“The planet’s on __ fire. You’re not children anymore. ...you’re adults now, and this is an actual crisis. It’s time to get to work and stop messing around.”

New York State – Top 3 Greenhouse Gas Sources

Short review of what we heard this morning

- Electricity: 21%
- Transportation: 36%
- Heating & Cooling: 31%
NYS - Top 3 GHG Sources – High School Formula

Electricity (E)

+ 

Transportation (T) & HEATING & COOLING (HC)
NYS - Top 3 GHG Sources – High School Formula

Electricity
   plus
Transportation,
Heating & Cooling

E
+

THC

Whoops...
“THC” is already taken 😊
NYS - Top 3 GHG Sources – High School Formula - Revised

Electricity (E) + Transportation (T) & Thermal (T) = Heating & Cooling

THERMAL
2/3s of the Carbon Bomb is from T&T

Electricity

+ T & T

Transportation & Thermal
Electric Vehicle (EV) EXPONENTIAL GROWTH

It took the world 20+ years to reach the 1\textsuperscript{st} million EVs

The 2\textsuperscript{nd} Million: **18 months**

The 3\textsuperscript{rd} Million: **8 Months**

Today: **5.6 Million EVS!**
Light duty vehicles (cars)

• 96% of the vehicles

• 82% of transportation’s carbon
Average U.S. Trips

98% of all US trips are <50 miles.

