

The Accelerating Energy Revolution

CleanTech Summit, Rotterdam

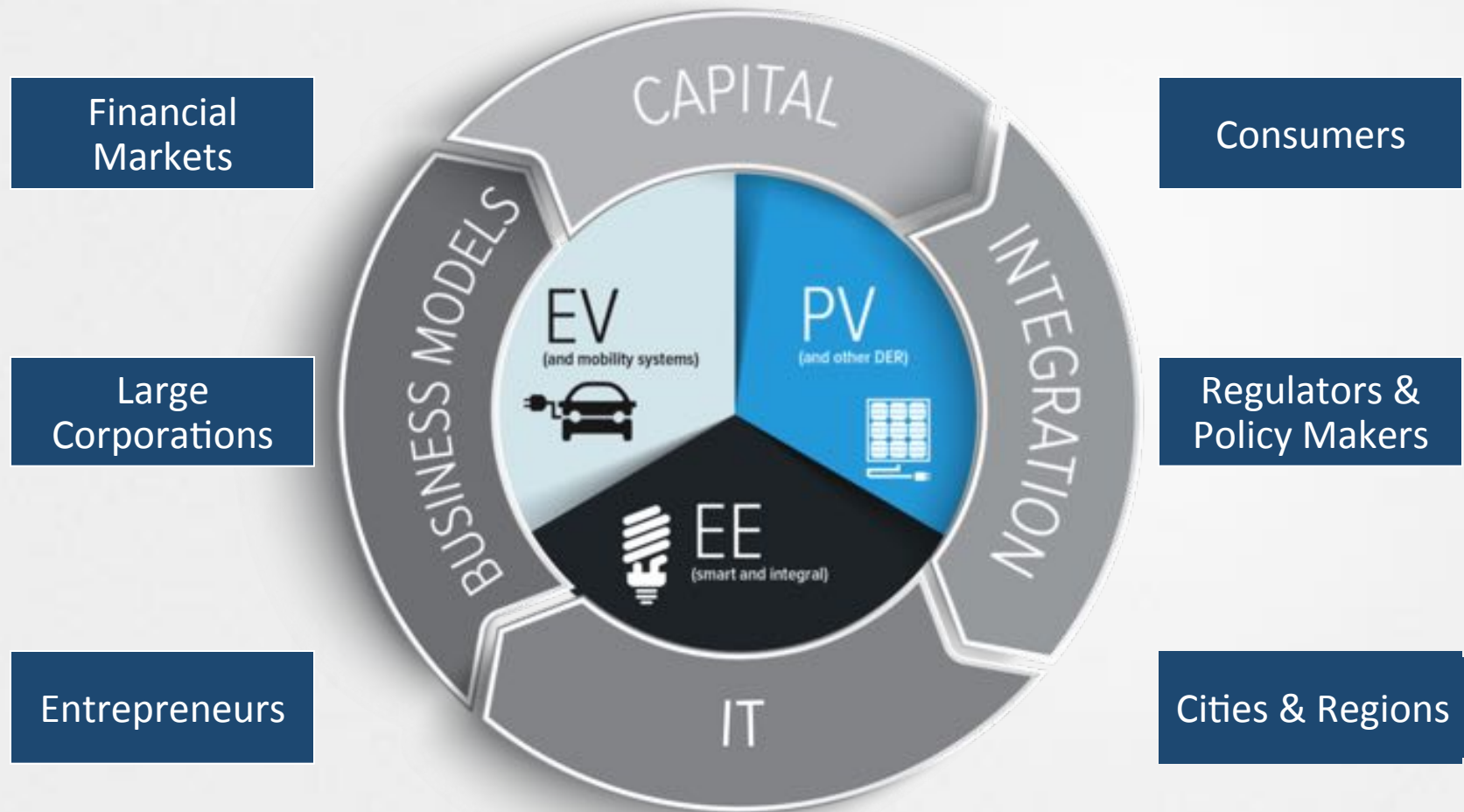
16 November 2015



FURTHER, FASTER, TOGETHER

