

Moving Forward to a Smarter Energy Reality





- World-renowned research center in Niskayuna for 100+ years
- More than 3,000 GE Energy employees and 12,000 total GE employees
- 12 major manufacturing operations
- Executive training center in Crotonville
- Working with NY to deploy smart grid solutions
- GE Foundation donating nearly \$30 million to NYC-area education initiatives



Why Everyday People Need Us To Move Forward

- **We need more power**
 - By 2030, more than 60% of the global population will live in cities*
- **Power must remain affordable**
 - Double-digit price increases are already commonplace
- **Sustainability must be achieved**
 - More than 40% of our current emissions are from electric generation**

*United Nations Population Division, "World Urbanization Prospects: the 2007 Revision."

**International Energy Agency

Why the Energy Industry Needs Us To Move Forward

- **Industrialized nations are living on borrowed time**
 - More than 50% of installed transformers are reaching the end of their design life*
- **Emerging economies will compete for resources**
 - Per capita electricity use will soar around the globe
- **Prosperity vs sustainability**
 - Competitiveness will be determined by our ability to grow in a prosperous yet sustainable manner

*Source: William Bartley P.E. Hartford Steam Boiler Inspection & Insurance)



imagination at work



There is no
“Smart Energy”
switch...

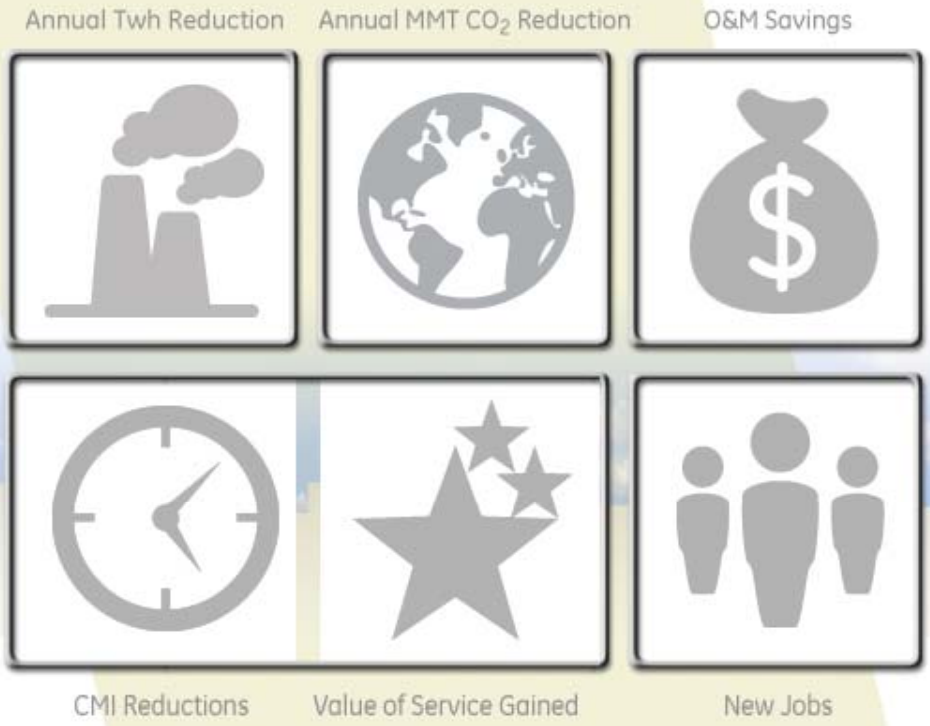
to solve our power problems



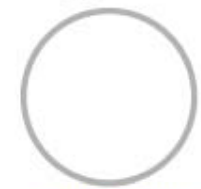
- Today's investments build the foundation for a sustainable energy future
- As our energy landscape evolves, benefits will kick in gradually
- Ratcheting up our collective Grid IQ moves our energy prospects from dim to bright