Most Plug-In Electric Vehicles: 100+ miles on a full charge. You don’t need a public charging station - just plug into a regular electric outlet overnight for 98% of your needs.
<table>
<thead>
<tr>
<th>Make and Model</th>
<th>All-Electric Range (miles)</th>
<th>Base MSRP</th>
<th>Fuel Economy (MPGe)</th>
<th>Federal Tax Credit</th>
<th>NY Rebate</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audi A3 e-tron</td>
<td>16</td>
<td>$38,900</td>
<td>83</td>
<td>$4,502</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BMW 330e iPerformance</td>
<td>14</td>
<td>$44,100</td>
<td>71</td>
<td>$4,901</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BMW 530e</td>
<td>16</td>
<td>$53,400</td>
<td>72</td>
<td>$4,668</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BMW 530e xDrive</td>
<td>14</td>
<td>$55,700</td>
<td>67</td>
<td>$4,668</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BMW 740e xDrive</td>
<td>14</td>
<td>$91,250</td>
<td>64</td>
<td>$4,668</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BMW i3 2016-18</td>
<td>81-114</td>
<td>$42,400</td>
<td>112-124</td>
<td>$7,500</td>
<td>$1,700</td>
<td>Battery Electric Vehicle</td>
</tr>
<tr>
<td>BMW i3 2019</td>
<td>153</td>
<td>$44,500</td>
<td>113</td>
<td>$7,500</td>
<td>$2,000</td>
<td>Battery Electric Vehicle</td>
</tr>
<tr>
<td>BMW i3 REx 2016-18</td>
<td>97</td>
<td>$47,450</td>
<td>109-111</td>
<td>$7,500</td>
<td>$1,700</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BMW i3 REx 2019</td>
<td>126</td>
<td>$48,300</td>
<td>100</td>
<td>$7,500</td>
<td>$2,000</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BMW i8</td>
<td>14</td>
<td>$140,700</td>
<td>76</td>
<td>$3,793</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>BMW X5 xDrive40e</td>
<td>14</td>
<td>$62,100</td>
<td>56</td>
<td>$4,668</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Cadillac ELR</td>
<td>40</td>
<td>$65,000</td>
<td>85</td>
<td>$7,500</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Cadillac ELR Sport</td>
<td>36</td>
<td>$65,000</td>
<td>80</td>
<td>$7,500</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Chevrolet Bolt</td>
<td>238</td>
<td>$36,620</td>
<td>119</td>
<td>$3,750</td>
<td>$2,000</td>
<td>Battery Electric Vehicle</td>
</tr>
<tr>
<td>Chevrolet Volt</td>
<td>53</td>
<td>$33,520</td>
<td>106</td>
<td>$3,750</td>
<td>$1,700</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Chrysler Pacifica</td>
<td>32</td>
<td>$39,995</td>
<td>82</td>
<td>$7,500</td>
<td>$1,100</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Ford C-MAX Energi - 2016</td>
<td>19</td>
<td>$31,770</td>
<td>88</td>
<td>$4,007</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Ford C-MAX Energi - 2017</td>
<td>20</td>
<td>$27,120</td>
<td>95</td>
<td>$4,007</td>
<td>$1,100</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Ford Focus Electric</td>
<td>115</td>
<td>$29,170</td>
<td>105</td>
<td>$7,500</td>
<td>$1,700</td>
<td>Battery Electric Vehicle</td>
</tr>
<tr>
<td>Ford Fusion Energi - 2016</td>
<td>19</td>
<td>$33,900</td>
<td>88</td>
<td>$4,007</td>
<td>$500</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Ford Fusion Energi - 2017, 2018, 2019</td>
<td>26</td>
<td>$34,595</td>
<td>103</td>
<td>$4,585</td>
<td>$1,100</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Honda Clarity Plug-in Hybrid</td>
<td>47</td>
<td>$33,400</td>
<td>110</td>
<td>$7,500</td>
<td>$1,700</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Hyundai Kona Electric</td>
<td>258</td>
<td>$36,450</td>
<td>120</td>
<td>$7,500</td>
<td>$2,000</td>
<td>Battery Electric Vehicle</td>
</tr>
<tr>
<td>Hyundai Ioniq Electric</td>
<td>124</td>
<td>$29,815</td>
<td>136</td>
<td>$7,500</td>
<td>$2,000</td>
<td>Battery Electric Vehicle</td>
</tr>
<tr>
<td>Hyundai Ioniq Plug-in Hybrid</td>
<td>29</td>
<td>$25,350</td>
<td>119</td>
<td>$4,543</td>
<td>$1,100</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Hyundai Sonata Plug-in Hybrid</td>
<td>27</td>
<td>$34,600</td>
<td>99</td>
<td>$4,919</td>
<td>$1,100</td>
<td>Plug-In Hybrid Electric Vehicle</td>
</tr>
<tr>
<td>Jaguar I-PACE</td>
<td>234</td>
<td>$69,500</td>
<td>76</td>
<td>$7,500</td>
<td>$500</td>
<td>Battery Electric Vehicle</td>
</tr>
<tr>
<td>Model</td>
<td>Mileage</td>
<td>MSRP</td>
<td>TCO ($)</td>
<td>Rebate ($)</td>
<td>节能减排类型</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>---------</td>
<td>----------</td>
<td>---------</td>
<td>------------</td>
<td>----------------------------------</td>
