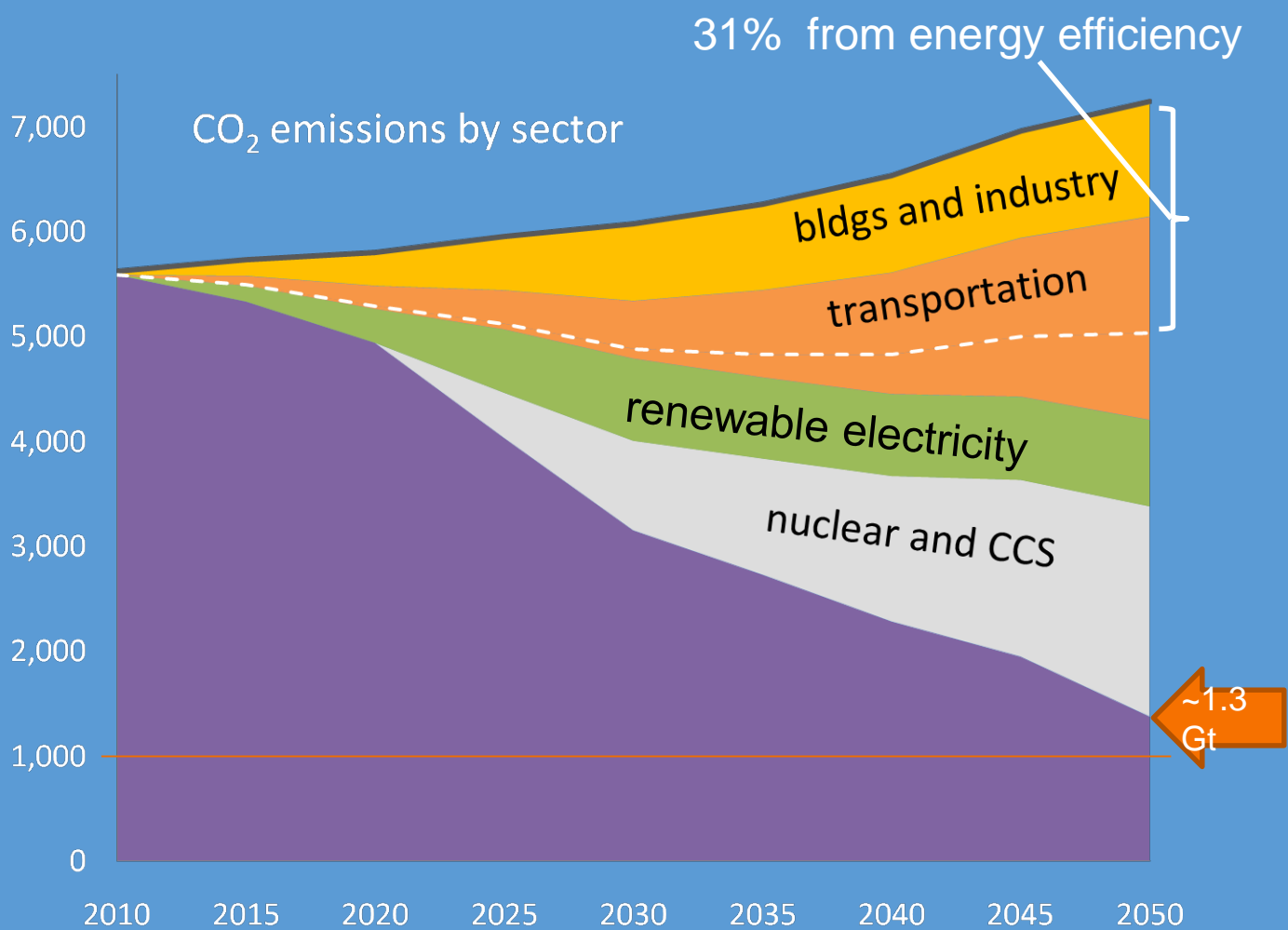


Advanced Energy Conference 2018

Kristina M Johnson, PhD
Chancellor
March 28, 2018
New York City, NY





~1.3
Gt

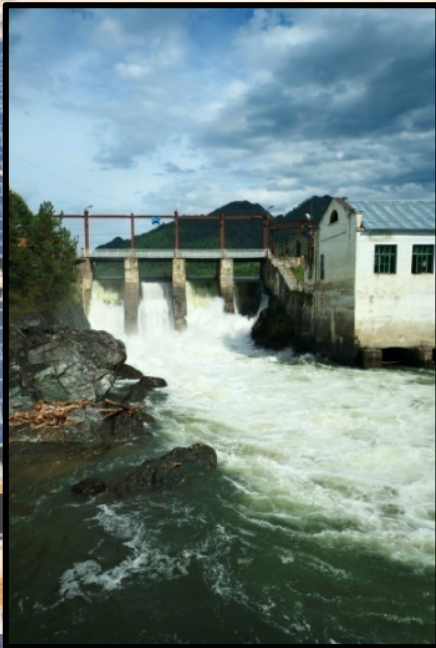
Strategic Technology Energy Plan (STEP) built around five levers (2010)

Levers

1. *Decarbonize* electric sector
2. *Electrify* heating & personal transport
3. *Save* 31% through energy efficiency and conservation