2010 2015 2020 2025 2030

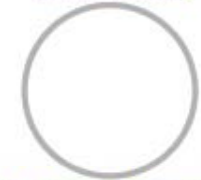
SMART GRID Evolution



Technology Penetrations



Smart Metering



Advanced Efficiency



Advanced Reliability



Advanced Visualization



Fully Integrated Network



2010

2015

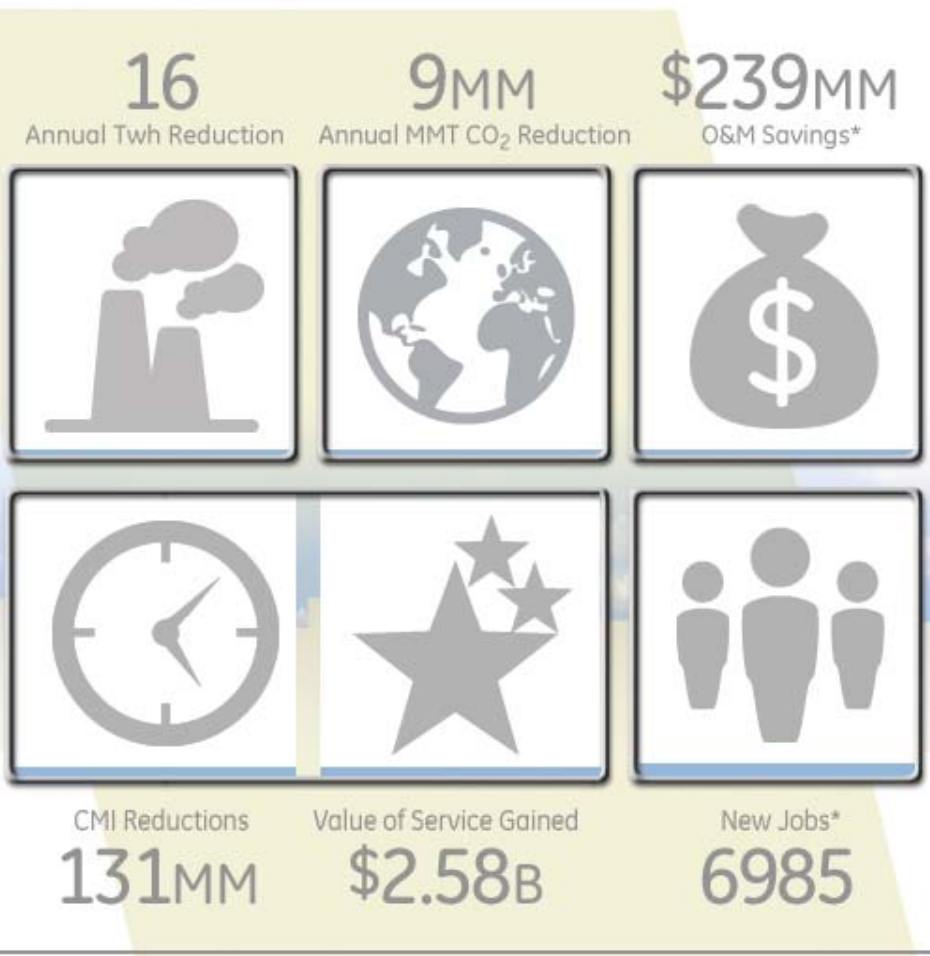
2020

2025

2030

SMART GRID

Evolution



* Cumulative

Technology Penetrations



imagination at work

2010

2015

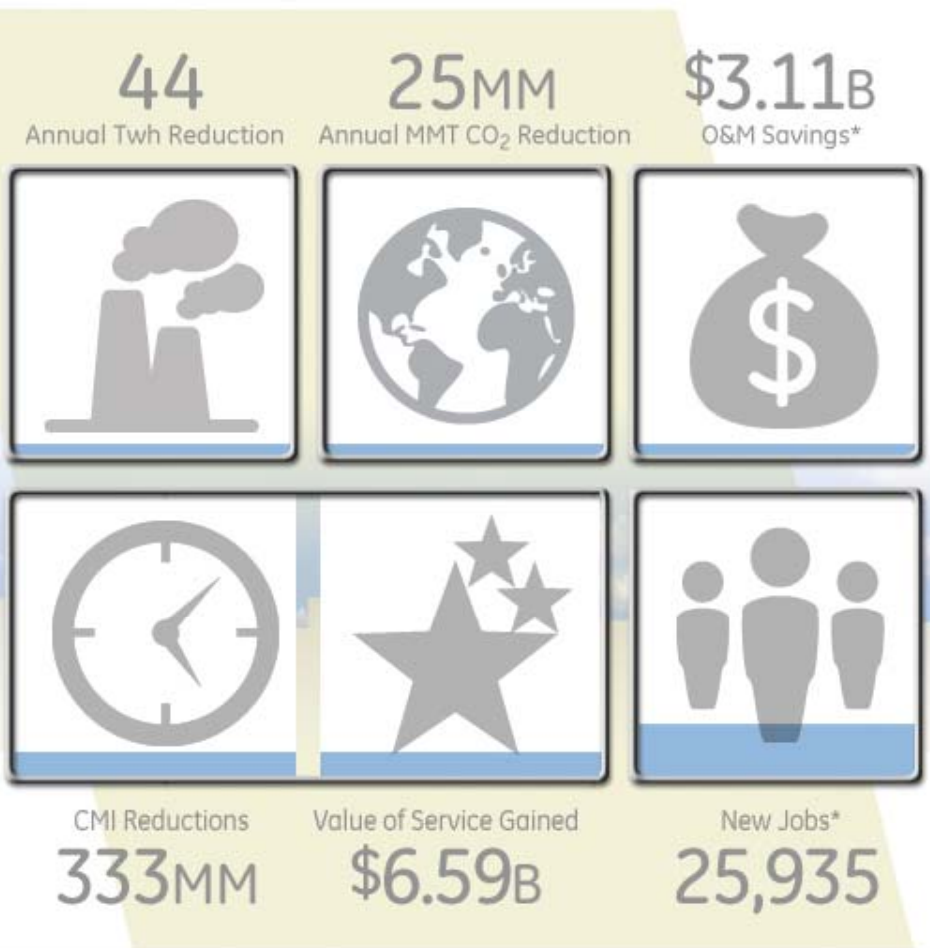
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SMART GRID