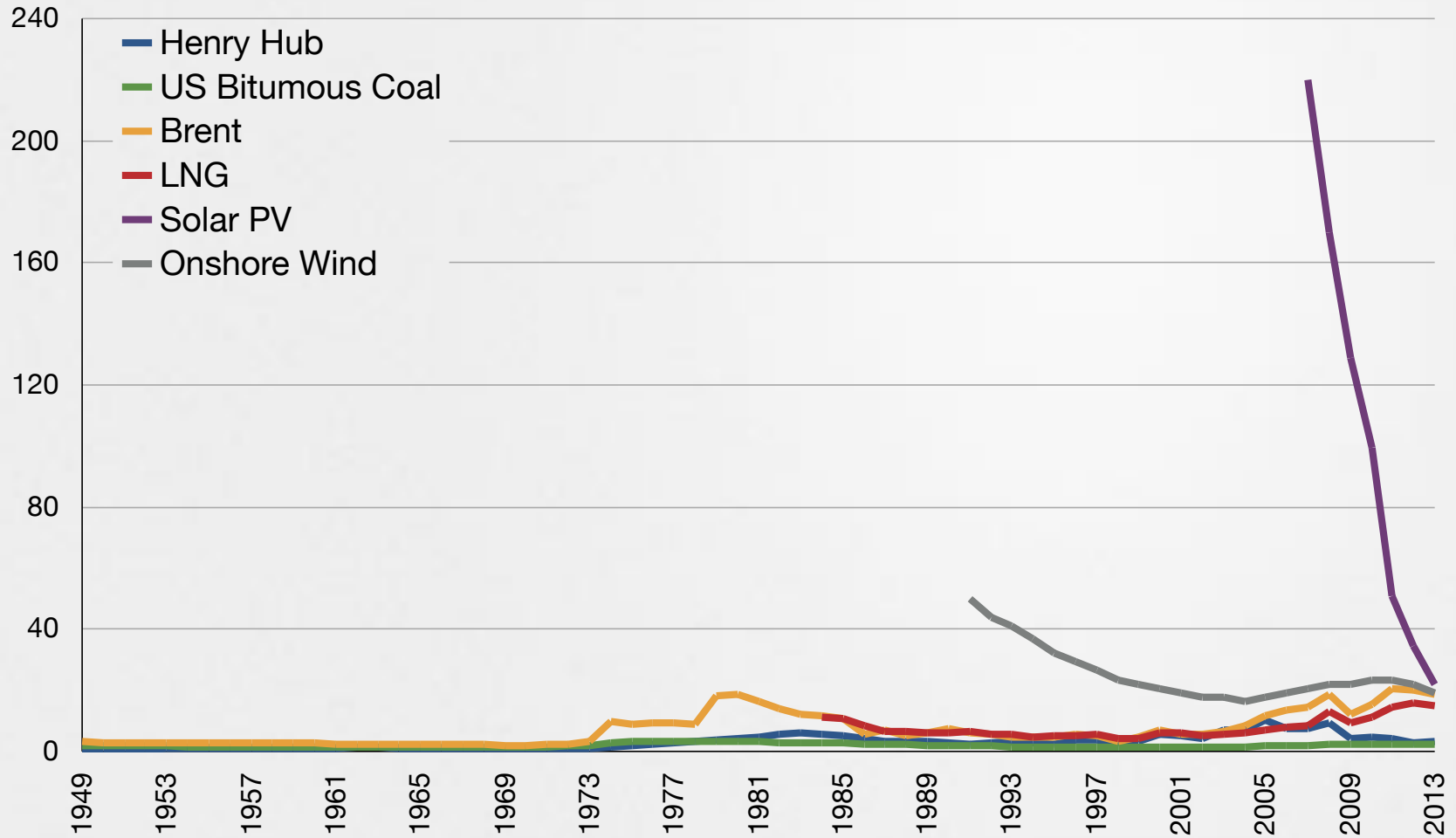
Creating a clean, prosperous, and secure low-carbon future

An energy revolution is brewing....



