

Power Industry Issues

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Presentation to the 2011 Tulane Engineering Forum

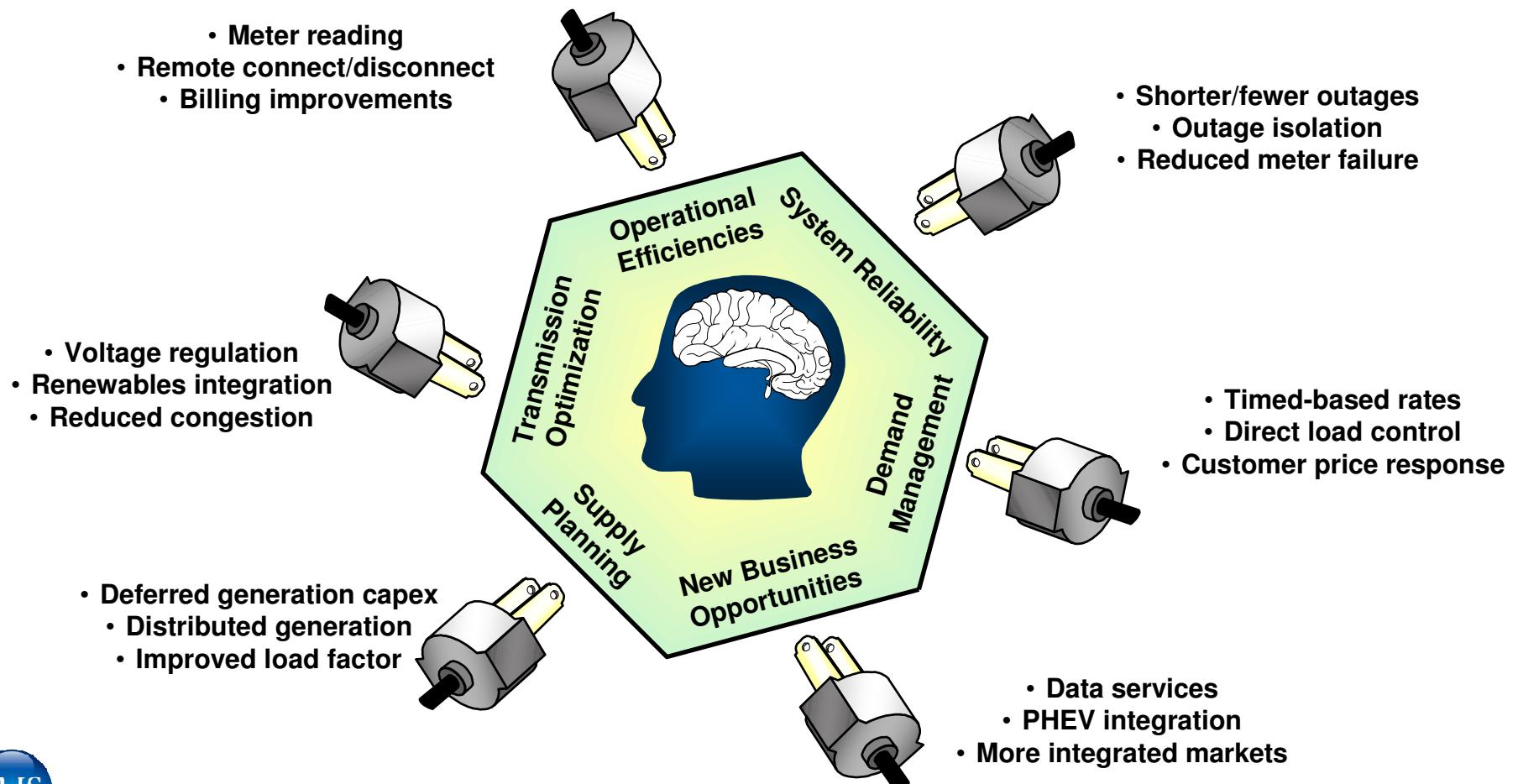
April 15, 2011 • New Orleans

US Power Companies Face New Challenges Driven by Technological Changes

- Smart Grid
- Smart Rates