4. *Substitute* biofuels for freight transport
5. *Modernize* grid.

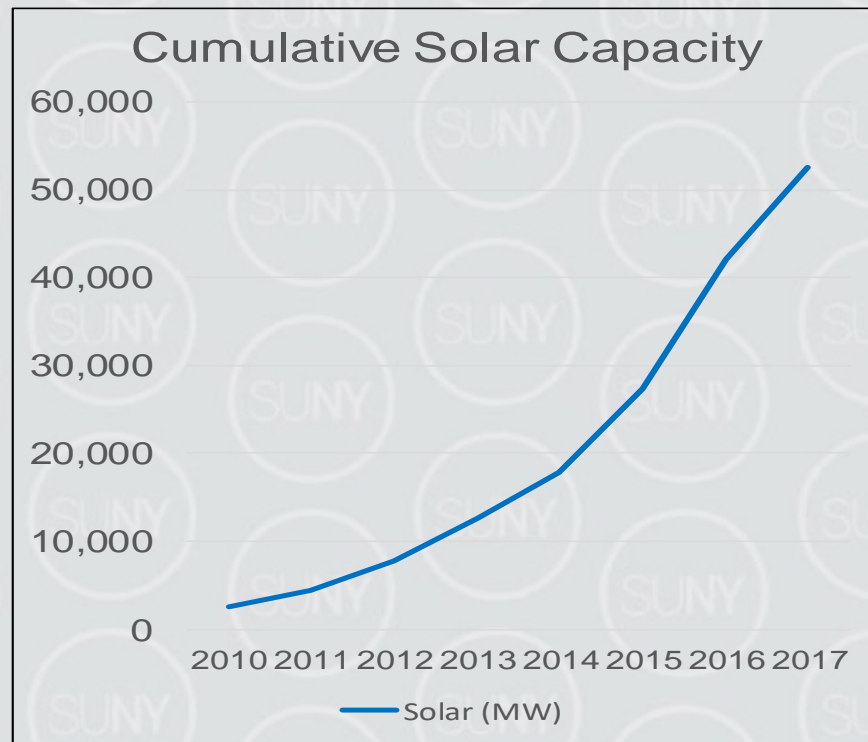
Goals

1. Balance Renewable, Fossil and Nuclear Energy (~1/3,1/3,1/3).
2. Electrify LDV transport 50% by 2035
3. Reduce energy consumption 23 by Quads by 2050.
4. Focus biomass on HDV and flight
5. Enable distributed energy and demand-side management.



Incremental Solar Power Installed in the U.S.

