

Financing Vermont's Energy Transition

VCRD Climate & Economy Conference

February 18, 2015

Andrea Colnes EAN Executive Director







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.



EAN Participants

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· Peter Adamczyk · Charlie Baker · Amanda Beraldi · Janet Besser ·
                                                  · Ludy Biddle · Kathryn Blume · Michele Boomhower Jeff Bower · Jo Bradley · Aaron Brown · Tom Buckley ·
                                        · Laurie Burnham · Sam Buckley · Megan Camp · Chris Campany · Erin Carroll · Marta Ceroni · Andrea Cohen · Andrea Colnes ·
                             · Steve Costello ·
                                                                                                                                                                Elizabeth Courtney •
                        · Paul Costello · Paul Craven
                                                                                                                                                               Cairn Cross . Chris D'Ella .
                                                              · Robert Barton ·
                                                                                                                                  · David Bradbury ·
                · Catherine Davis · Alex DePillis
                                                                                                                                                                          Edward Delhagen +
            · Catherine Dimitruck
                                                                                                                                                                                 Richard Donnelly .
                                             · Lee Boyeau ·
                                                                                                                                                      - Paul Burns -
                                                                           · Joseph Cincotta ·
                                                                                                                     · Hal Cohen ·

    Robert Dostis

                                                                                                                                                                                       William Driscoll .
                                                                  + Matt Cota +
                                                                                                                                 - Rich Cowart -
                                  · Kevin Ellis ·
                                                                                                                                                            · Gwen Hallsmith ·
                                                                                            + Arthur & Anne Berndt +

    Julia Dundorf

                                                                                                                                                                                               Rebecca Ellis •

    Janet Doyle •

    Tom Ezslin •

                                                                                       - Jennifer Berman - Peter Bourne -
  Peg Elmer + Jamie Ervin
                                                                                                                                                                                                 Jon Erickson +
                              · Paul Markowitz ·
                                                                                                                                                                 · Johanna Miller ·
                                                        · Karen Gitman ·
                                                                                                                                          - Blair Hamilton
                                                                               · Melody Burkins · Margaret Cheney · Paul Comey ·
+ Richard Faesy
                                                                                                                                                                                                  Chad Farrell +
                                                                                                                                           · Julie Lineberger ·
                                                    · Karen Horn ·
                         + James Merriam +
                                                                                                                                                                        · Brian Otlev ·
                                                                              · Michael Dworkin · Scott Johnstone · Ronald Miller ·

    Laurie Fielder

                                                                                                                                                                                                Abby Friedman +

    Bill McKibben -

                                                                                                                                               · Ralph Meima ·
                                                                               · James Moore · Timothy Palmer · William Patten ·
                        · Elizabeth Pearce ·
                                                                                                                                                                      · Andy Perchlik ·
                                                                                                                                                                                                Steve Greenfield +
· Sara Gilbert
                                                    · Lawrence Mott ·
                                                                                                                                              - Alan Nogee -
                                                                              · Susan Allen Picone · Ernie Pomerleau · Mary Powell ·
                                                                                                                                                                                                   Robert Griffin +
· Peter Gregory
                                                     + Kenneth Perine +

    Jim Sabataso •

                            · Janice St. Onge ·

    Leigh Seddon •

                                                                                 · William Raap · Chris Recchia · Chuck Ross ·
 David Hill + John Hollar
                                                                                                                                                                                            Alison Hollingsworth +
                                                         · William Sayre ·

    Liz Schlagel

                                                                                          · Rich Sedano · Jeffrey Wolfe ·
                                  · Ron Shems ·
                                                                                                                                                               Gabrielle Stebbins •
  Asa Hopkins + John Irving
                                                                                                                                                                                        Ken Jones - Dan Jones -

    Rich Snyder +

                                                                                                                                   . Shap Smith .
    Ellen Kahler
                                                                                                                                                                                              Chris Kramer +
                                                                        + Winn Smith +
                                                                                                                          · Bill Stenger ·
                                       · Thomas Torti ·

    Richard Weston

                                                                                                                                                                                          Adam Lougee •
        . Sandy Levine .

    Mary Margaret Sloan

    Karen Yacos +

                                                                                                                                                                        Deb Markowitz - Wendy McArdle -
           + Anne Margolis +
               · · Linda McGinnis · Michael Miller ·
                                                                                                                                                            Bill Miller + Derek Moretz - Pat Moulton
                     · Melanie Needle · Scudder Parker ·
                                                                                                                                           Michael Pieciak · John Quinney · Patty Richards ·
                               · Greg Rieder · Cara Robechek · Dave Roberts · Andrew Savage · Jan Schultz · Justine Sears · Tim Shea · Adam Sherman · Amy Shollenberger ·