<td></td>
</tr>
<tr>
<td>Kia Niro</td>
<td>26</td>
<td>$28,200</td>
<td>105</td>
<td>$4,543</td>
<td>$1,100 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Kia Optima Plug-in Hybrid</td>
<td>29</td>
<td>$35,290</td>
<td>103</td>
<td>$4,919</td>
<td>$1,100 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Kia Soul EV</td>
<td>111</td>
<td>$33,950</td>
<td>108</td>
<td>$7,500</td>
<td>$1,700 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Mercedes-Benz B250e</td>
<td>87</td>
<td>$39,900</td>
<td>84</td>
<td>$7,500</td>
<td>$1,700 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Mercedes-Benz GLE550e</td>
<td>8</td>
<td>$66,700</td>
<td>43</td>
<td>$4,085</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Mercedes-Benz S550e</td>
<td>12</td>
<td>$96,600</td>
<td>58</td>
<td>$4,043</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Mercedes-Benz C350e</td>
<td>8</td>
<td>$47,900</td>
<td>51</td>
<td>$3,417</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Mercedes-Benz GLC 350e</td>
<td>9</td>
<td>$50,650</td>
<td>56</td>
<td>$4,460</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>MINI Cooper S E Countryman ALL4</td>
<td>12</td>
<td>$36,900</td>
<td>65</td>
<td>$4,001</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Mitsubishi i-MiEV</td>
<td>59</td>
<td>$22,995</td>
<td>112</td>
<td>$7,500</td>
<td>$1,700 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Mitsubishi Outlander</td>
<td>22</td>
<td>$35,795</td>
<td>74</td>
<td>$5,836</td>
<td>$1,100 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Nissan LEAF - 2018, 2019</td>
<td>150</td>
<td>$29,990</td>
<td>112</td>
<td>$7,500</td>
<td>$2,000 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Porsche Cayenne S E-Hybrid</td>
<td>14</td>
<td>$79,900</td>
<td>47</td>
<td>$6,712</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Porsche Panamera 4 E-Hybrid</td>
<td>16</td>
<td>$99,600</td>
<td>46</td>
<td>$6,670</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Porsche Panamera S E-Hybrid</td>
<td>15</td>
<td>$96,100</td>
<td>51</td>
<td>$4,752</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>smart electric fortwo cabriolet</td>
<td>57</td>
<td>$28,100</td>
<td>102</td>
<td>$7,500</td>
<td>$1,700 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>smart electric fortwo coupe</td>
<td>58</td>
<td>$23,900</td>
<td>108</td>
<td>$7,500</td>
<td>$1,700 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Subaru Crosstrek Hybrid</td>
<td>17</td>
<td>$34,995</td>
<td>90</td>
<td>$4,502</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Tesla Model 3 Base</td>
<td>220</td>
<td>$35,000</td>
<td>130</td>
<td>$3,750</td>
<td>$2,000 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Tesla Model 3 Mid Range</td>
<td>264</td>
<td>$42,900</td>
<td>123</td>
<td>$3,750</td>
<td>$2,000 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Tesla Model 3 Long Range AWD</td>
<td>310</td>
<td>$49,900</td>
<td>116</td>
<td>$3,750</td>
<td>$2,000 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Tesla Model 3 Long Range AWD Performance</td>
<td>310</td>
<td>$60,900</td>
<td>116</td>
<td>$3,750</td>
<td>$2,000 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Tesla Model S</td>
<td>259-335</td>
<td>$85,000</td>
<td>98-103</td>
<td>$3,750</td>
<td>$500 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Tesla Model X</td>
<td>238-295</td>
<td>$88,000</td>
<td>85-93</td>
<td>$3,750</td>
<td>$500 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Toyota Prius Prime</td>
<td>25</td>
<td>$27,350</td>
<td>133</td>
<td>$4,502</td>
<td>$1,100 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Volkswagen e-Golf - 2016</td>
<td>83</td>
<td>$28,995</td>
<td>116</td>
<td>$7,500</td>
<td>$1,700 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Volkswagen e-Golf - 2017, 2018</td>
<td>125</td>
<td>$31,895</td>
<td>119</td>
<td>$7,500</td>
<td>$2,000 Battery Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Volvo XC90 T8</td>
<td>17</td>
<td>$66,300</td>
<td>62</td>
<td>$5,169</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Volvo XC60 T8</td>
<td>17</td>
<td>$52,900</td>
<td>58</td>
<td>$5,169</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
<tr>
<td>Volvo S90 T8</td>
<td>21</td>
<td>$63,900</td>
<td>71</td>
<td>$5,169</td>
<td>$500 Plug-In Hybrid Electric Vehicle</td>
<td></td>
</tr>
</tbody>
</table>
“There’s a better way to do it: find it” - Thomas Edison
CLEAN TRANSPORTATION