- Electric Vehicles
- Renewable Power Requirements



Plugging into a Smarter Grid



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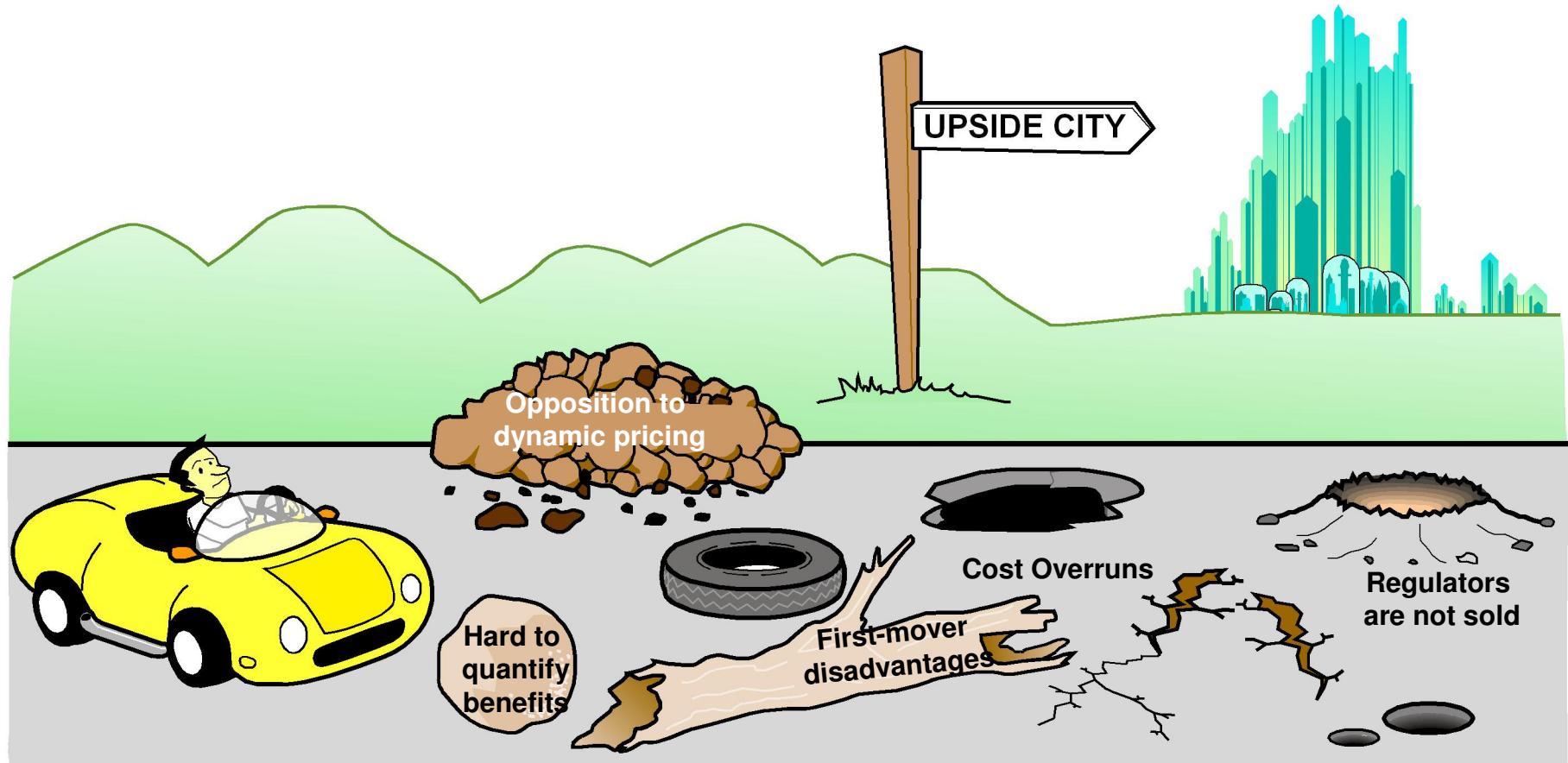
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On the Road to a Smarter Grid: Some Obstacles Ahead



