

Draft 6th Plan Conservation Potential Update

Power Committee

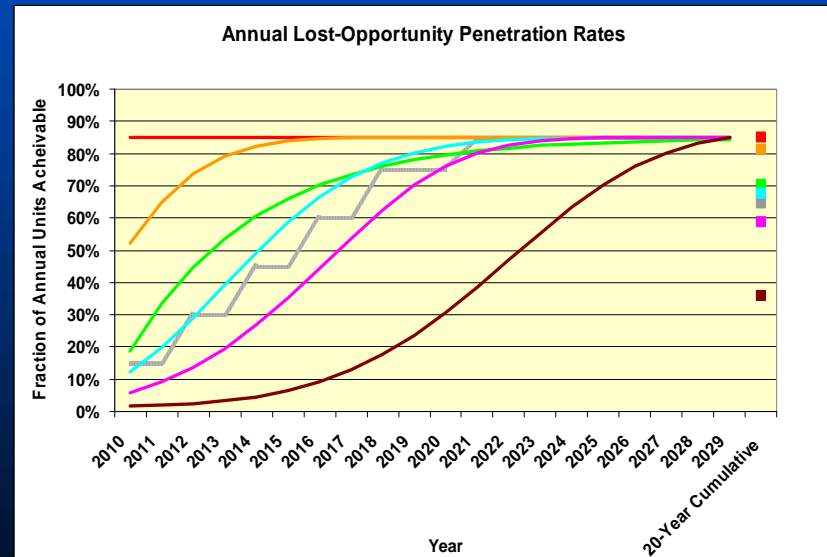
April 14, 2009

Today: TVs & Ramp Rates

■ Updated Potential Assessment



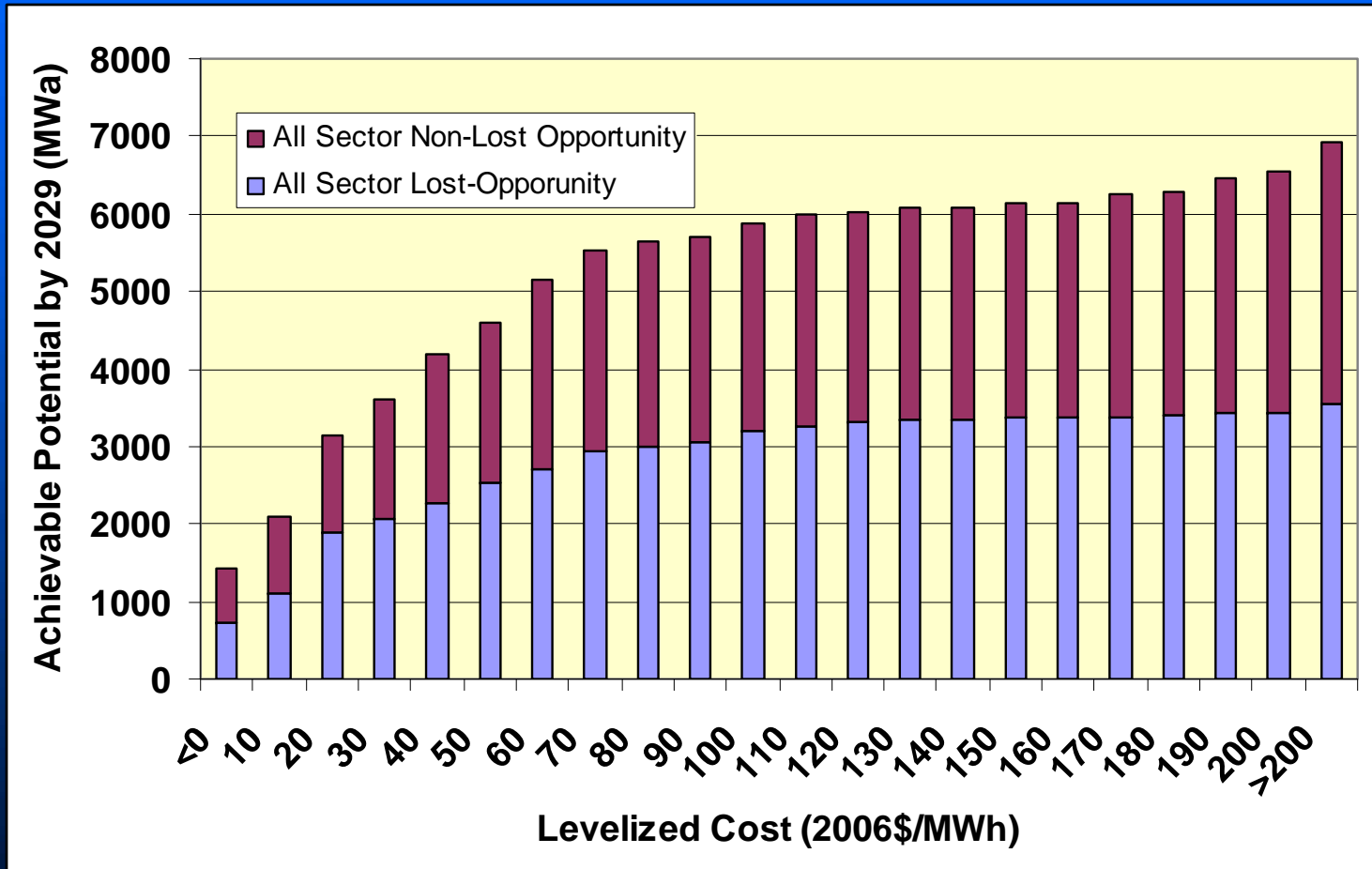
■ Penetration Rate Assumptions



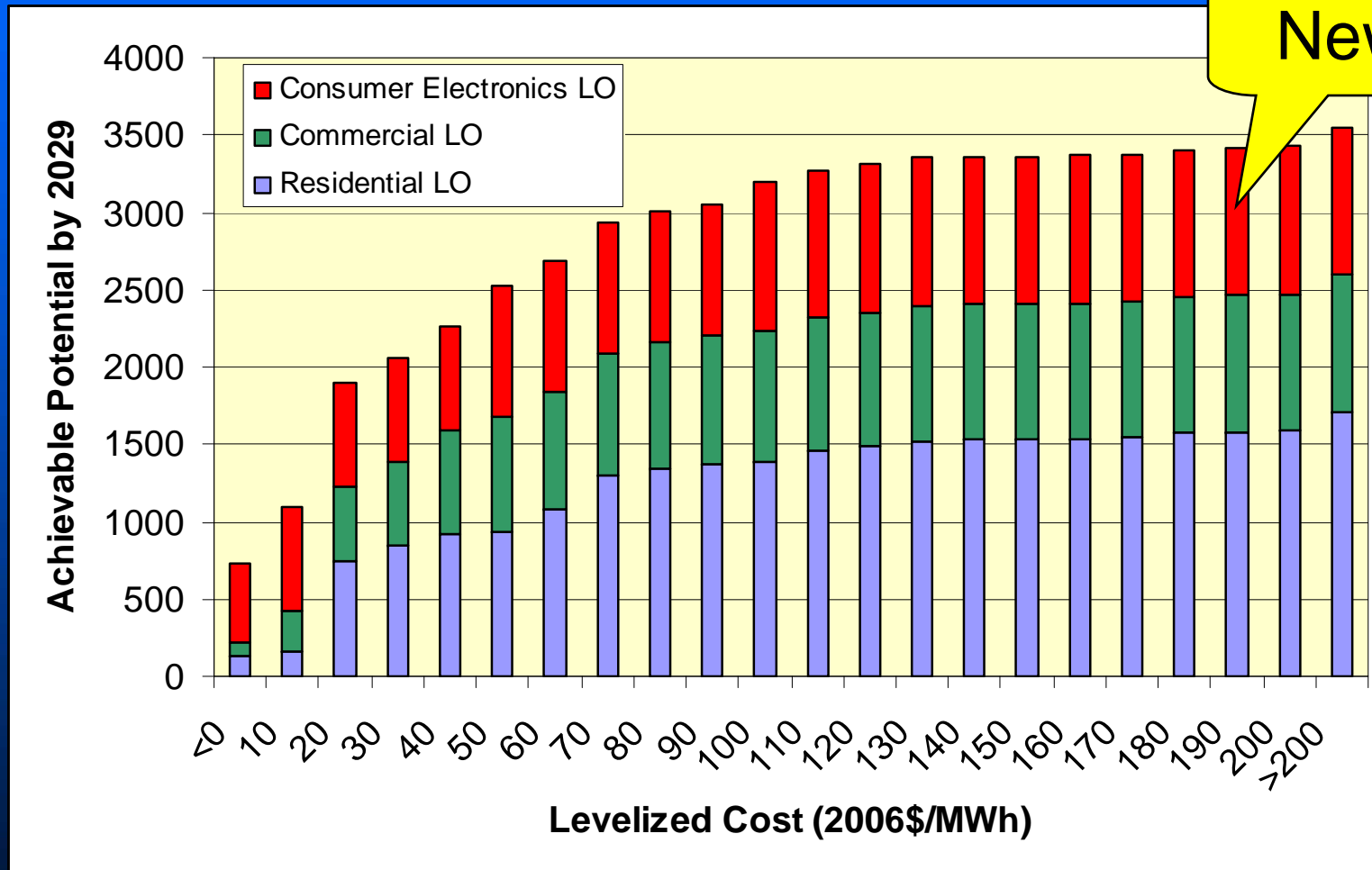
Updated Assessment

- We found more
 - Consumer Electronics: Add About 950 MWa
 - » TVs, Monitors, Computers, Set-top Boxes
 - » Mostly low-cost
- Minor Adjustments
 - Industrial: No net change
 - » Revised forecast & savings adjustments
 - Commercial: Minus about 100 MWa
 - » Revised forecast & savings adjustments