Evolution



* Cumulative

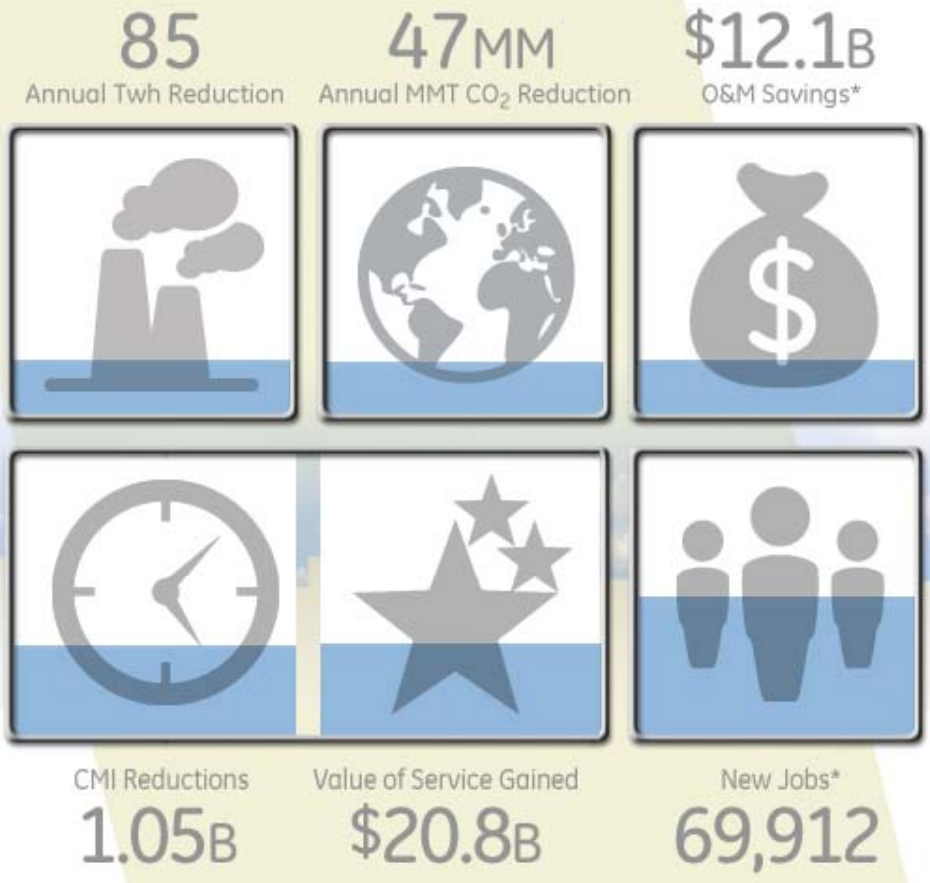
Technology Penetrations



imagination at work

2010 2015 **2020** 2025 2030

SMART GRID Evolution



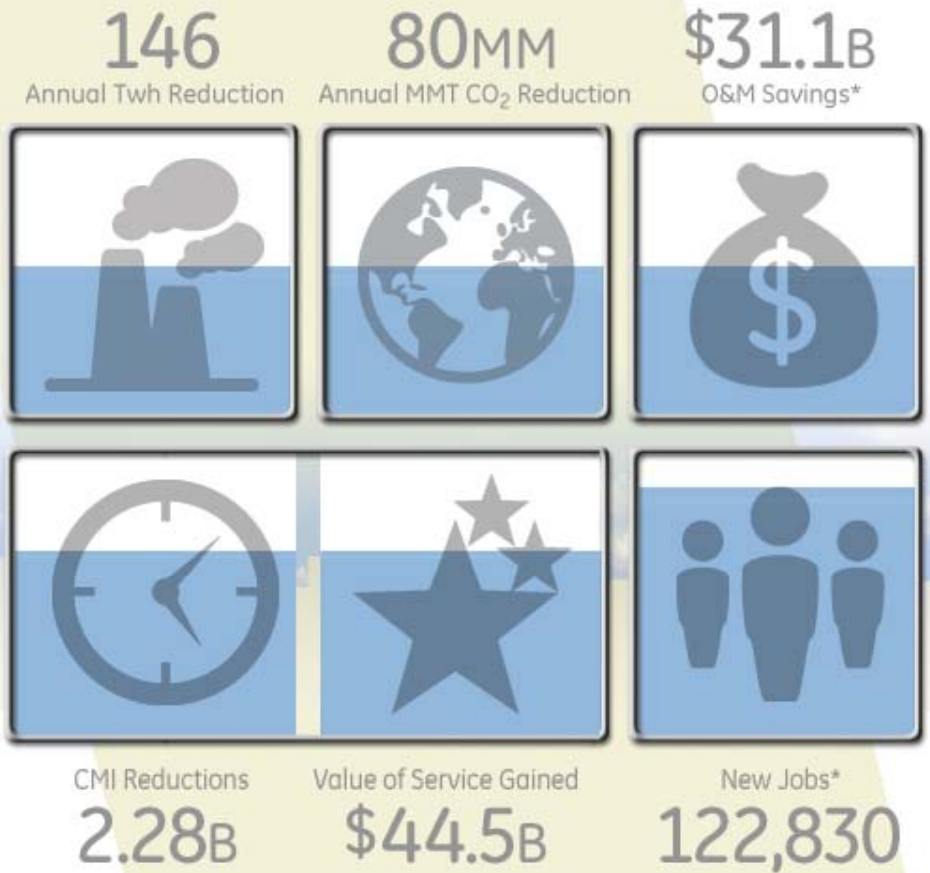
* Cumulative

Technology Penetrations



2010 2015 2020 **2025** 2030

SMART GRID Evolution



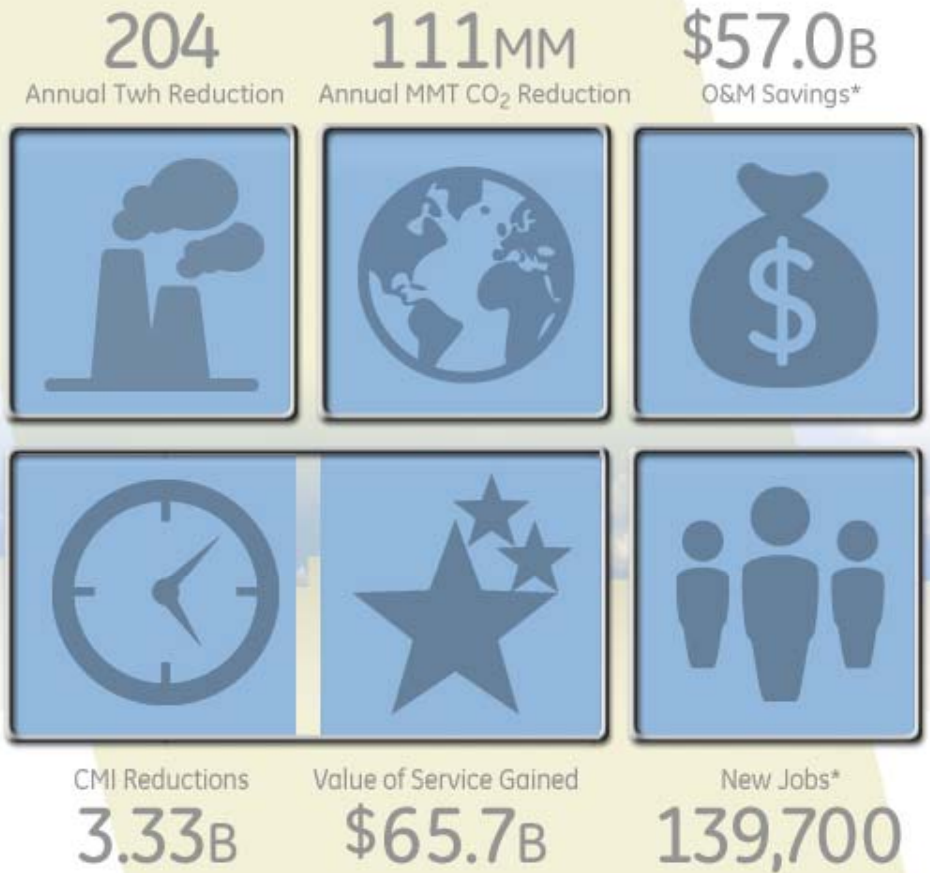
* Cumulative