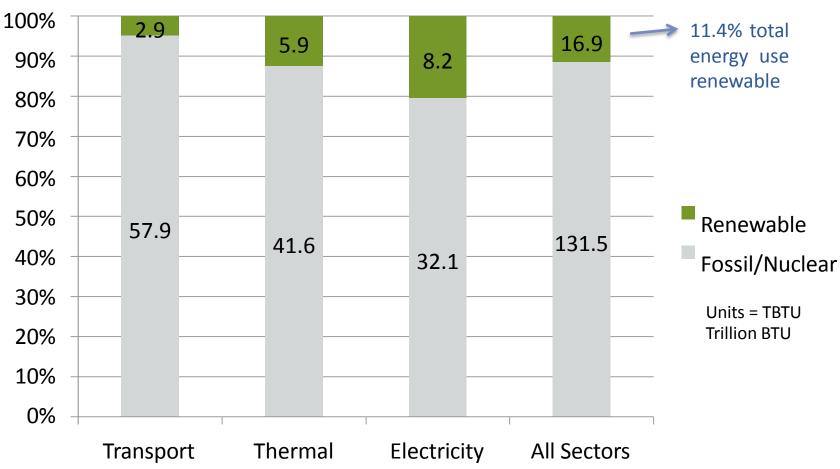
    Luke Shullenberger - Sarah Simonds - Darren Springer - Martha Staskus - James Sullivan - Mary Sullivan - Sam Swanson -

                                                          - Gaye Symington - George Twigg - Marianne Tyrrell - Bob Walker - Ben Walsh - Anne Watson -
                                                                               · Mary Westervelt · Bonnie Wonniger · Eric Zencey ·
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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

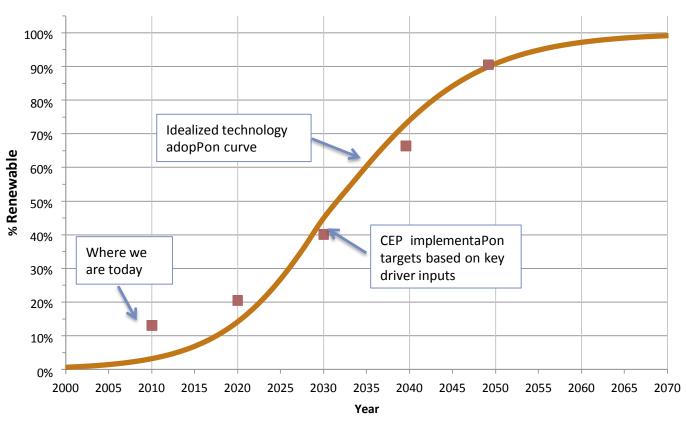
Strategic Context: Our Current Energy Mix





Transformation S-Curve

90 by 2050: Tech Adop3 on Curve & Milestones



Our First Milestone: 20% x 2020

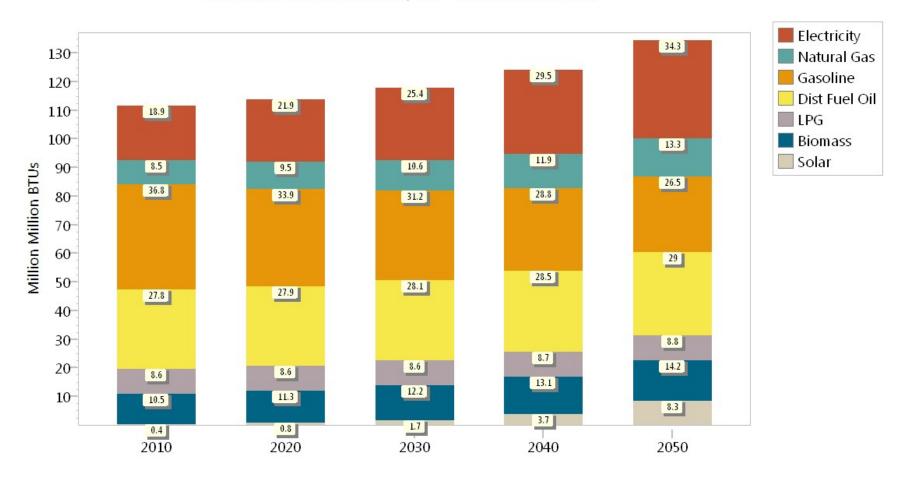
For the 2020 milestone, EAN set a target goal of 20% renewable across all sectors. Given available technology, Vermont's current energy programs, and where the state should be on the transformation S-curve (see page 2), achieving 20% (roughly a doubling of our 2010 renewable %) appears achievable and 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 gal		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 # c		1	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