Renewables are rapidly becoming competitive

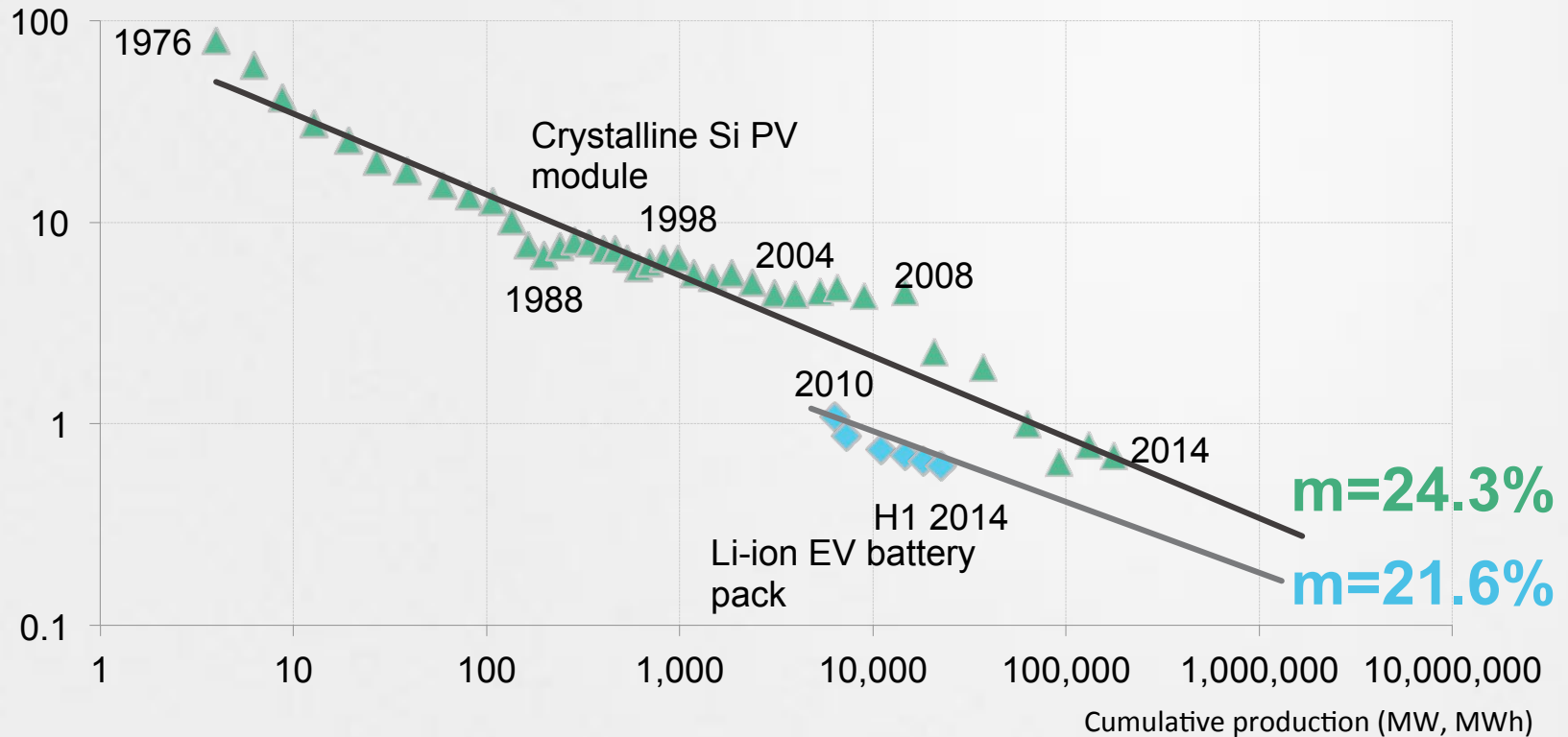
\$/MMBtu (real)