Technology Penetrations



2010 2015 2020 2025 **2030**

SMART GRID Evolution



* Cumulative

Technology Penetrations

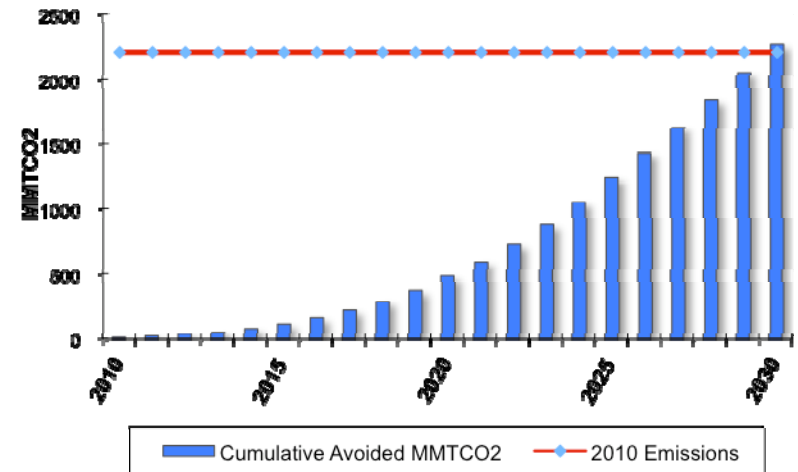




Net result:

Like 2010 never happened

If these very conservative smart grid adoption estimates prove true, the savings will exceed our total electrical consumption and electrical CO₂ output for 2010





