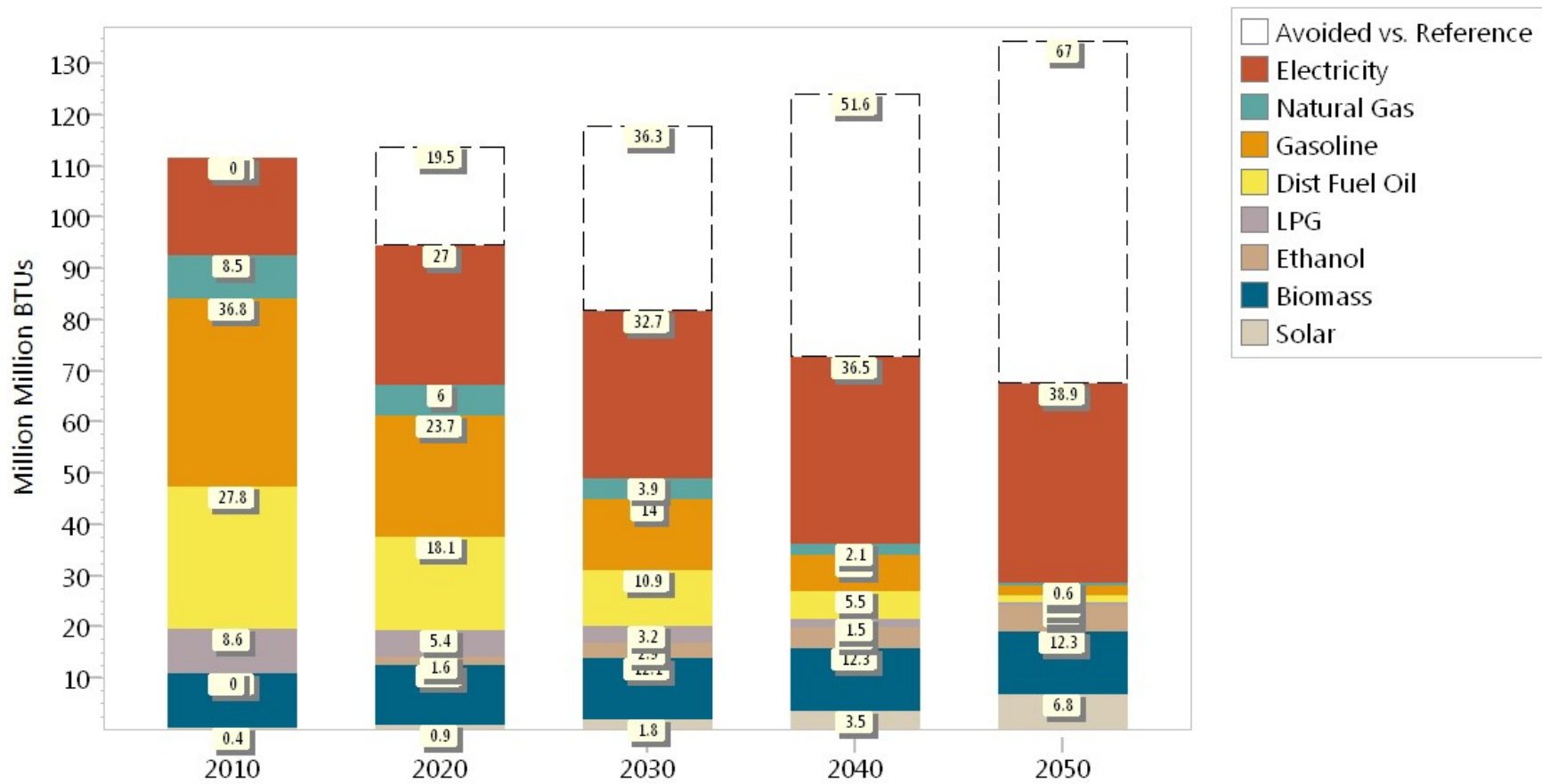


LEAP modeling courtesy of David Hill, VEIC



Vermont End Use Energy Demand by Fuel Type

Scenario: 90% by 2050 Pathway Example