Due to the impact of the experience curve

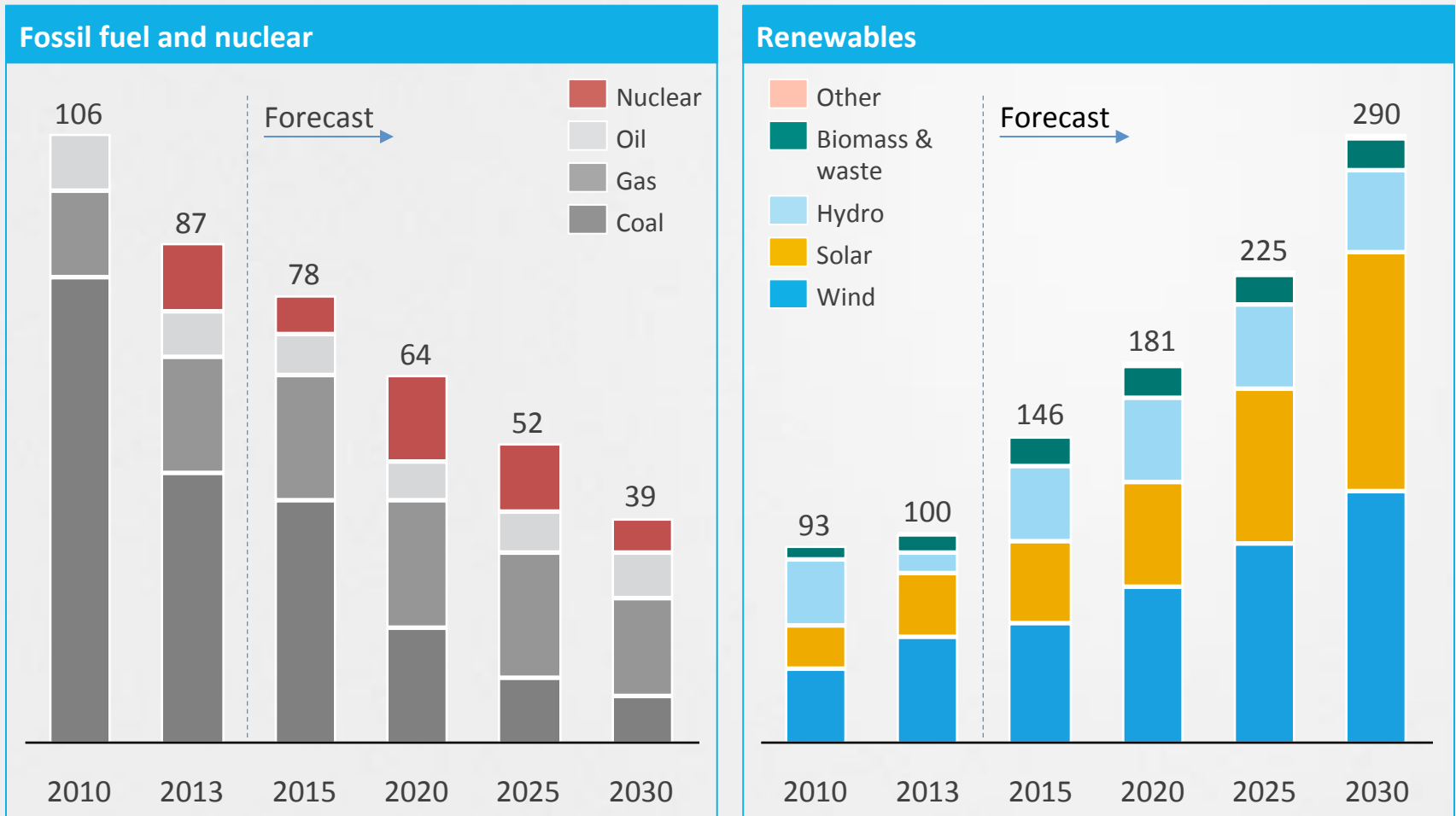
Solar PV and Li-ion battery experience curve

Historical prices
(USD/W, USD/Wh)



Driving power generation capacity additions

2010-2020 (GW)