More Results: New lifestyle options

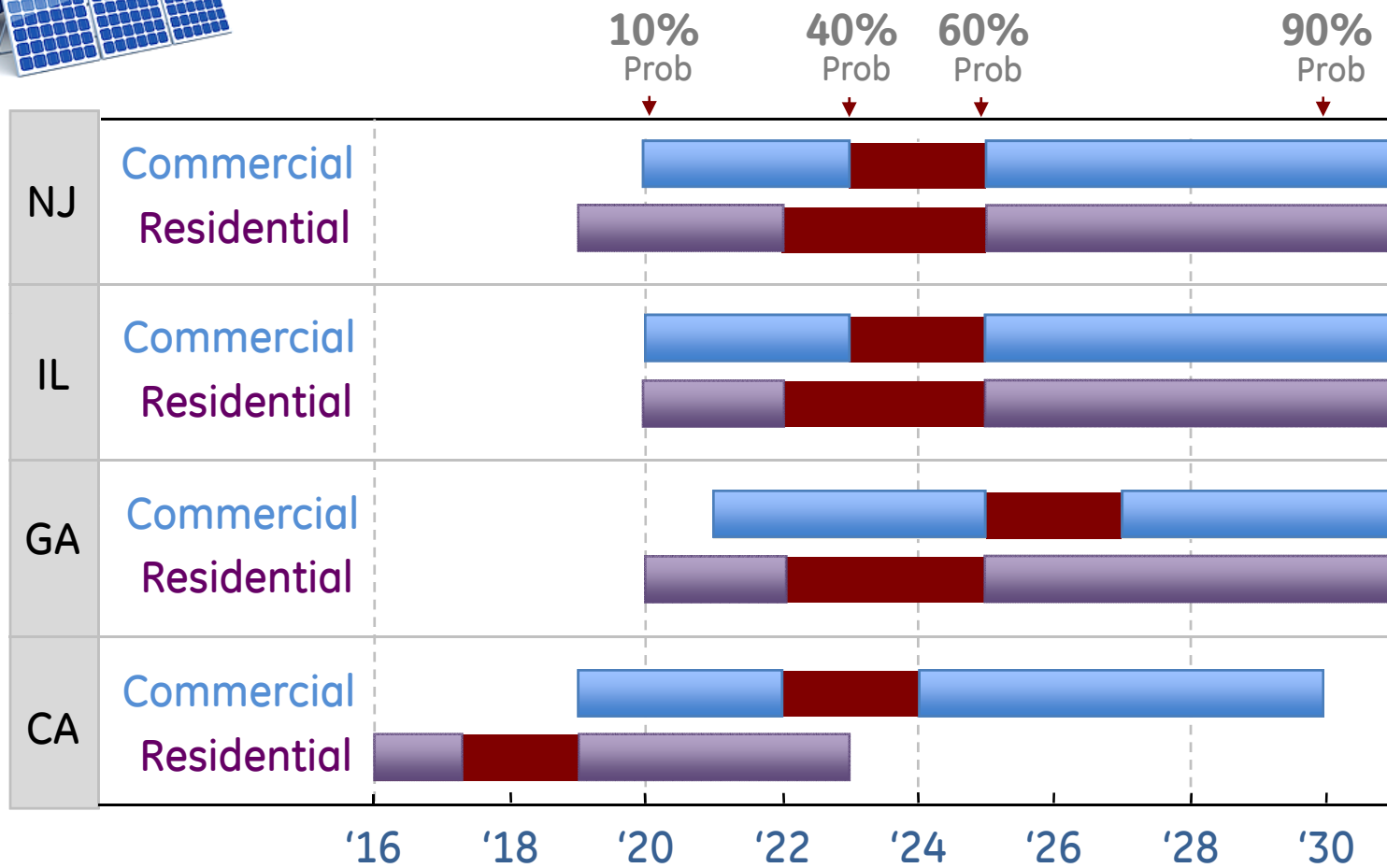
- 73% of cars, SUV's and pickup trucks or 84% of light duty vehicle fleet could be powered by existing electrical generation, transmission and distribution*
- Green house gas emissions ... reduced 27% max
- Organic compounds down 93%, CO₂ down 98% and NOX down 31%
- Reduce oil imports by 6 million barrels per day