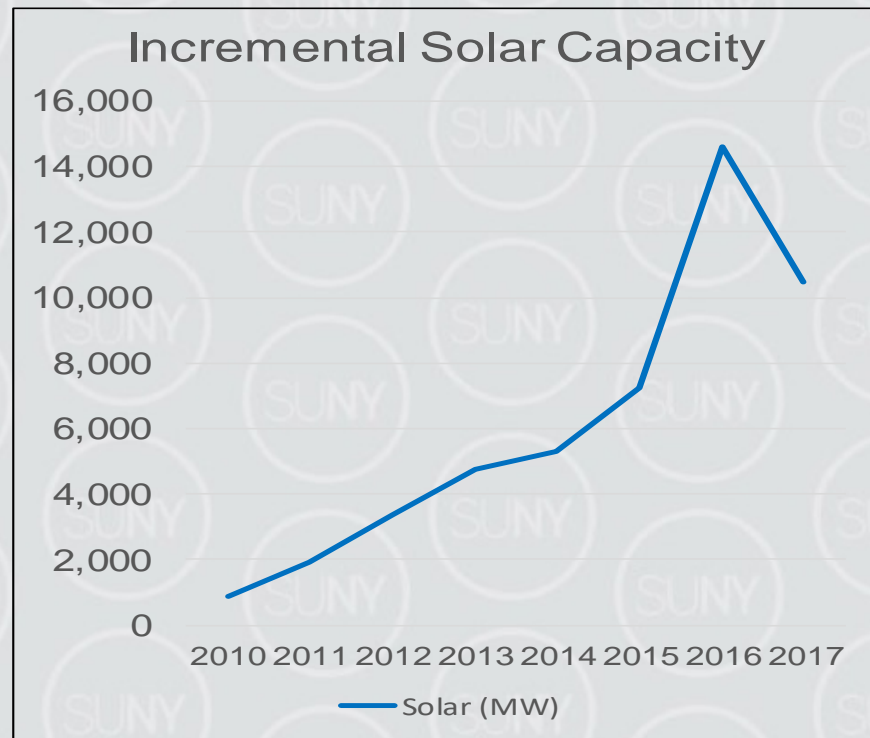
Year	Incremental MW	Cumulative MW
2010	850	2,534
2011	1,915	4,449
2012	3,366	7,815
2013	4,754	12,569'
2014	5,287	17,856
2015	7,260	27,400
2016	14,626	42,026
2017	10,500	52,526



Estimated Q4 2014 by taking the average of Q1-Q3 2014 (1322 MW). Source: Solar Energy Industries Association 2010-2014; SEIA/GTM Research" US Solar Market Insight"

Incremental Solar Power Installed in the U.S.

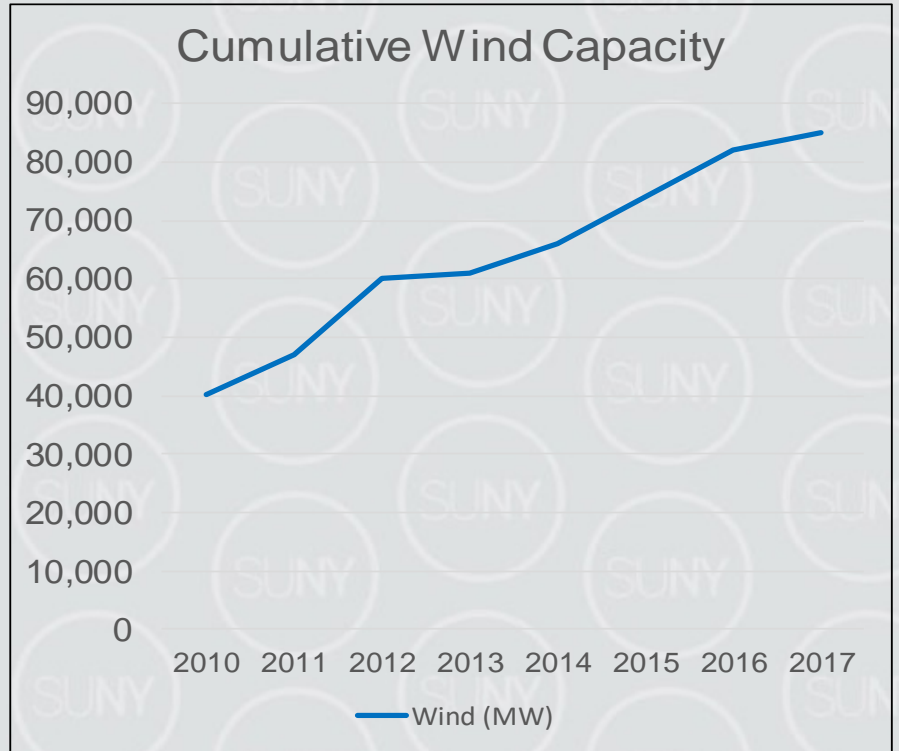
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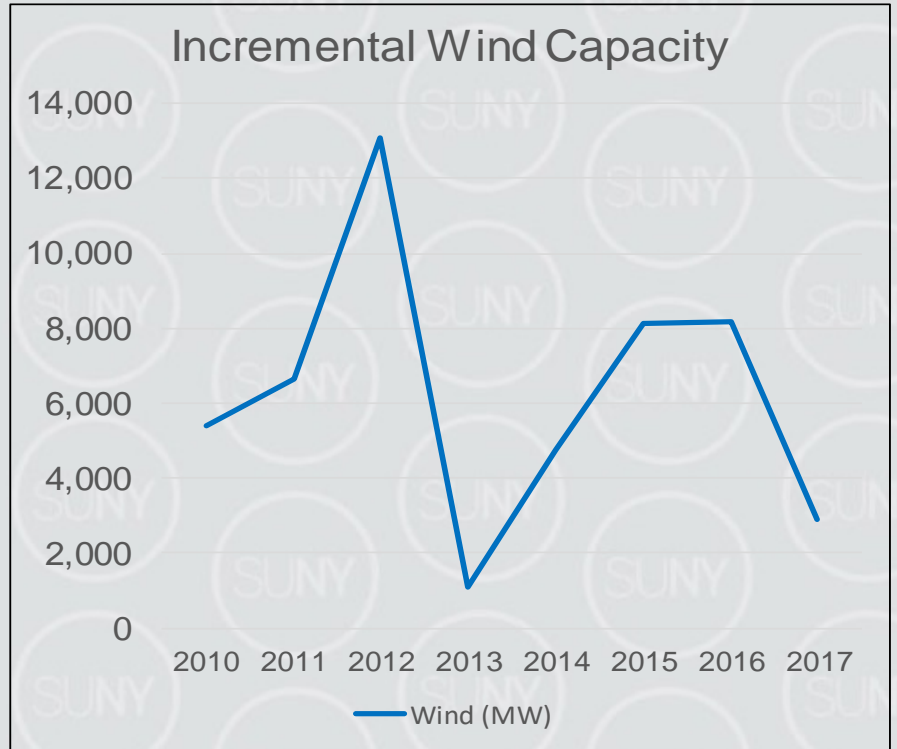
Incremental Wind Power Installed in the U.S.