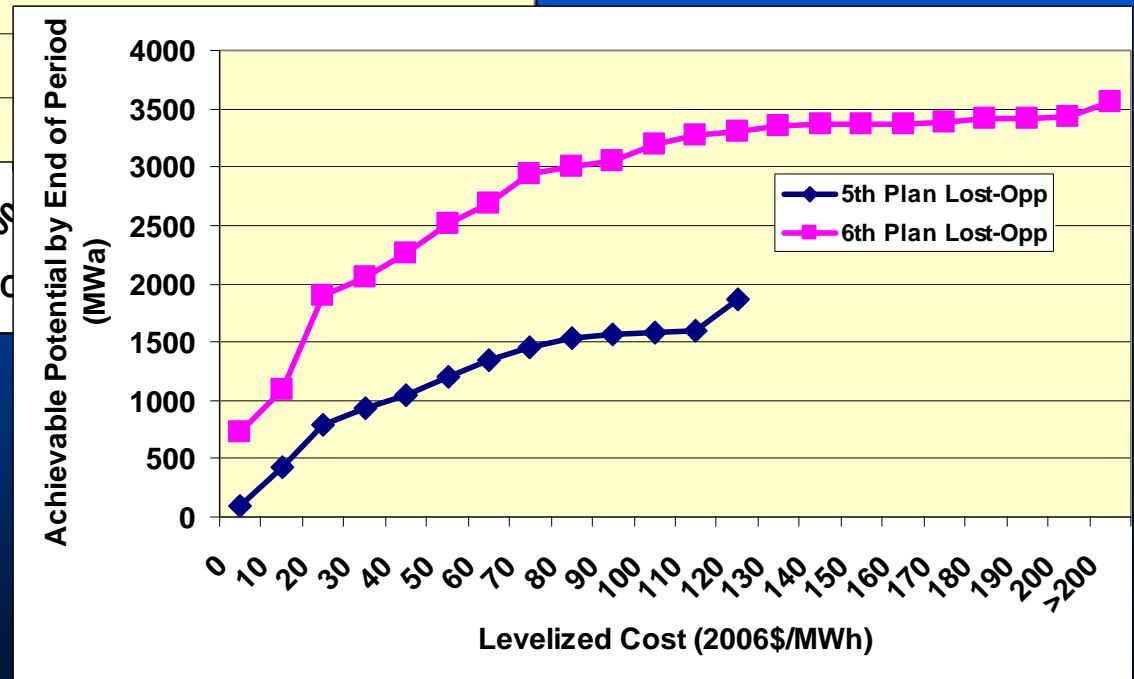
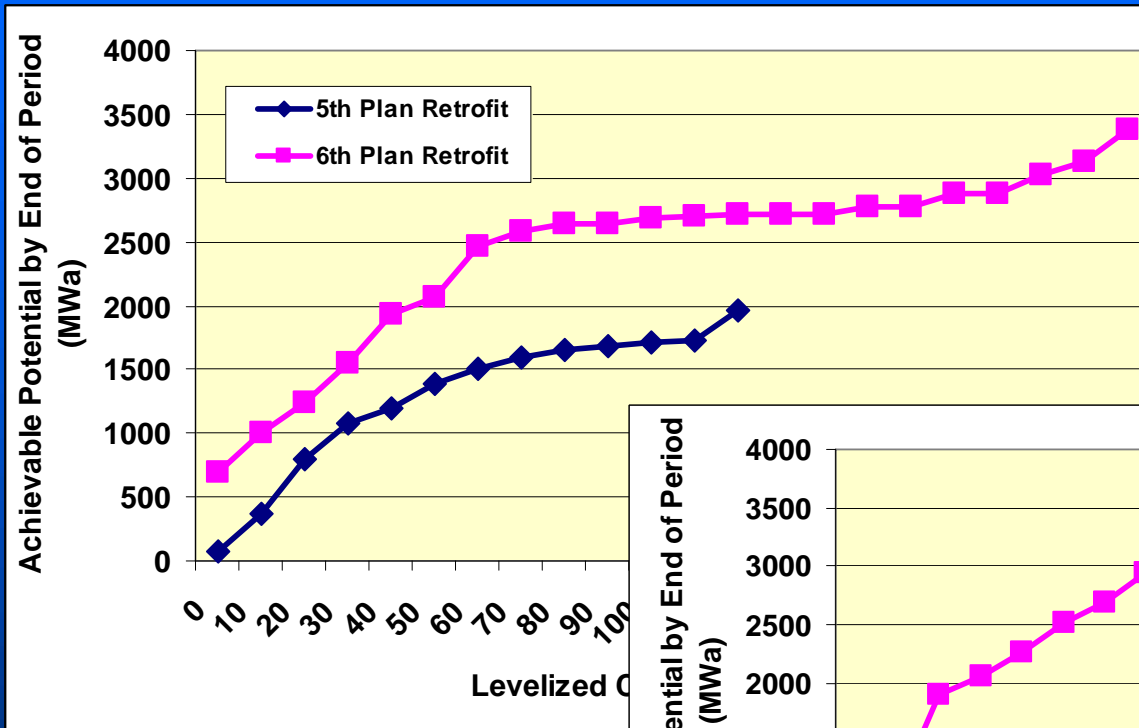
Updated Achievable Potential



Lost-Opportunity Potential



Compared to 5th Plan



Where's the Difference?