LEAP modeling courtesy of David Hill, VEIC



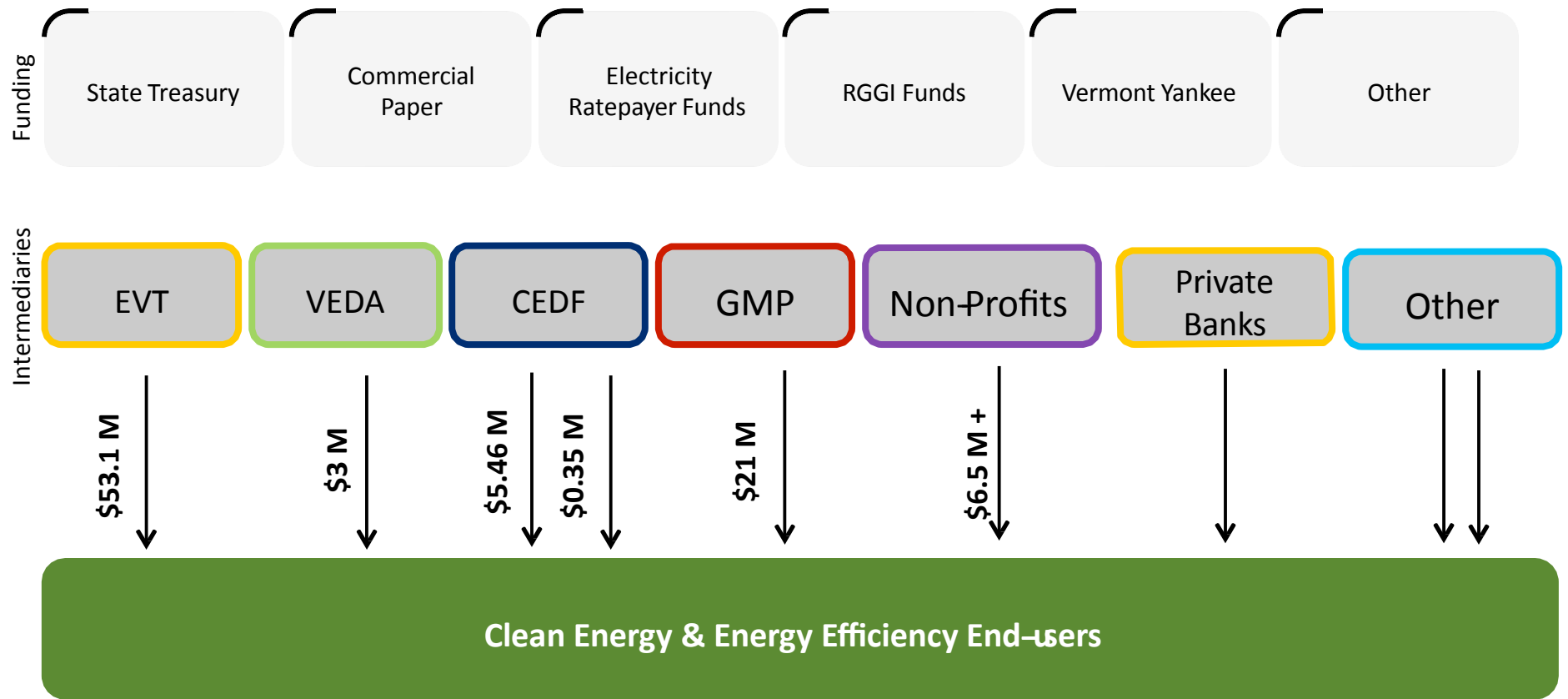
Clean Energy Finance Initiative Steering Committee



Clean Energy Development Fund (CEDF)