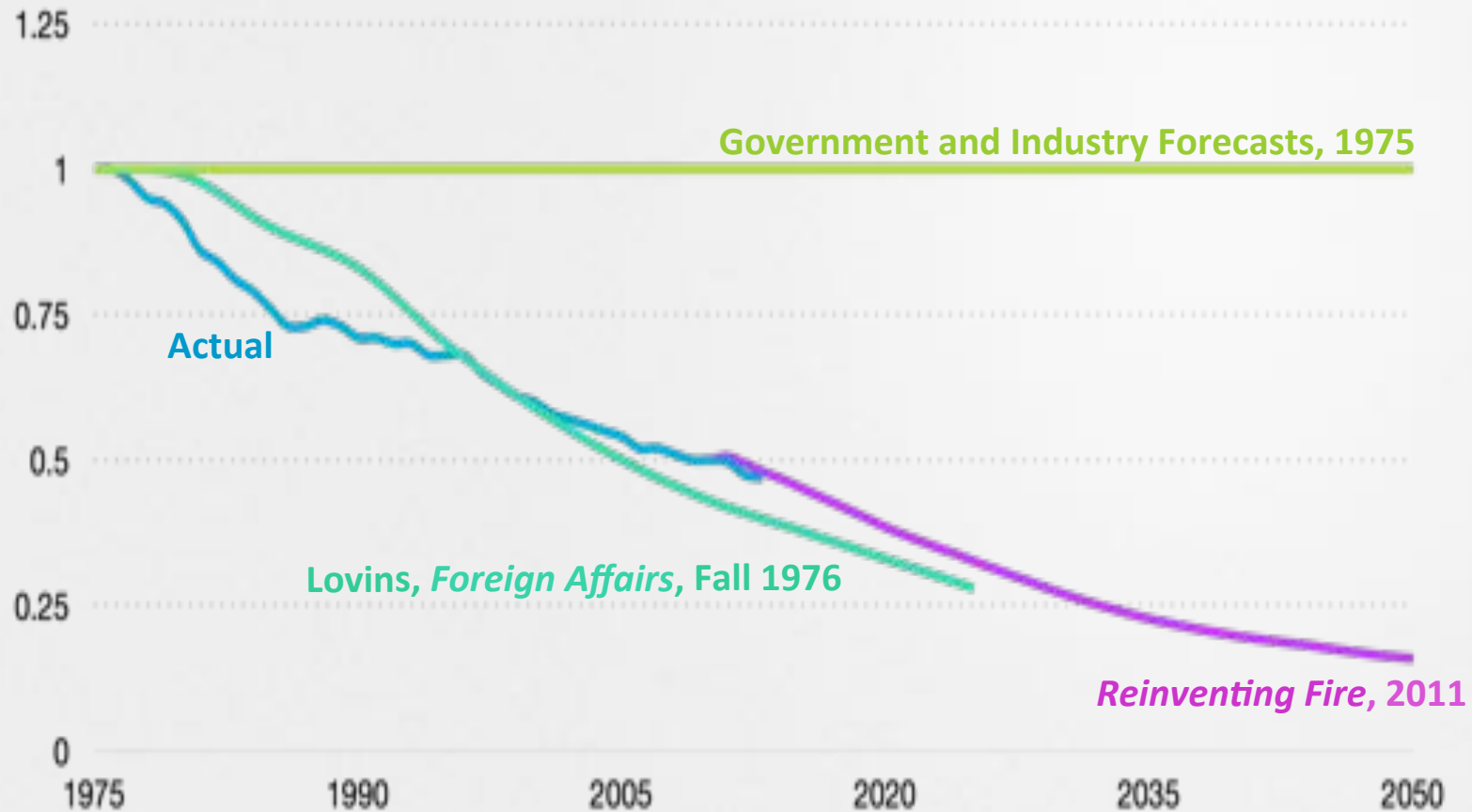


Source: Bloomberg New Energy Finance

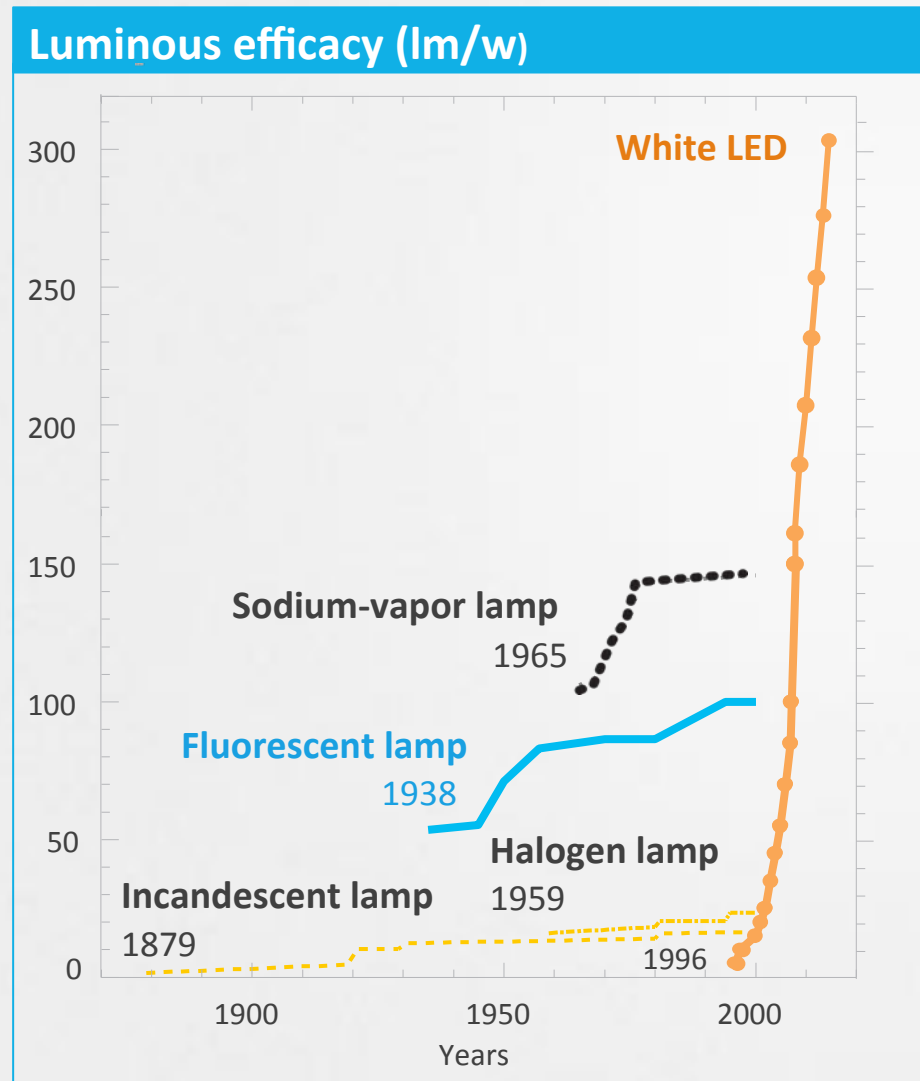


Economies are more and more efficient

Index of U.S. Primary Energy Per Dollar of Real GDP (1975=1.0)



LED technology is just one example



U.S. buildings are becoming more efficient

3-4× energy productivity worth 4× its cost



−38%
2010 retrofit



−70%
2013 retrofit



−63%
2011 new



−85%
2015 new

Energy efficiency improvement post retrofit / against U.S. office median

The transportation future is electric:



Prices on electric cars will continue to drop until they're within reach of the average family.