MWa Achievable End of Period and <\$120/MWh	5th Plan	6th Plan
Consumer Electronics	155	954
Industrial	350	796
Distribution Efficiency	0	421
Residential	2119	2427
Commercial	1183	1320
Agriculture	93	103
Total	3902	6021

Ramp Rates

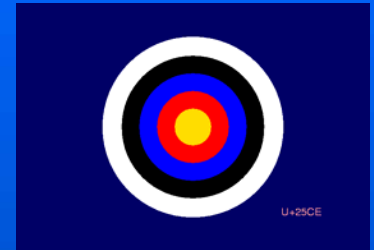
Lots of Conservation is Available
But How Fast Can We Build It?

Why Achievable Penetration Rates Matter



PORTFOLIO MODEL

Practical Limit on Deployment
Impacts Timing of Generation
Key for System Cost & Risk
“Similarly Available and Reliable”

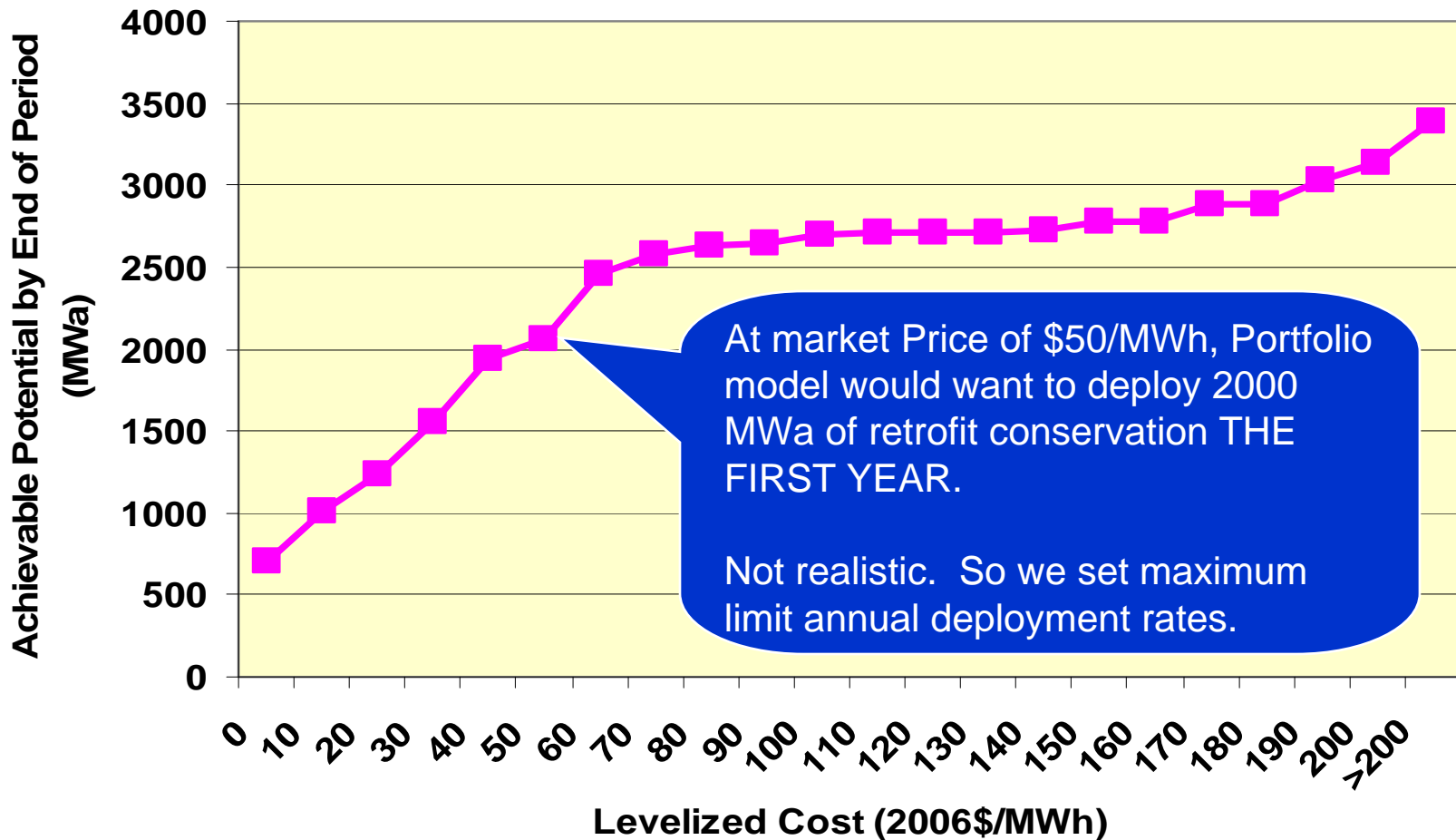


CONSERVATION TARGETS

Impacts Near-Term Targets
Keen BPA & Utility Interest
Accountability
Budgets

Here's the Policy Issue

Draft 6th Plan Supply Curve for Retrofit Conservation
(Non-Lost Opportunity Conservation)



Long-Term Short-Term

- Long-Term Achievability
 - Recognizes Can't Get it All
 - Retain 85% Max Penetration for 6th Plan
 - Some Less
 - » (HPWH, Solar PV, Daylight, Occupancy Sensor)
- Near-Term Achievability Penetration
 - Acts as Practical Limit on Deployment
 - Set Annual Penetration Rates – Ramp Rates