Vermont Energy End Use Demand by Fuel Type

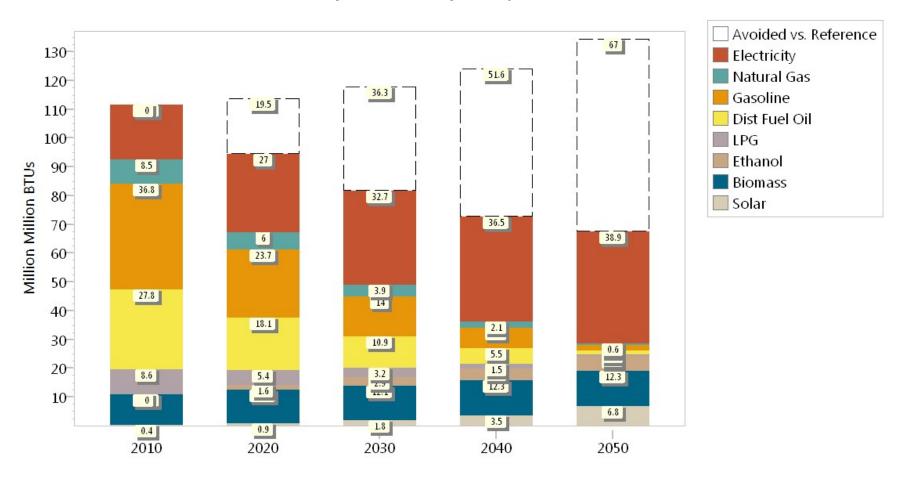
Scenario: Reference Case, EIA "Business As Usual"



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

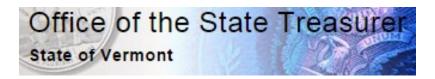


Clean Energy Finance Initiative Steering Committee





Committed to the future of rural communities.









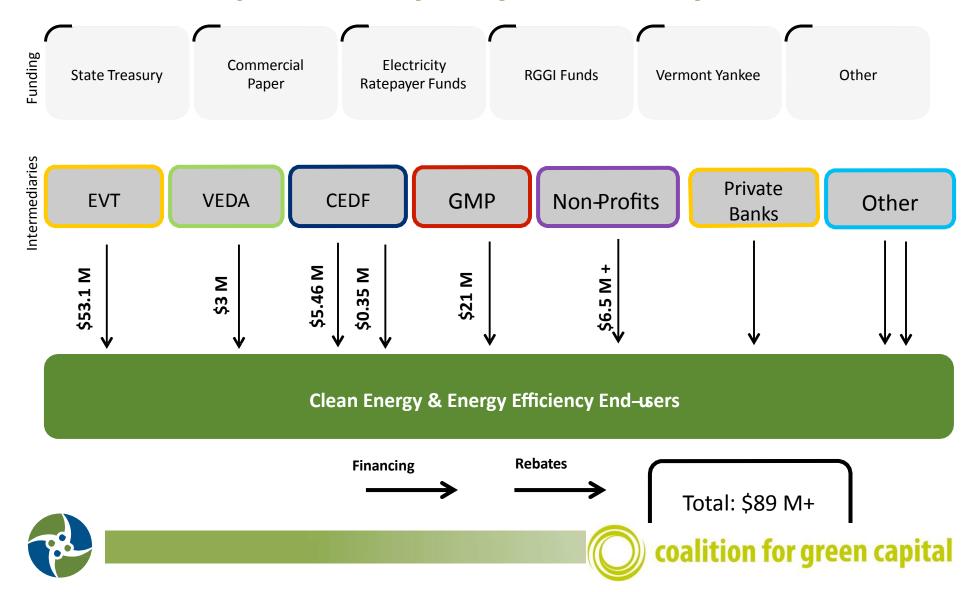


Clean Energy Development Fund (CEDF)





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



Vermont identifies over \$33 billion in clean energy investment

1	
2	



Selected Technologies Wind Solar PV		Total Current Installed Capacity	Total Poten3al Market	\$312 M \$6,000 M	
		214 MW 87 MW	329 MW		
			2,248 MW		
Energy Efficiency Electric		993 GWh	5,219 GWh	\$1,884 M	
	Thermal	218,000 MMBtu	32,000,000 MMBtu	\$9,699 M	
Bioenergy Electric Genera3on ¹		88 MW	132 MW	\$158 M	
Transporta3on		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 \$1,194 M Total	
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

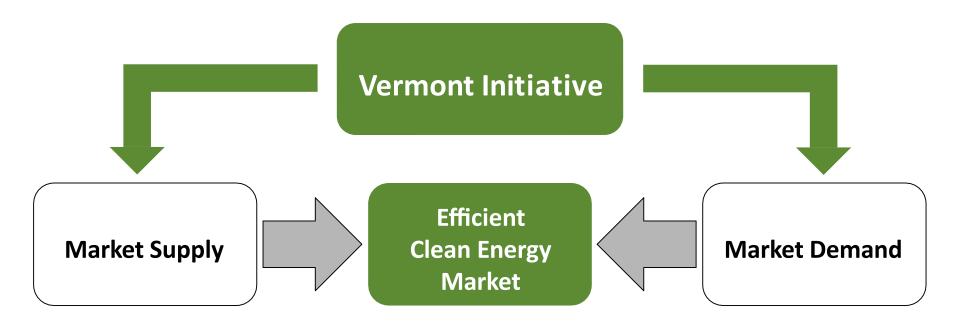
Key Vermont Energy Ques3ons

- 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:

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