Year	Incremental MW	Cumulative MW
2010	5,404	40,267
2011	6,649	46,916
2012	13,089	60,005
2013	1,105	61,110
2014	4,769	65,879
2015	8,113	73,992
2016	8,154	82,146
2017	2,896	85,042



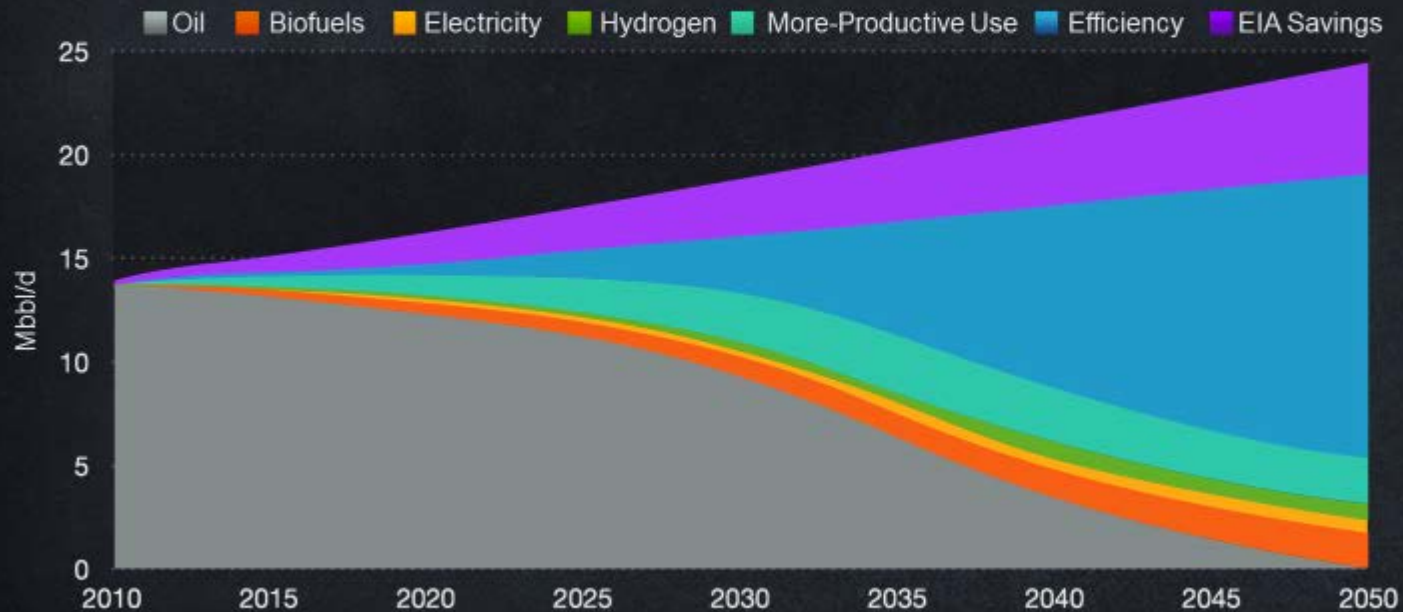
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Transportation Without Oil