Developing 6th Plan Achievable Penetration Rates for Near-Term Achievability



Historic Perspective

- Program Performance
- Pace of Codes & Standards
- Periodic Survey of Current Stock

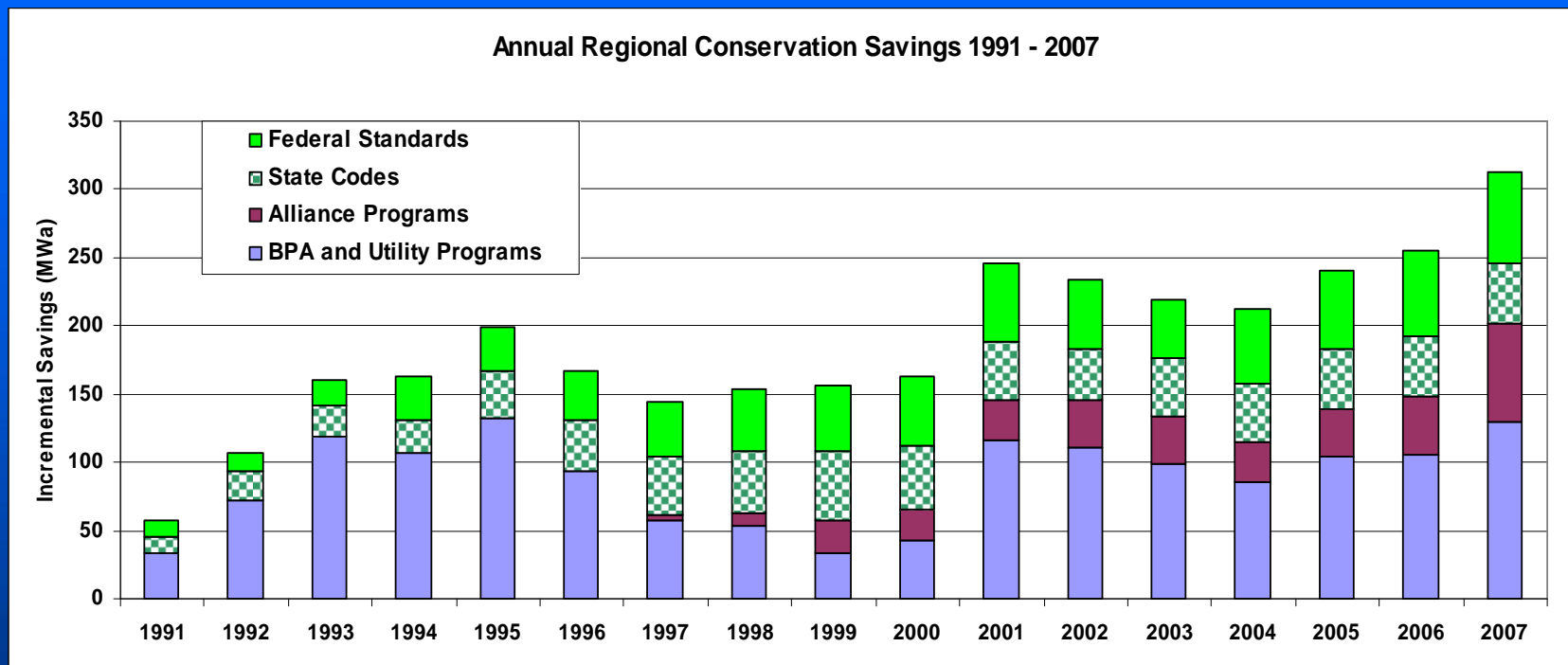
Forward Looking

- Considers Character of Measures
- Implementation Strategies
- Size & Cost
- Physical Availability of Equipment
- Training & Education Requirements

How We Estimate Annual Deployment Limits

- Build-Out Limitations
 - Delivery Mechanisms
 - Decision Makers
 - Current Market Saturation
 - Equipment & Infrastructure Availability
 - Subject to Code or Standard
 - Size & Cost
 - Complexity of Measures
- Measure Bundles Have Unique Limitations

Historic Perspective



BPA, Utility & NEEA Programs

- Averaged 150 MWa per year since 2001
- Over 200 MWa in 2007
- Probably >200 MWa in 2008
- At \$40-50 /MWh Avoided Costs

Codes & Standards

- One third of Savings since 1991
- Large Long-Term Potential
- Near-Term Impact Limited by New Stock Additions & Turnover Rates

Forward-Looking

Use a Bottom-Up Approach to Estimate Penetration Rates

- Estimate Annual Penetration Rates by Measure Bundle
- Distinguish Features that Impact Penetration Rate
 - Complexity of Measures
 - Delivery Mechanisms & Decision Makers
 - Current Market Saturation
 - Equipment & Infrastructure Availability
 - Subject to Code or Standard
 - Size & Cost
- $(\text{Annual Penetration Rate}) \times (\text{Annual Units}) \times (\text{Unit Savings})$
- Then Sum of All Measure-Level Supply Curves by Year & Levelized Cost bin

Penetration Rate “Families”