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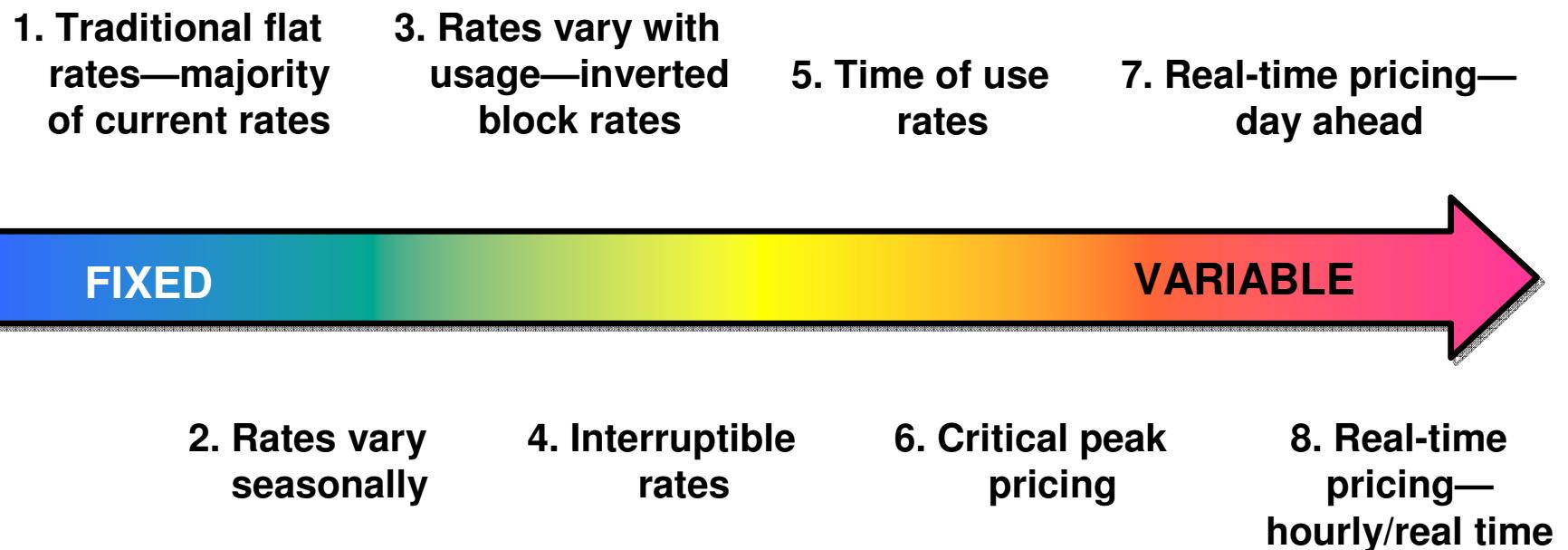
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The Spectrum of Electric Rates



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The Perception about Smart Grid and Dynamic Pricing

- Smart Grid will usher in widespread use of dynamic pricing.
- Customer participation rates will be high.
- Regulators will approve default dynamic pricing for all customers.
- Significant demand response and energy conservation will be achieved.



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Dynamic Pricing: Regulatory Realities

- No North American smart grid proposal includes mandated Real Time Pricing (RTP) for any customer class.
- Majority of smart grid plans include voluntary dynamic rates, often time-of-use and/or critical peak pricing or rebate, not RTP.
- No state regulatory commission has pushed utilities towards opt-out/mandated dynamic rates for small customers unless rate leaves customers indifferent.
- Regulatory approvals of default/opt-out dynamic rates given only for largest customer classes (e.g., California IOUs).