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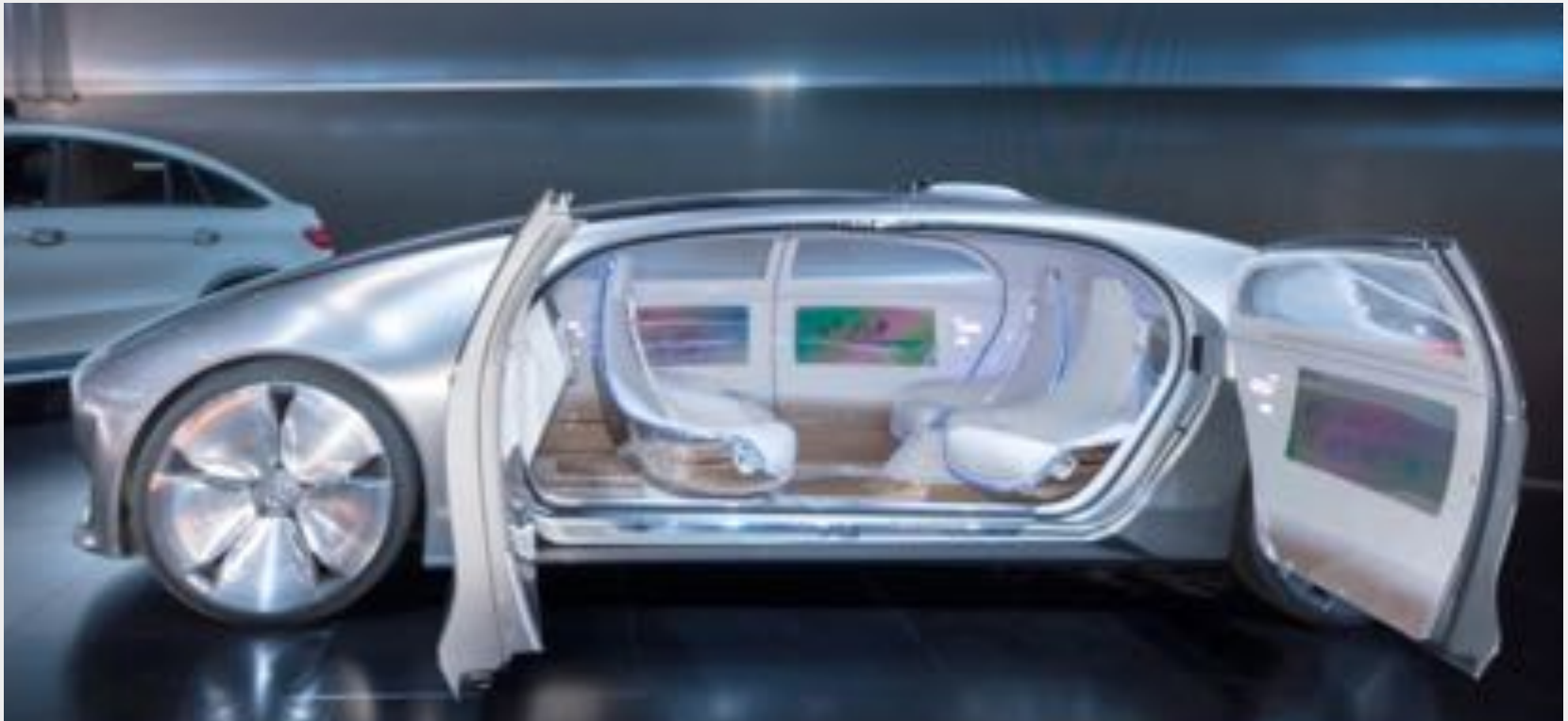


Prices on electric cars will continue to drop until they're within reach of the average family.



The Washington Post 1915

Autonomous vehicles: from PIGS to SEALs








A seamless, cheaper, more pleasant user experience

For multiple transportation methods, enabled by IT



The shift will continue – costs keep falling

Trends pushing down the cost of solar, other renewables and energy efficiency	Examples
 <p>Increasing technical innovation</p>	<ul style="list-style-type: none"> • New battery chemistries • New solar PV technologies
 <p>Synergistic solutions increasing the value of renewables</p>	<ul style="list-style-type: none"> • Solar PV + battery storage • IT and storage for peak shaving
 <p>Data and internet of things increasing integration</p>	<ul style="list-style-type: none"> • Sensors • Predictive software • Demand response automation
 <p>Innovative business models increasing customer bases</p>	<ul style="list-style-type: none"> • No up front costs • Funnel analysis • Value beyond energy
 <p>Innovative financing reducing cost of capital</p>	<ul style="list-style-type: none"> • Third-party financing • Green bonds • YieldCos

Technology change... it causes revolutions



And who sets the speed of disruption?



Elon Musk, Tesla,
SolarCity, SpaceX



Tony Fadell,
Nest



Daniel Yates,
Opower



Robin Chase,
Zipcar, GoLoco, Buzzcar



Frans van Houten,
Philips



Michael Brylawski,
VisionFleet



Erica Mackie,
CEO of Grid Alternatives



Larry Page & Sergey Brin,
Google

Thank YOU

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