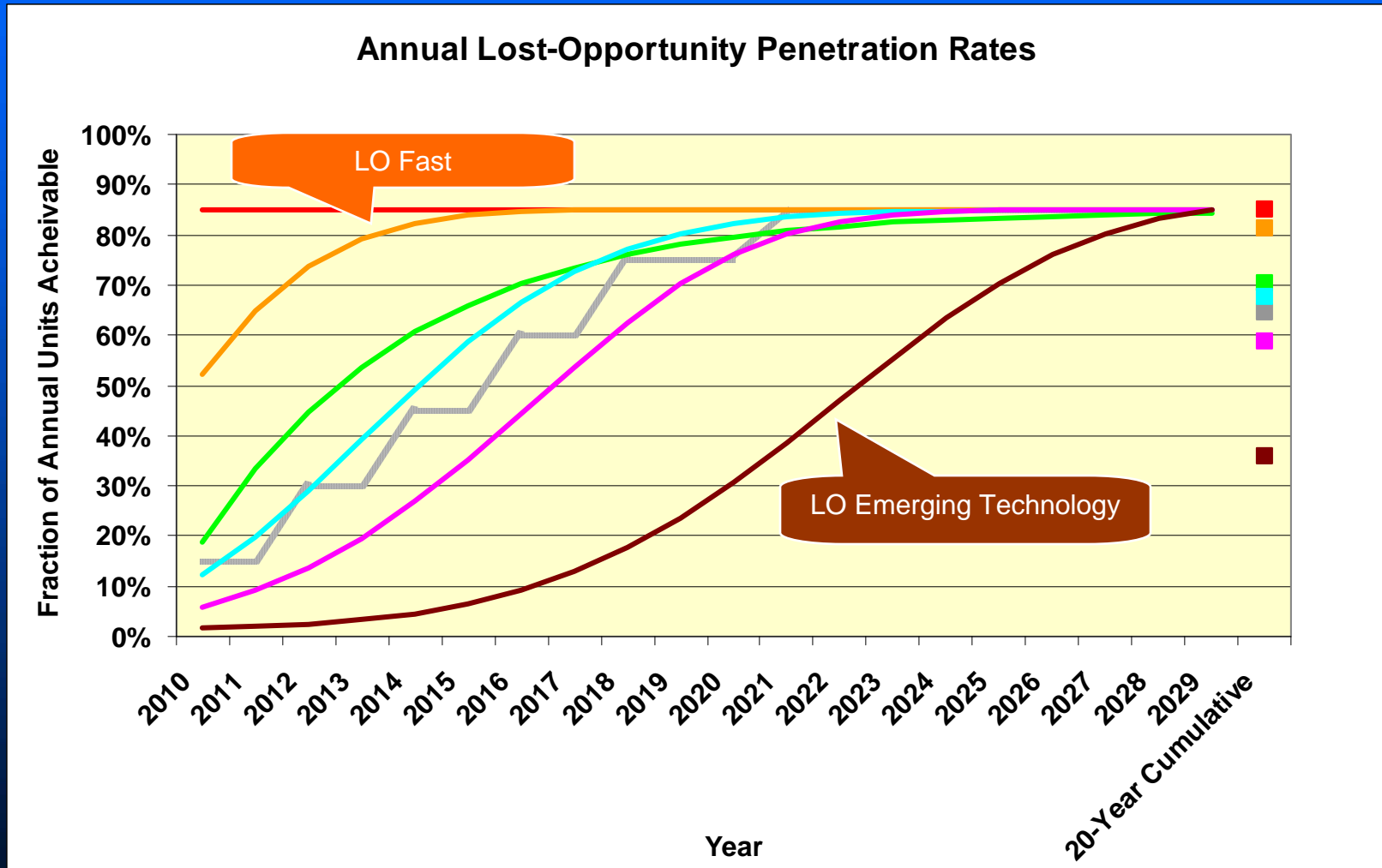
■ Lost-Opportunity

- Emerging Technology
- LO Slow
- LO Medium
- LO Fast

■ Retrofit (Non-Lost Opportunity)