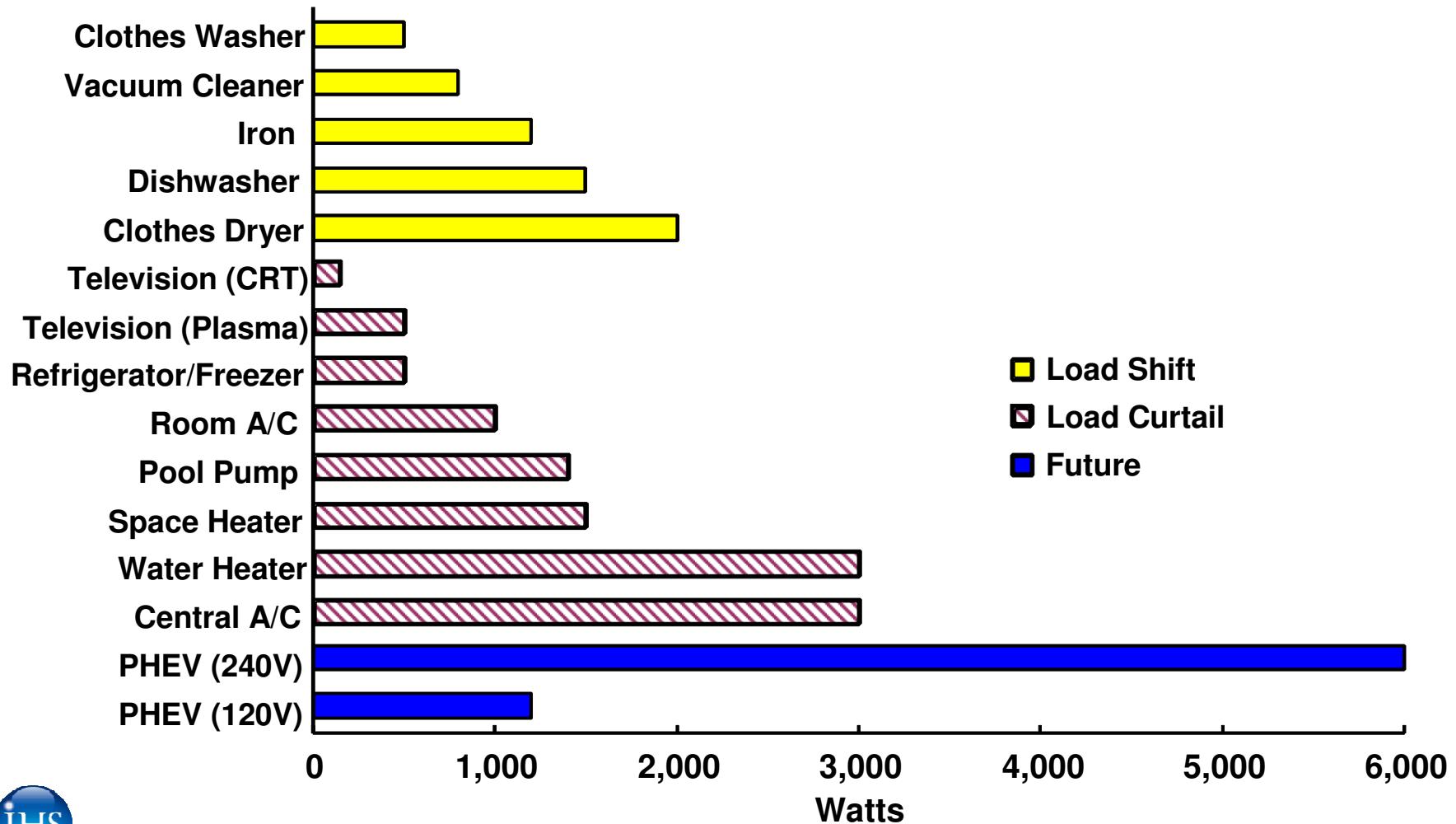
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Wattages for Typical Residential Loads