*Impacts assessment of plug-in hybrid vehicles on electric utilities & regional U.S. power grids Pacific Northwest National laboratory, Nov. 2007



More Results: Mainstream distributed solar

PV Grid Parity is Coming ... without incentives



10-25% IRR's today in AZ, CT, HI, MA, NJ, & OR with incentives

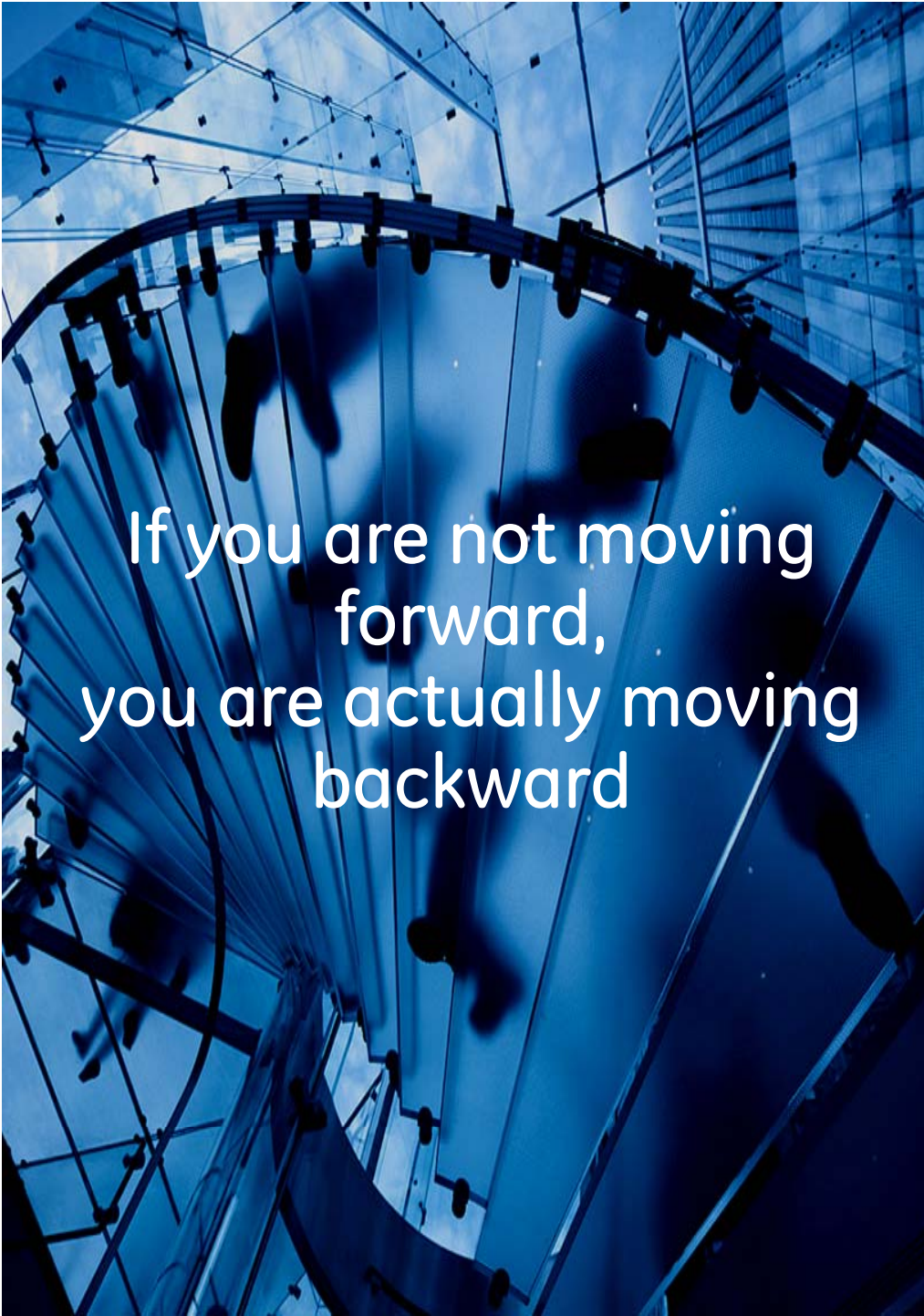
Smart Policies Help Us Move Forward

Policymakers...establish the targets

1. Energy Efficiency resource standard
2. Peak load reduction standard
3. Clean energy standard

Regulators...provide the incentives

1. Cost recovery guidelines
2. Innovative rate designs
3. Equal treatment of demand-side resources



If you are not moving
forward,
you are actually moving
backward

- Energy-savvy regions will leapfrog late-adopters in business, lifestyle and opportunity
- The revolution begins with the first steps of the evolution
- Smart grid technology and software foundations are scalable, adaptable and flexible for future breakthroughs
- Forward-thinking decisions today ensure a secure, robust energy tomorrow

Findings are based upon a GE study conducted in 2010

Main Sources

Energy and Carbon Baseline Forecasts	US Department of Energy, Energy Information Administration, Annual Energy Outlook 2010, Report #:DOE/EIA-0383(2010)
Energy and Carbon Savings	Pratt, RG et al. "The Smart Grid: An Estimation of the Energy and CO2 Benefits (PNNL-19112, Revision 1)" Pacific Northwest National Laboratory. Prepared for the U.S. Department of Energy under Contract DE-AC05-76RL01830. January 2010
Dynamic Pricing Response	Faruqui, A., The Brattle Group. "The Emergence of Dynamic Pricing." Presented at GE Smart Grid Symposium, July 15, 2009
Methodological framing	Wakefield, M et al. "Methodological Approach for Estimating the Benefits and Costs of Smart Grid Demonstration Projects." Electric Power Research Institute. Final Report, January 2010.