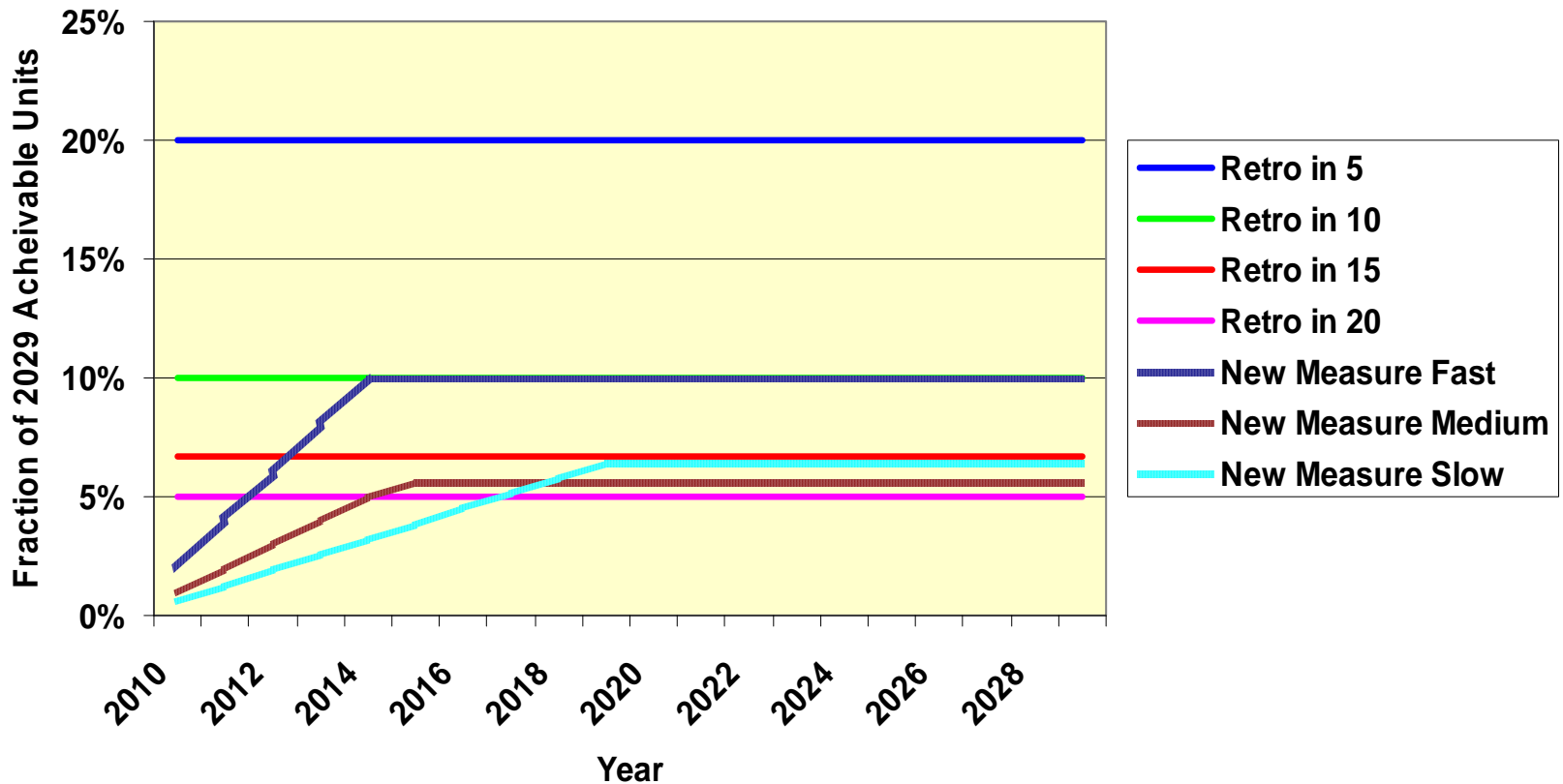
- New Measure Slow
- New Measure Medium
- New Measure Fast
- In 20 Years
- In 10 Years
- In 5 Years

Example Family of Lost-Opportunity Penetration Rates



Example Family of Retrofit Penetration Rates

Annual Retrofit Penetration Rates



Residential Lost-Opportunity Achievable Penetration Rate Examples



LO Slow

- Refrigerators
- Freezers
- Cooking
- Heat Pump Upgrades
- Elec Furnace to HP Conversions

About 540 MWa by 2029

LO Medium

- Clothes Washer
- Dishwasher
- Clothes Dryer
- Shell & Window Measures
- Window AC Units

About 340 MWa by 2029

LO Emerging Technology

- TV, Monitors & Computers
- Heat Pump Water Heater
- Gravity Film Heat Exchanger