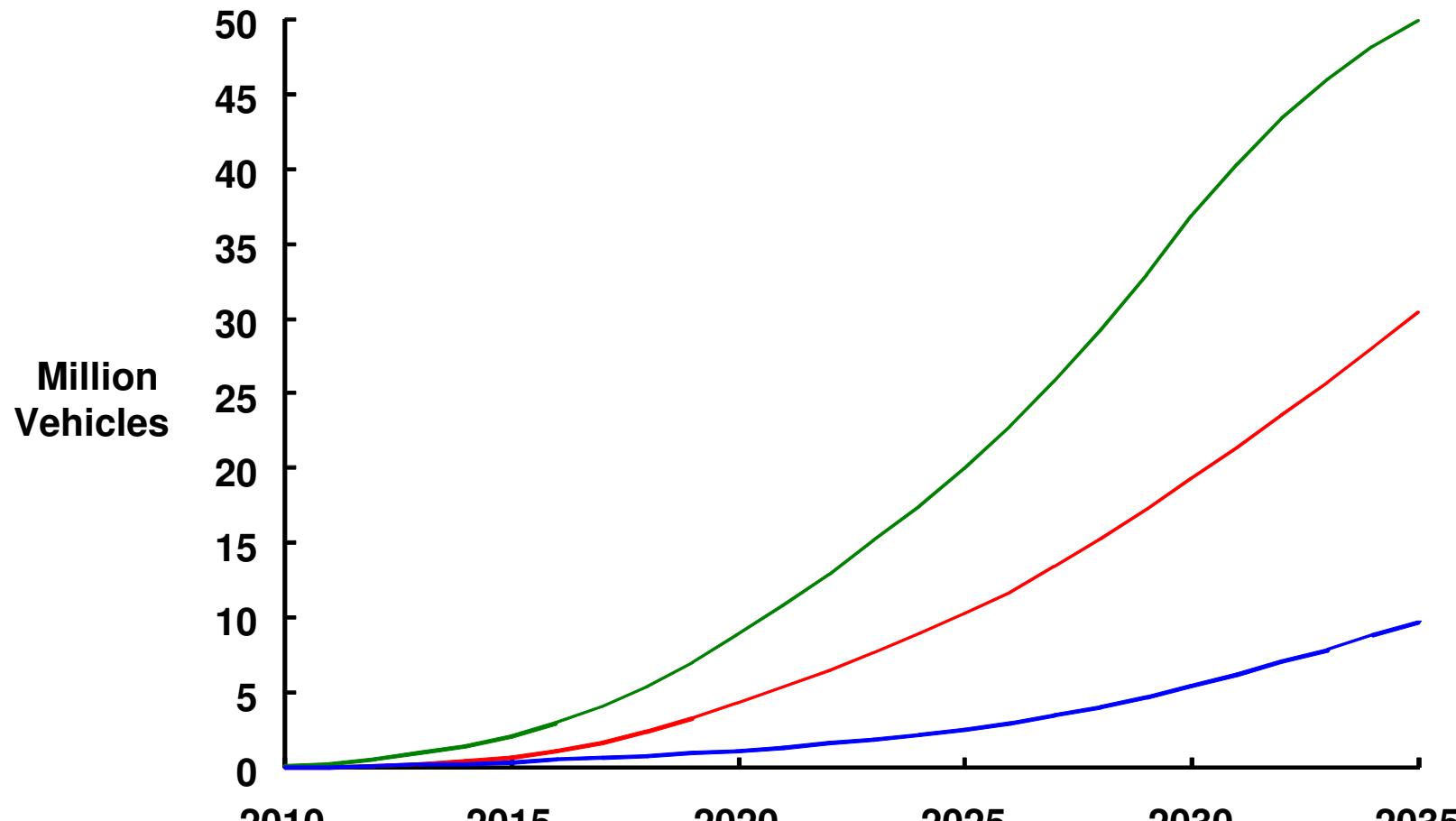
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Electric Vehicles Sold Each Year in the United States, Three Scenarios



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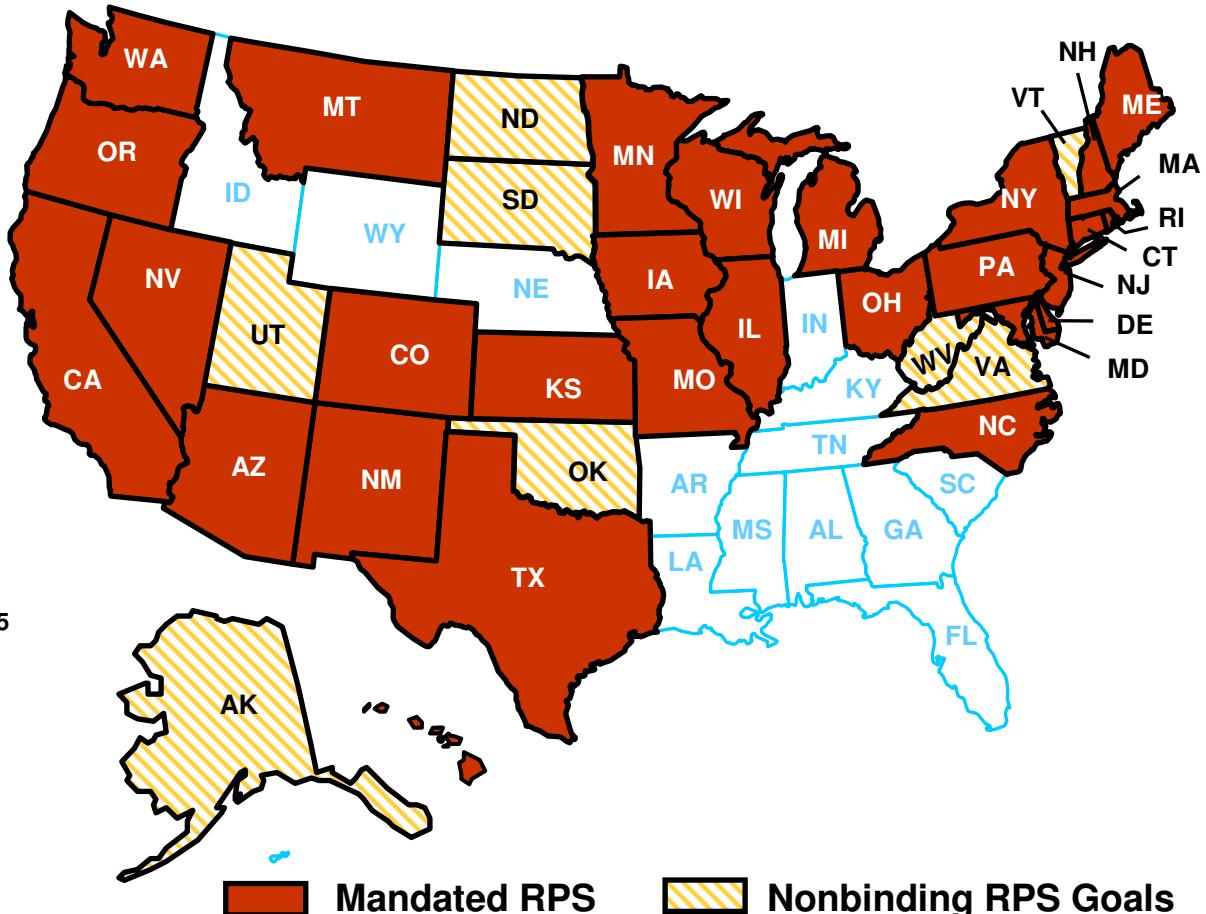
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State Renewable Portfolio Standards: Status and Targets