Goals

1. EV in every garage
2. Empower municipalities to lead by example
3. Coordinate Charging Infrastructure Development
4. EV Car Share to reduce the # of vehicles
5. Initiate Electric Heavy Duty vehicles – School Buses, Trucks...
EV In Every Garage

- Majority of Westchester families have 2+ cars and commute <30 miles/day
- 90% / year growth in new EVs in county since program start

If your family has 2 or more cars...

At least 1 should be ELECTRIC

Plug it in at night – Drive local all day
GAS FREE
CLEAN TRANSPORTATION

EV In Every Garage

HS EV Contest

Empower Families To Lead

High School Electric Vehicle Video Contest

High school students across Westchester have the chance to create a fun & educational 2-4 minute video to inform family, friends and fellow peers about electric vehicles.

Students in groups of 2 or more who make a video that best fits the grading criteria will have the opportunity to win one of three sponsored cash prizes!

Cash Prizes:
1st Place—$5,000
2nd Place—$2,000
3rd Place—$1,000

Honorable Mention Prize:
Tickets to the Formula-E Electric Sports Car Races in Brooklyn on July 13th or 14th

Grading Criteria

<table>
<thead>
<tr>
<th>1st Place</th>
<th>2nd Place</th>
<th>3rd Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,000</td>
<td>$2,000</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

Required Video:
Post video to YouTube
4 minute minimum length

Additional Prices:
Tickets to Formula-E Electric Sports Car Races in Brooklyn on July 13 or 14

1. EV EDUCATION (25 Points)
   - Compare EVs to Gas Vehicles
   - Economics/Financial benefits
   - Health Benefits
   - Global Environmental benefits
   - Local air pollution impacts
   - $5
   - 25

2. EV RIDES (25 Points)
   - Student video includes ride in an EV (if available, please)
   - $5
   - 25

3. EV RECRUITMENT (25 Points)
   - Recruit a local EV Auto Dealer to become a Contest Sponsor
   - $15

4. VIDEO (25 Points)
   - Design Aesthetics
   - Score
   - Originality
   - Conciseness
   - $10
   - 25

5. SOCIAL MEDIA (25 Points)
   - Social Media Points for Facebook Views
   - $5
   - 10 - 100
   - $10
   - 100 - 200
   - 200 - 300
   - $25

For more info: Call Sustainable Westchester
914-242-4735 or email RonEarthKindEnergy.com

Registration Link: https://tinyurl.com/y8wev38r
Early Registration by 12/31/18 gains 3 extra points!
Municipalities Lead By Example

Empower municipalities to purchase EVs for their fleets and lead by example

- <20 Municipal Fleet EVs when the program began
- Quintupled the number of municipal fleet EVs to 100+
- Monthly Peer-to-Peer Webinar Call with County Government to share information on:
  - EV Grants
  - Charging Infrastructure
  - Contracts
  - Best Practices (White Plains EV School Buses; New Rochelle Free EV Shuttle)
CLEAN TRANSPORTATION

EV Charging Infrastructure

Coordinate EV Charging infrastructure development

- Technical support for EV charging station & fleet grants
- GRANTS: ZEV & other NYS
- DC Fast Charger Goal: 1 every 5 square miles
CLEAN TRANSPORTATION

**EV Car Share**

- Reduce # of vehicles
- Create basis for autonomous vehicles
- Transition vehicles to “shared economy”
- 1st and last mile EV commuting & ride sharing
- Free EV Charging Infrastructure (Level 2 + DC Fast Chargers) in exchange for parking rights
- Free Rides in EV Shuttles (paid by advertisers)
Available Energy Sources

**World energy use**
16 TW per year

**SOLAR**
23,000 per year

**COAL**
1.8

**Natural Gas**
1.8

**Petroleum**
1.8

**Uranium**
1.9

**TIDES**
0.3 – 2 per year

**WIND**
25-70 per year

**Waves**
0.2-2

**HYDRO**
3 – 4 per year

**Biomass**
2 – 6 per year

**Geothermal**
3 – 4 per year

**Enough Fossil Fuel & Nuclear Power for ~100 years**

http://www.asrc.cestm.albany.edu/perez/

© R. Perez et al.
The Power of the Sun

The earth receives more energy from the sun in just one hour than the world uses in a whole year.
AWESome Power
NYC 1900 – ALL Horses, 1 Car

NYC 1913 – ALL Cars, 1 Horse

We made the transition from Horse & Buggies to gas cars in 13 years last century -

We can make this transition to EVs NOW!
“You’re the master of your own destiny.

The future of humanity will be determined in the next few years.

...if we act now, those actions will pay off.

...Every action we take inspires someone else”

- Oscar Pak
  Sleepy Hollow High School
  EV Video Contest Champion

Why Drive Electric?

bit.ly/kickgas