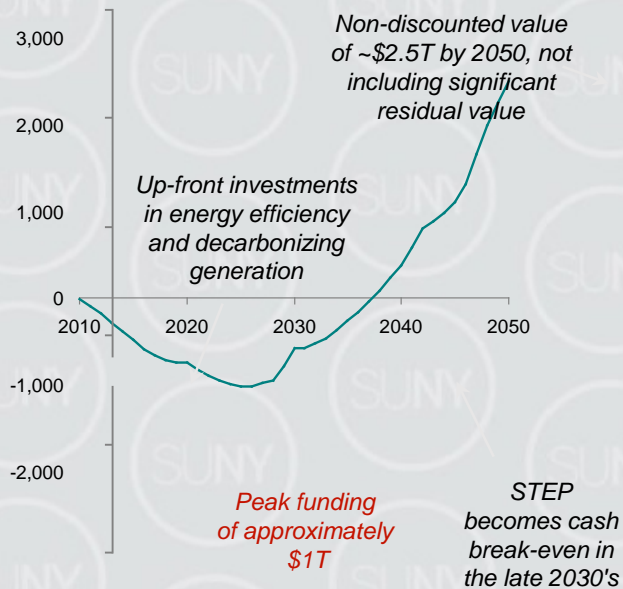
despite 90% more automobility, 118% more trucking, 61% more flying



STEP total cost minus BAU, in aggregate

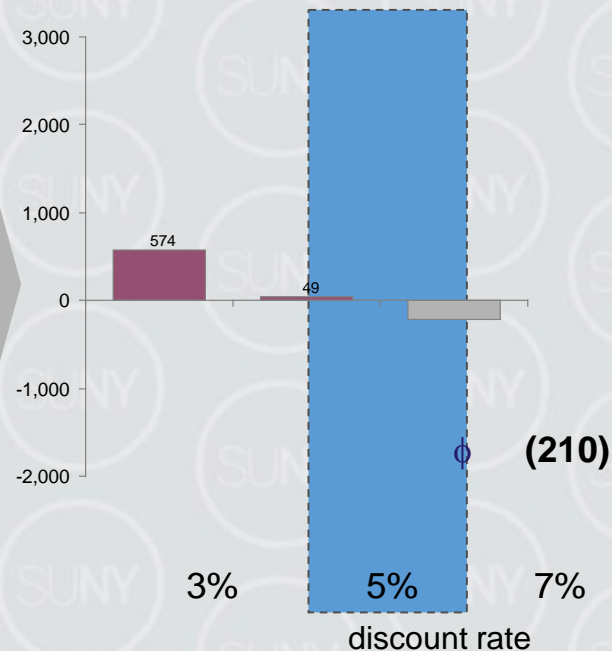
Cash flow savings of STEP compared to BAU

Cumulative Cash Cost (\$B, 2009)



Present value of STEP savings compared to BAU

Discounted Cost (\$B, 2009)



Four historical premises of energy

1. Demand is growing (fast)
2. Conventional, centralization lowers cost
3. Central supply is reliable, flexible and fossil-fuel based
4. Customers buy commodities

“The times they are a changing...”