AK:	50% by 2025	ND:	10% by 2015
AZ:	15% by 2025	NH: ⁴	16.3% by 2025
CA: ¹	33% by 2020	NJ:	22.5% by 2021
CO:	30% by 2020	NM:	20% by 2020
CT: ²	23% by 2020	NV:	25% by 2025
DC:	20% by 2020	NY: ⁴	9.7% by 2015
DE:	20% by 2019	OH: ²	12.5% by 2024
HI:	20% by 2020	OK:	15% by 2015
IA:	105 MW by 1999	OR:	25% by 2025
IL:	25% by 2025	PA: ²	8% by 2020
KS: ³	20% by 2020	RI:	16% by 2020
MA: ⁴	25% by 2030	SD:	10% by 2015
MD:	20% by 2022	TX:	5.9/10 GW by 2015/2025
ME: ⁴	10% by 2017	UT:	20% by 2025
MI:	10% by 2015	VA:	12% by 2022
MN: ⁵	30% by 2020	VT: ⁶	20% by 2017
MO:	15% by 2021	WA:	15% by 2020
MT:	15% by 2015	WI:	10% by 2015
NC:	12.5% by 2021	WV: ⁷	25% by 2025



Sources: IHS CERA, Database of State Incentives for Renewable Energy (DSIRE)

1. In September 2009 the governor signed an executive order to increase the RPS to 33 percent by 2020 (from 20 percent by 2010), and in September 2010 the California Air Resources Board adopted implementing regulations. Though in effect, the 33 percent RPS is not backed by state legislation and faces potential challenges.

