Community Storage: EVs & Battery Systems - Beyond Light Duty Vehicles

Vermont Energy Investment Corporation

Vermont Energy Investment Corporation

- Nonprofit with 30 years experience reducing economic, environmental costs of energy
- Comprehensive focus and results
  - Energy Efficiency – Renewable Energy – Transportation
- National & international consulting & implementation
  - Program design, planning, & evaluation – policy & advocacy – research
- Clients are government agencies, regulators, utilities, foundations, advocates
- Operate 3 Energy Efficiency Utilities

Efficiency Vermont

EFFICIENCY$MART

DCSEU

A Tale of Two Projects

Massachusetts Electric School Bus

iREV
Initiative for Resiliency in Energy through Vehicles

Electric Vehicles and Emergency Response

LAPD purchased 100 BMW i3 electric cars.

Bethany Whitaker
Vermont Energy Investment Corporation, June 2016

Electric School Bus Technology

- Vehicle technology is maturing rapidly
  - Five buses currently carrying students in California
    - Expect to have 40 in service next year
  - Fewer deployed in cold climates
    - Some in Quebec

- Bi-directional capable systems emerging
  - Proven in other vehicle classes
  - School bus manufacturers know it is important, but haven't done it yet

Bi-directional Charging Equipment

- Charging equipment capable, but in limited commercial production

- Most experience is with pilot / demonstration projects
  - University of Delaware / PJM work
  - Los Angeles Airforce Base Pilot
  - MIT / Lincoln Labs Demonstration

- Start to bring technology to commercial application

Buses to Grid
System Peak Reduction

- There are over 24,000 buses in ISO-NE territory
- Each bus capable of 40 kW of power
- With Bi-directional Capabilities that is 960 MW
- Buses are idle during ISO-NE summer peak
- Mostly idle during ISO-NE winter peak

Grid Interaction – an Incremental Approach

Retail / Distribution Level: 1-way power flows

Retail / Distribution Level: 2-way power flows

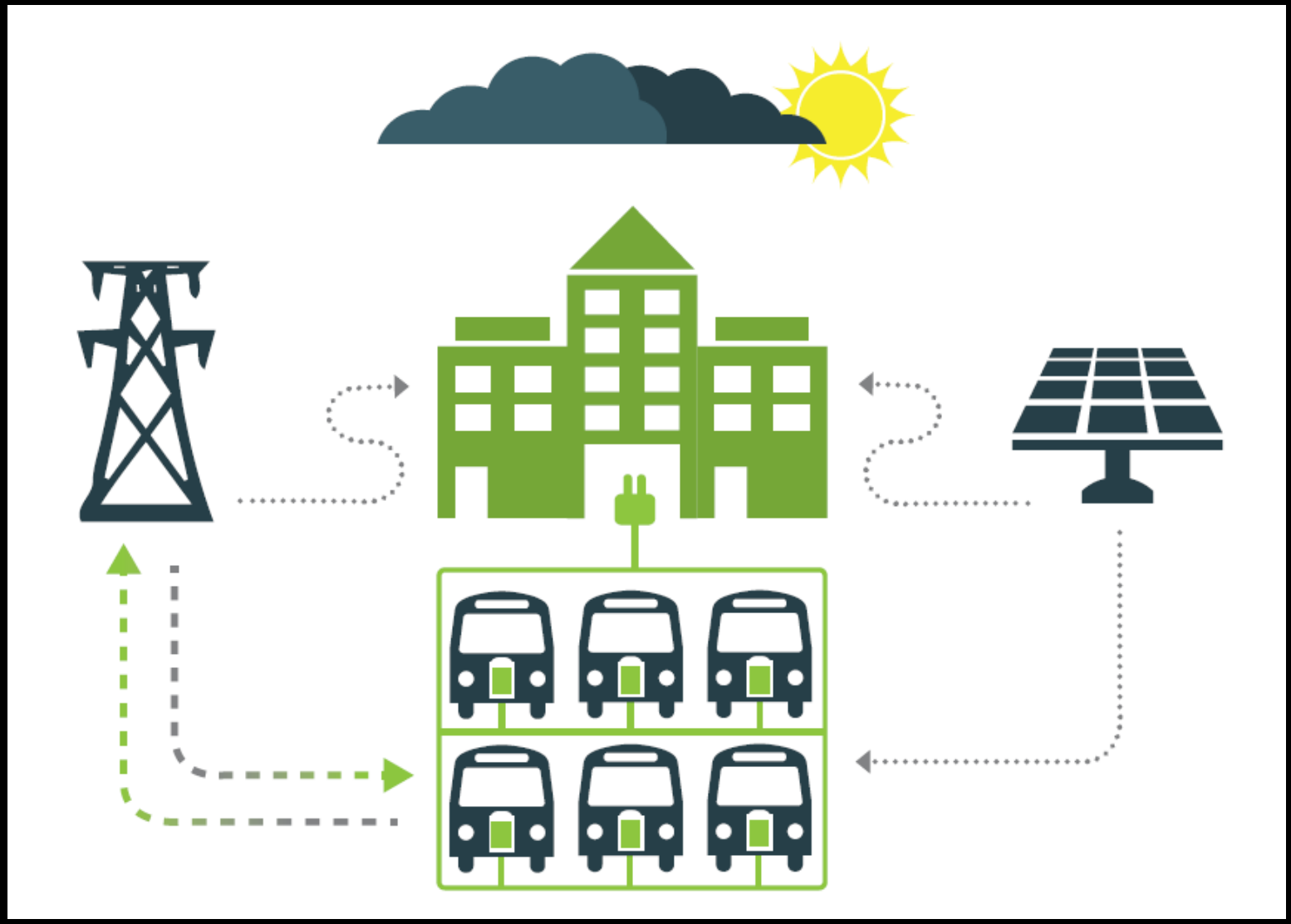
Wholesale / Transmission Level: 1-way power flows