Future of energy:

1. Demand is flat or decreasing (in US)
2. Unconventional, distributed and low-carbon
3. Current supply is challenged by variability of new entrants
4. Prosumers replace consumers and start to move off-grid

From PIGS to SEALS



Courtesy of Amory Lovins, RMI

Future of Energy for SUNY

- Source 100% of SUNY electrical demand from zero-carbon sources
- Design all new buildings to be zero-net energy
- Reduce carbon emissions from the 64 million sq. ft. physical plant to comply with EO88
- Announced partnerships with NYSERDA, National Grid and NYPA
- Current SUNY electrical consumption is ~ 1.2 million MWhs
- SUNY owns and operates 40% of all State-owned buildings

Collective Action



Easter Parades on Fifth Avenue, New York, 13 years apart

1900: where's the first car?



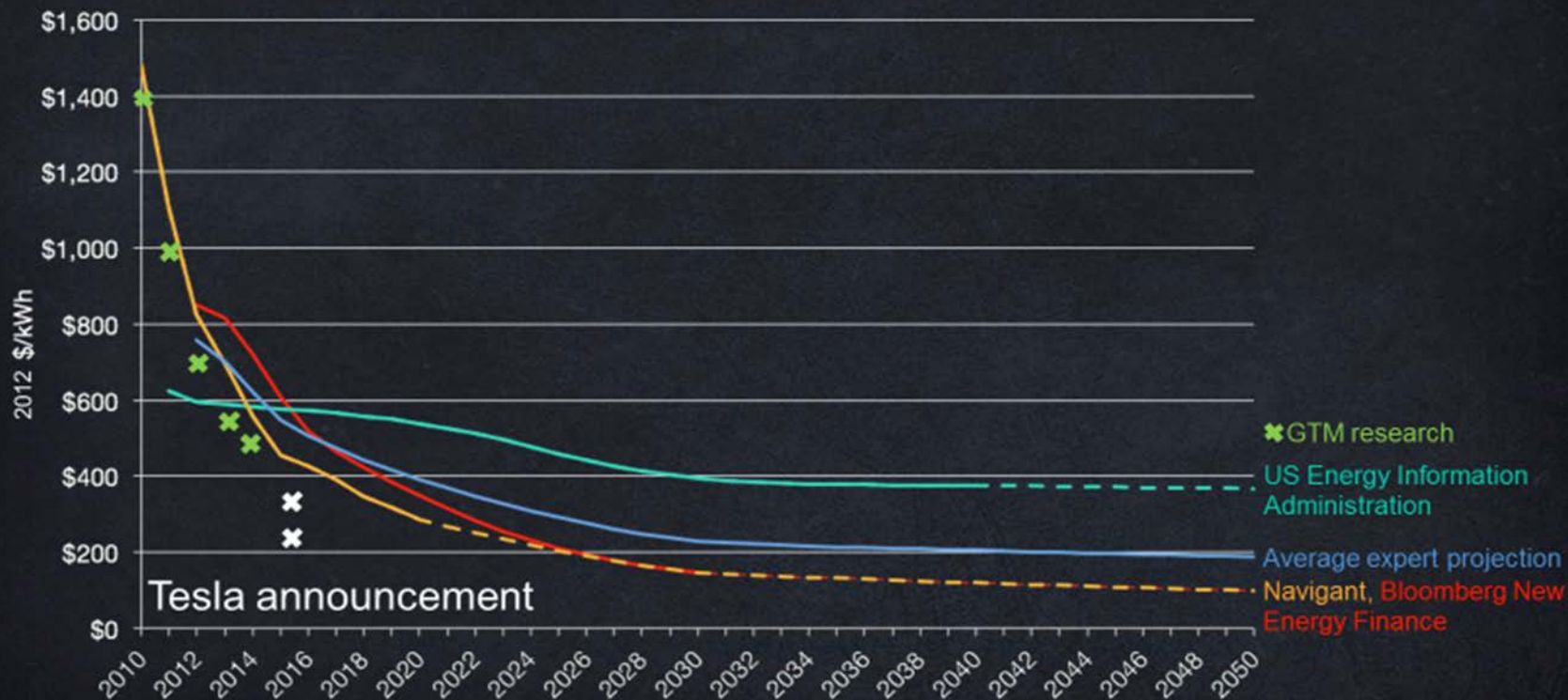
1913: where's the last horse?





“I can’t wait
to see what
happens
when our
industries
merge.”

Batteries' Costs Continue to Plummet



Electric Needs Will Decline as Efficiency Gains Speed

Annual changes in U.S. electricity consumption