2. Excludes tiers or classes specifically targeting nonrenewable resources.

3. Target based on peak demand.

4. Target for new renewable resources in states that have a separate target for new versus existing renewable resources.

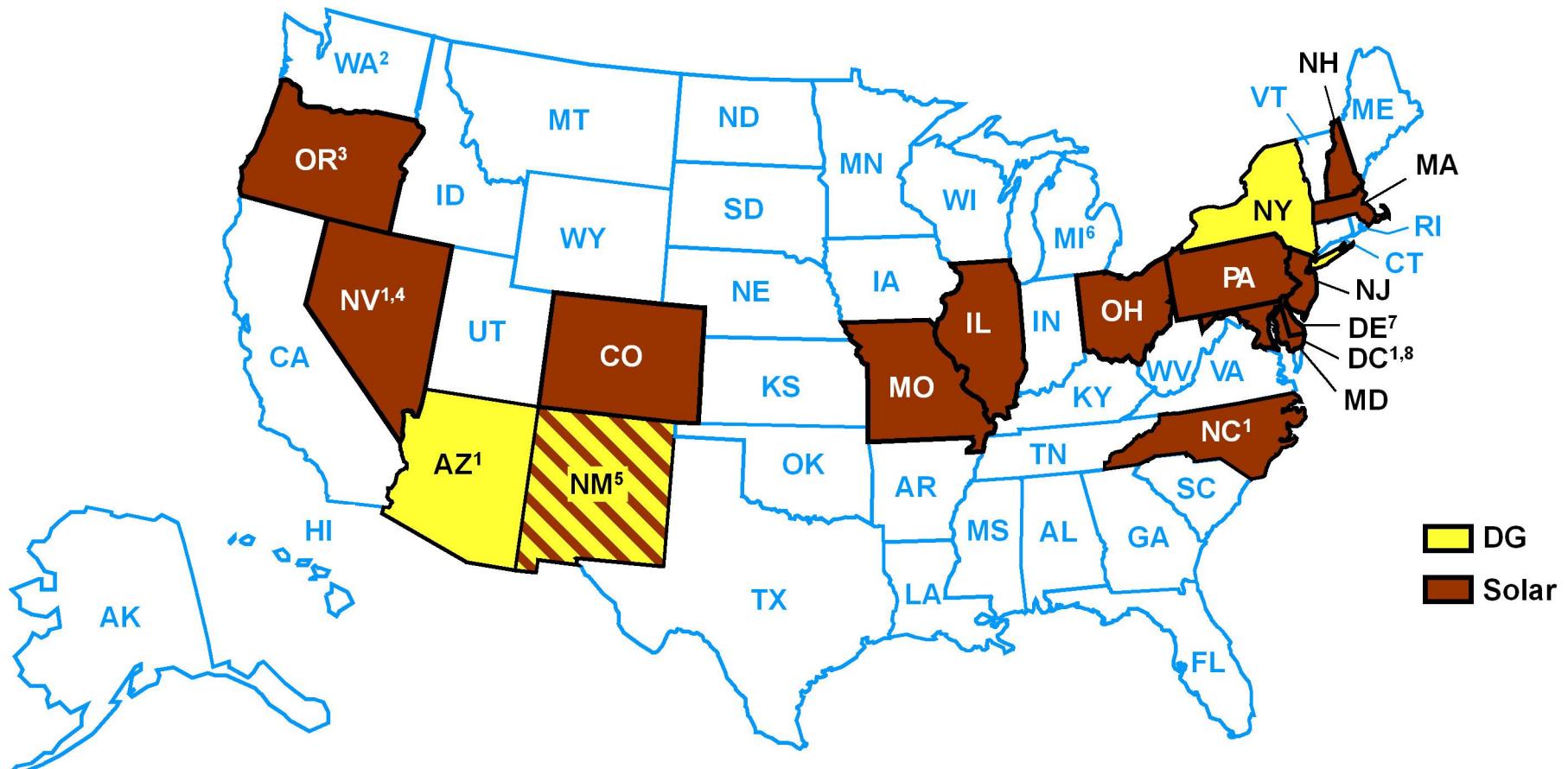
5. Target for Xcel only; non-Xcel utilities must meet 25 percent target by 2025.

6. Becomes mandatory in 2013 if it is not met by 2012.

7. Alternative and Renewable Portfolio Standard (eligible technologies include non-renewable resources; no minimum target for renewable energy)

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States with RPS Set-aside and Credit Multiplier Provisions



Sources: IHS CERA and Database of State Incentives for Renewable Energy.

1. Solar thermal heating is an eligible technology in Arizona, Nevada, North Carolina, and Washington, DC.
2. In Washington a 2x credit multiplier is applied to DG.
3. In Oregon a 2x credit multiplier is applied to PV.
4. In Nevada a 2.4–2.5x credit multiplier is applied to PV.
5. New Mexico has both solar and DG set-aside requirements.
6. In Michigan a 3x credit multiplier is applied to solar.
7. In Delaware a 1.25x multiplier is applied to in-state solar and a 3x multiplier is applied to coop and muni solar.
8. In Washington, DC, a 1.1x multiplier is applied to solar.

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US Solar PV Outlook: Technology Advances and Policy Support Brighten the Horizon

- The US PV market is on a robust growth track driven by
 - Dramatic cost declines and anticipated future cost reductions. In the past year module prices have fallen 50 percent.
 - Stable financial incentives. The federal investment tax credit (ITC) is guaranteed through 2016.
 - State renewable portfolio standards (RPS). In addition to California's aggressive RPS, PV demand is supported by 17 states with solar and distributed generation RPS set-asides.
- IHS CERA expects 6,000 MW of new PV capacity additions through 2015 (approximately 5 percent of all new capacity additions).
- Approximately 75 percent of additions are expected in the West, mainly in California.