Wholesale / Transmission Level: 2-way power flows

Role: Utilities

- Help School District/School figure out billing and costs
  - Managed Charging Systems
  - Time of Use Charges
- Determine local value of energy storage
  - What do utilities want to do
  - What are they willing to pay (if anything)
    - Renewables
    - Peak shaving
    - Aggregate for wholesale markets

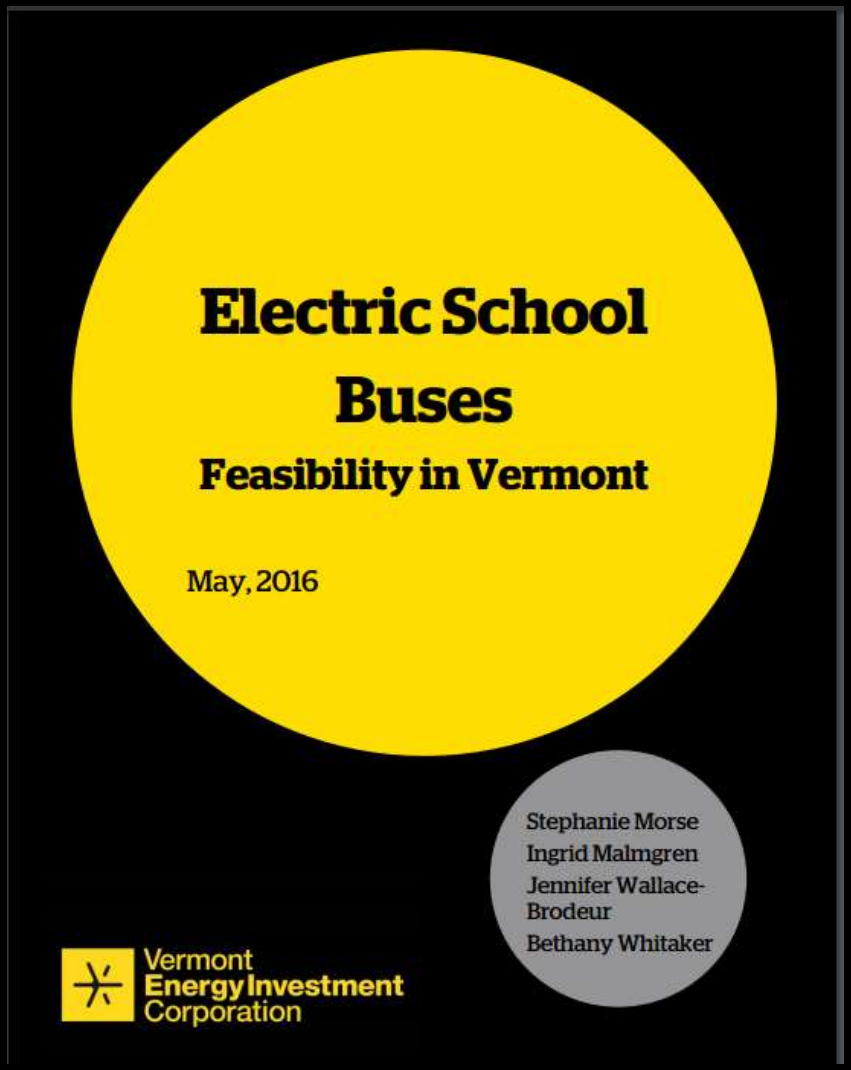
Grid Interaction – Opportunities

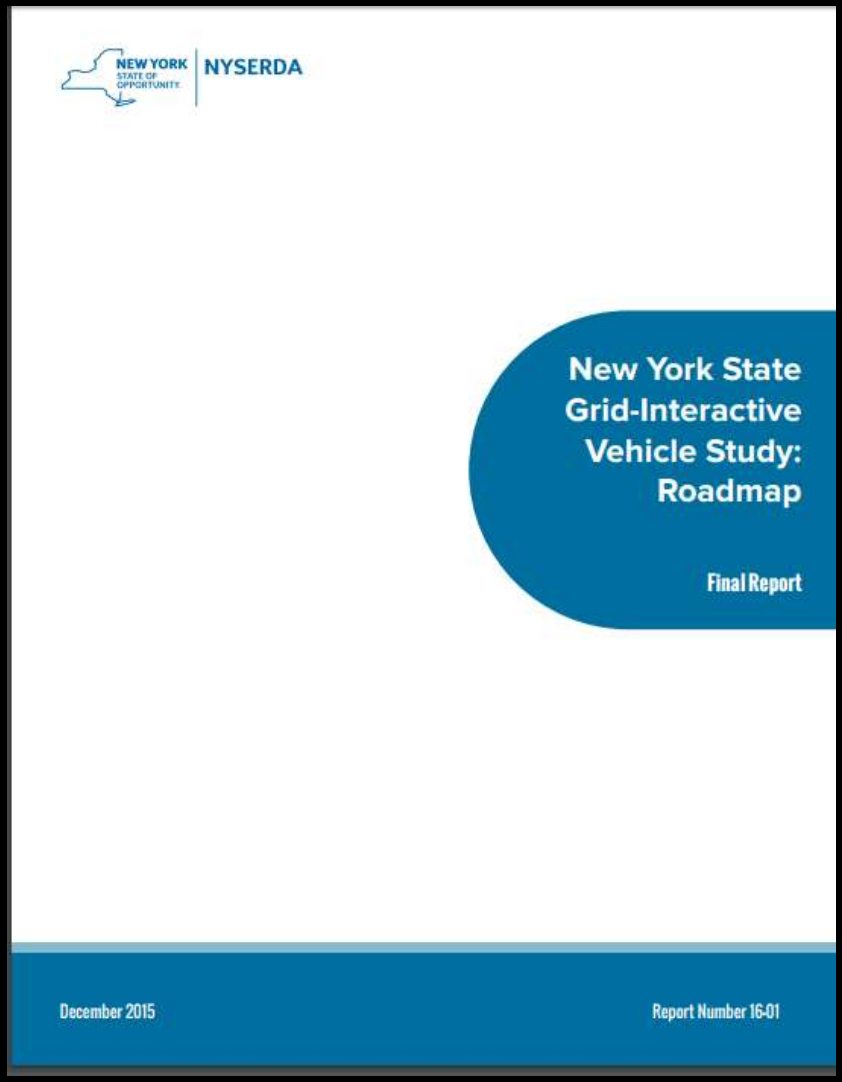


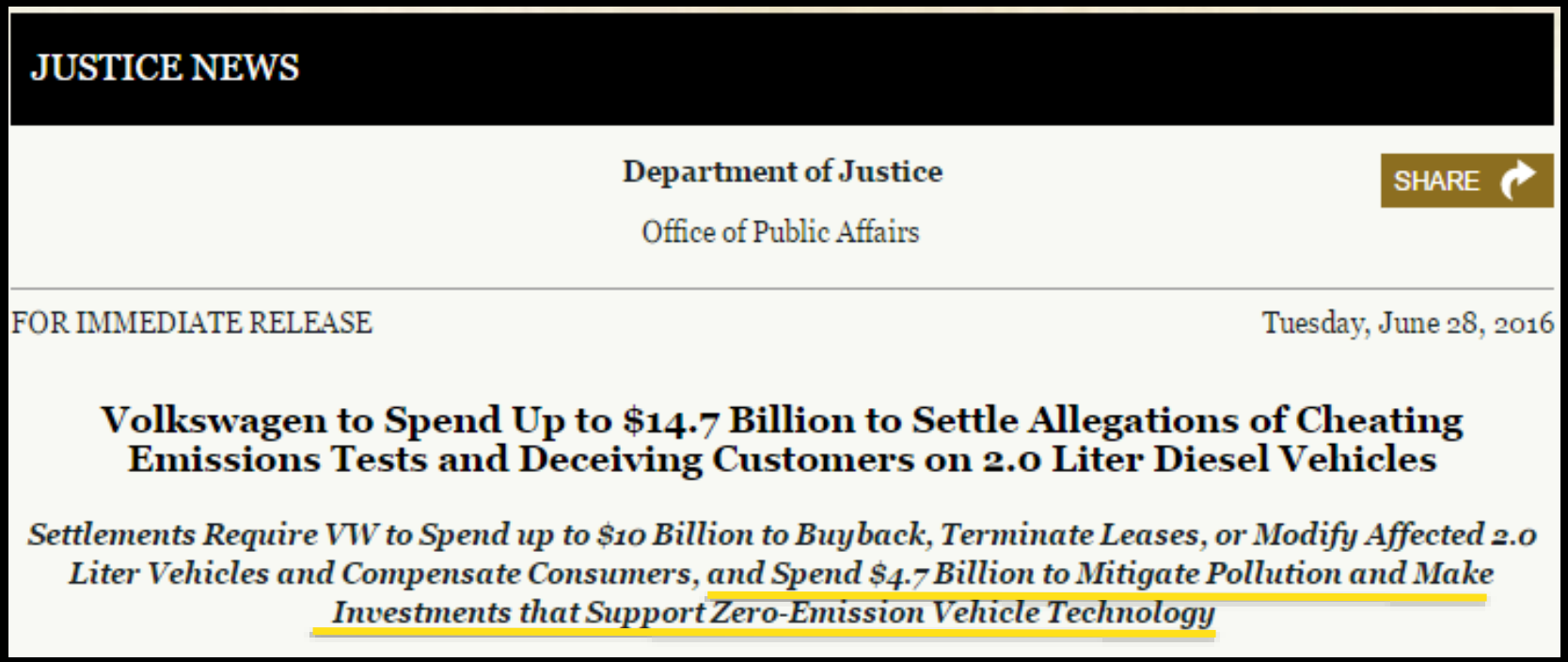
Energy from Batteries can Power:

- Communications Equipment
- Traffic Lights
- Fuel Pumps

Mobile Storage can get to where power is needed


Electric School Buses
Feasibility in Vermont
May, 2016
Stephanie Morse
Ingrid Malmgren
Jennifer Wallace-Brodeur
Bethany Whitaker
Vermont Energy Investment Corporation