VT Financial Support for Clean Energy: Complex; Many Players; Mostly Grants



Financing

Rebates

Total: \$89 M+



coalition for green capital

Vermont identifies over \$33 billion in clean energy investment

- 1
- 2
- 3
- 4
- 5
- 6
- 7

Selected Technologies		Total Current Installed Capacity	Total Potential Market	Total Unfilled Potential Cost
Wind		214 MW	329 MW	\$312 M
Solar PV		87 MW	2,248 MW	\$6,000 M
Energy Efficiency	Electric	993 GWh	5,219 GWh	\$1,884 M
	Thermal	218,000 MMBtu	32,000,000 MMBtu	\$9,699 M
Bioenergy Electric Generation ¹		88 MW	132 MW	\$158 M
Transportation		801 EVs 43 Public EVSE	400,000 EVs 127,000 Bio Vehicles 20,000 Bio Trucks 500 Public EVSE	\$415 M for Vehicles \$779 M for EVSE <u>\$1,194 M Total</u>
Thermal Fuel Switching		N/A	20,000,000 MMBtu	\$6,898 M
Electric Grid Upgrades ²		N/A	N/A	\$7,034 M
TOTAL		N/A	N/A	\$33,322 M



Largest VT energy sources are gasoline for transport and fuel oil for building heat

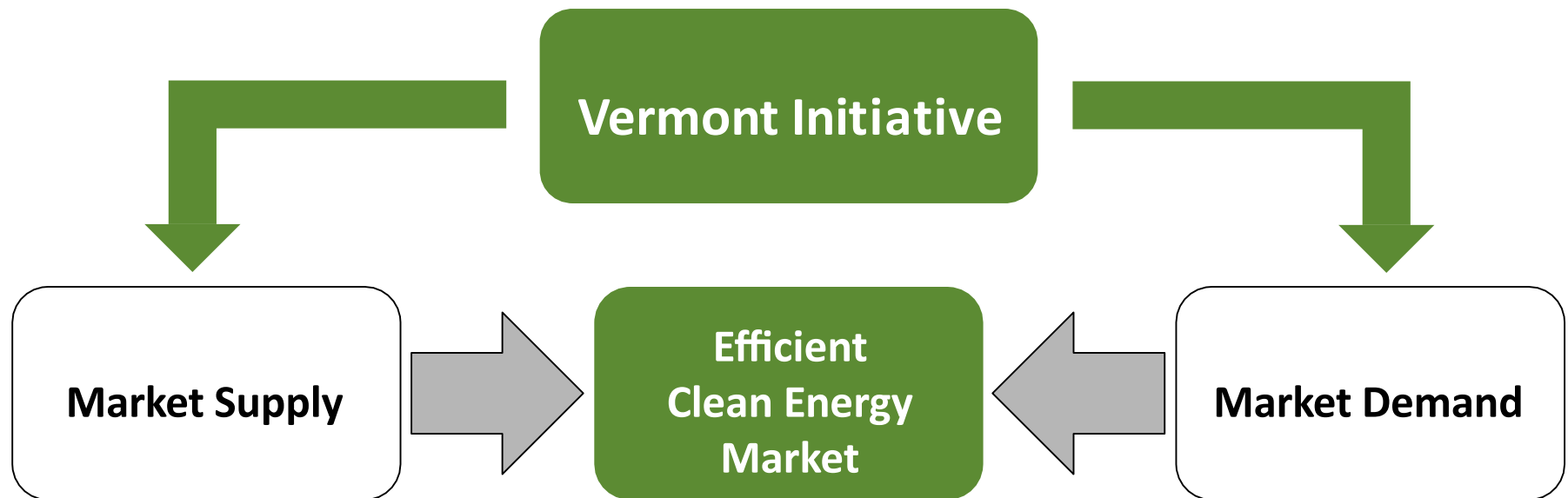
- Gasoline is over 25% of total state energy use
- Fuel oil is second largest source, drives costs
- Electricity is fairly clean, but dependence on natural gas is growing

Key Vermont Energy Questions

- How does VT reduce use of fuel oil for heating?
- How does VT replace nuclear with clean electricity, and ensure new electricity is also clean?
- How does VT replace gasoline cars with electric vehicles?



Vermont government must build a bridge to create efficient clean energy markets



- Bridge the gap between supply and demand
- Use resources efficiently with targeted financing, demand generation and market development



Clean Energy Finance Initiative

Thank You!

Questions:

Andrea Colnes
Energy Action Network
acolnes@eanvt.org