Methodological framing	Neena, B, et al. "Characterizing and Quantifying the Societal Benefits Attributable to Smart Metering Investments." Electric Power Research Institute. Topical Report July 2008
Methodological framing	Siddiqui, O., et al. "The Green Grid: Energy Savings and Carbon Emissions Reductions Enabled by a Smart Grid. 1016905. Electric Power Research Institute. Technical Update, June 2008
Value of Service Benefits	Sullivan, M., et al. "Estimated Value of Service Reliability for Electric Utility Customers in the United States." LBNL-2132E. Prepared for Office of Electricity Delivery and Energy Reliability U.S. Department of Energy. Lawrence Berkeley National Laboratory. June 2009
Distribution Automation and DMS CMI savings	Flynn, B and OG&E. "Justifying Distribution Automation at OG&E." Paper delivered at Distributech 2009, San Diego, CA
O&M savings from IVVC	GreenOrder Scorecard - GE ecomagination - Volt/VAR Control (Version Final, 14 Sept 2010). Ecomagination recertification epr 2010
Job Creation	KEMA. "The U.S. Smart Grid Revolution: KEMA's Perspectives for Job Creation." Prepared for the GridWise Alliance, December 23, 2008

Assumptions

AMI with customer EMS will reach 100% penetration by 2030

Distribution Automation and DMS market segment exist, with higher technology packages (full DMS) accounting for a maximum 20% of the market, standard DA 40% of the market, and DA with FDIR for 20% of the market. The DA/DMS suite of technologies reach their maximum penetration levels at or around 2030

IVVC has a maximum penetration level of 80%, and reaches that level in 2030.

Consistent with PNNL, energy and Twh accrue from: Conservation effect of feedback; deployment of diagnostics in commercial and residential buildings, higher quality M&V so that savings are persistent, load shifting, CVR and IVVC.

Consistent with Eco scorecard, IVVC O&M savings that accrue from voltage control.

Consistent with KEMA report, net new jobs are created at utilities, contractors, direct utility suppliers, indirect utility supply chain industries, and ESCOs