NEW YORK STATE OF OPPORTUNITY
NYSERDA
New York State Grid-Interactive Vehicle Study: Roadmap
Final Report
December 2015
Report Number 16-01



JUSTICE NEWS

Department of Justice

Office of Public Affairs

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FOR IMMEDIATE RELEASE

Tuesday, June 28, 2016

Volkswagen to Spend Up to $14.7 Billion to Settle Allegations of Cheating Emissions Tests and Deceiving Customers on 2.0 Liter Diesel Vehicles

Settlements Require VW to Spend up to $10 Billion to Buyback, Terminate Leases, or Modify Affected 2.0 Liter Vehicles and Compensate Consumers, and Spend $4.7 Billion to Mitigate Pollution and Make Investments that Support Zero-Emission Vehicle Technology

Preservation of Environmental Claims: Today's settlement by state attorneys general preserves all claims under state environmental laws

INITIAL SUBACCOUNTS	INITIAL ALLOCATIONS ($)	INITIAL ALLOCATIONS (%)
Puerto Rico	$ 7,500,000.00	0.28%
North Dakota	$ 7,500,000.00	0.28%
Hawaii	$ 7,500,000.00	0.28%
South Dakota	$ 7,500,000.00	0.28%
Alaska	$ 7,500,000.00	0.28%
Wyoming	$ 7,500,000.00	0.28%
District of Columbia	$ 7,500,000.00	0.28%
Delaware	$ 9,051,682.97	0.34%
Mississippi	$ 9,249,413.91	0.34%
West Virginia	$ 11,506,842.13	0.43%
Nebraska	$ 11,528,812.23	0.43%
Montana	$ 11,600,215.07	0.43%
Rhose Island	$ 13,495,136.57	0.50%
Arkansas	$ 13,951,016.23	0.52%
Kansas	$ 14,791,372.72	0.55%
Idaho	$ 16,246,892.13	0.60%
New Mexico	$ 16,900,502.73	0.63%
Vermont	$ 17,801,277.01	0.66%
Louisiana	$ 18,009,993.00	0.67%
Kentucky	$ 19,048,080.43	0.71%
Oklahoma	$ 19,086,528.11	0.71%
Iowa	$ 20,179,540.80	0.75%
Maine	$ 20,256,436.17	0.75%
Nevada	$ 22,255,715.66	0.82%
Alabama	$ 24,084,726.84	0.89%

New Hampshire	$	29,544,297.76	1.09%
South Carolina	$	31,636,950.19	1.17%
Utah	$	32,356,471.11	1.20%
Indiana	$	38,920,039.77	1.44%
Missouri	$	39,084,815.55	1.45%
Tennessee	$	42,407,793.83	1.57%
Minnesota	$	43,638,119.67	1.62%
Connecticut	$	51,635,237.63	1.91%
Arizona	$	53,013,861.68	1.96%
Georgia	$	58,105,433.35	2.15%
Michigan	$	60,329,906.41	2.23%
Colorado	$	61,307,576.05	2.27%
Wisconsin	$	63,554,019.22	2.35%
New Jersey	$	65,328,105.14	2.42%
Oregon	$	68,239,143.96	2.53%
Massachusetts	$	69,074,007.92	2.56%
Maryland	$	71,045,824.78	2.63%
Ohio	$	71,419,316.56	2.65%
North Carolina	$	87,177,373.87	3.23%
Virginia	$	87,589,313.32	3.24%
Illinois	$	97,701,053.83	3.62%
Washington	$	103,957,041.03	3.85%
Pennsylvania	$	110,740,310.73	4.10%
New York	$	117,402,744.86	4.35%
Florida	$	152,379,150.91	5.64%
Texas	$	191,941,816.23	7.11%
California	$	381,280,175.09	14.12%
Tribal Allocation Subaccount	$	49,652,857.71	1.84%
Trust Administration Cost Subaccount	$	27,000,000.00	1.00%
Tribal Administration Cost Subaccount	$	993,057.15	0.04%
	$	2,700,000,000.00	100.00%


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