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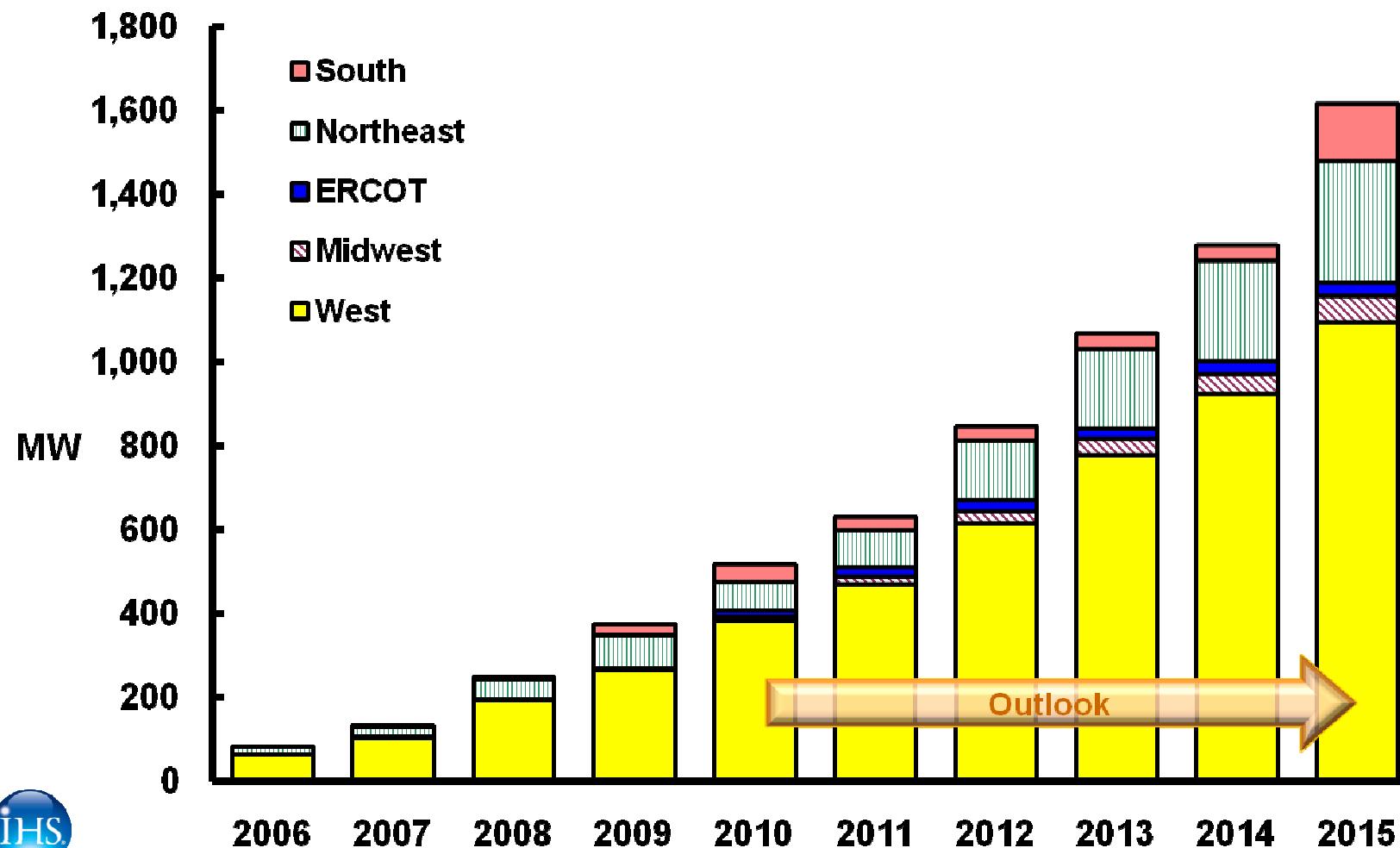
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US Annual Solar PV Capacity Additions

6,000 MW in 2010–15



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What Will the Future Bring?

- **Many technology-driven innovations are changing the power sector – smart grid, electric vehicles, renewable power, etc**
- **But, distribution utilities are highly regulated, so policies and politics matter**
- **And, power is a capital intensive business: the sector's most significant strategic challenge this decade may be how to invest in new technologies without pricing its customers out of the electricity market**



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