About 1450 MWa by 2029

Residential Retrofit

Achievable Penetration Rate Examples



Retro in 5 Years

- Showerheads
- Lighting

About 240 MWa by 2029

Retro in 15 Years

- Weatherization
- HVAC Conversions

About 750 MWa by 2029

New Measure Ramp-Up

- Solar DHW
- Solar PV

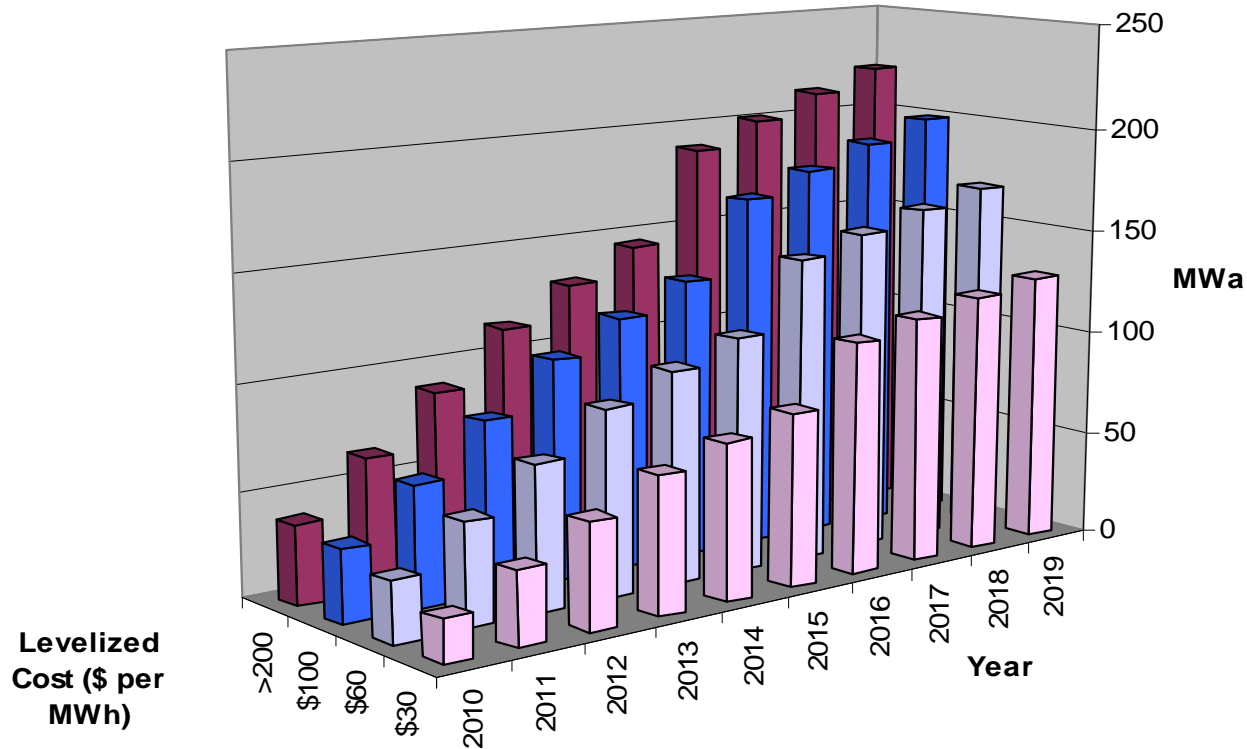
About 610 MWa by 2029

Roll Up Max Rates for All Measures

- About 200 “Bundles” of Measures
- By Cost & By Year
- Lost-Opportunity & Retrofit Separated



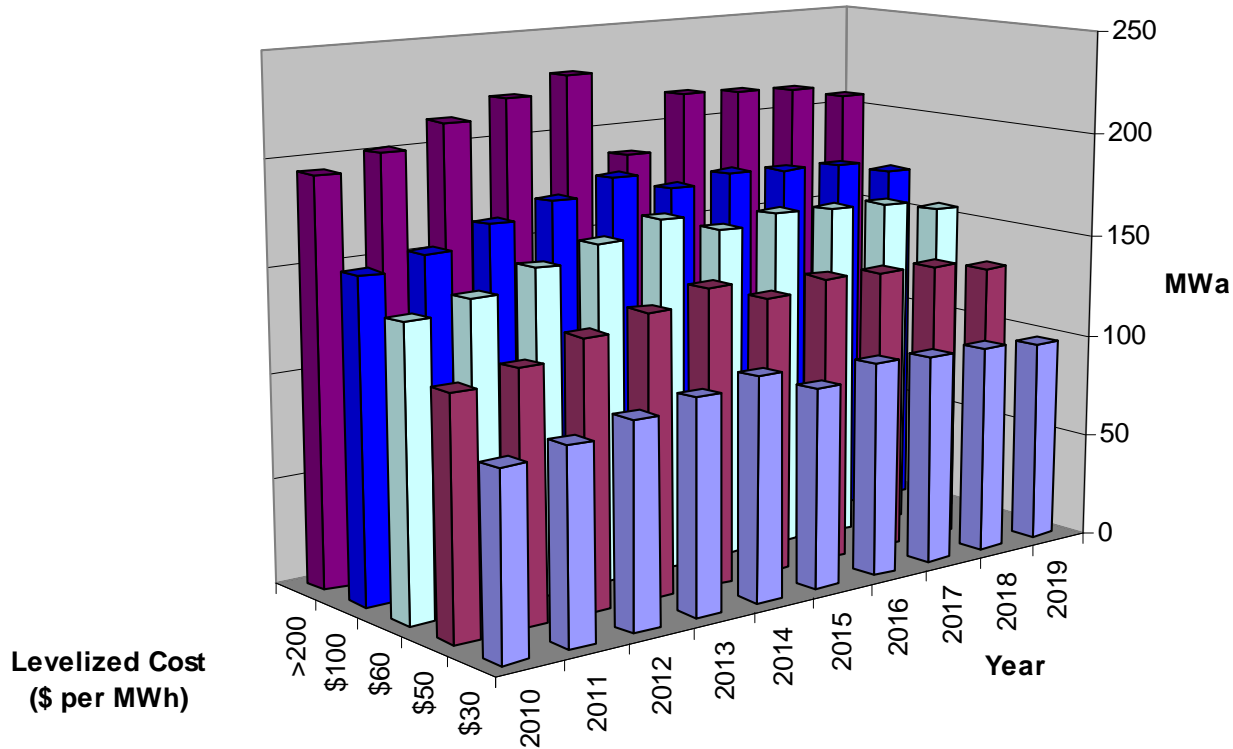
Lost-Opportunity



About 15% to 85% in 10 years

Similar to 5th Plan Rates – But Higher MWa

Retrofit



Relatively flat over time

Comparative Max Rates

6 th PLAN	2010	2014	2019
Lost-Opportunity @ \$100/MWh	35	120	200
Retrofit @ \$60/MWh	140	160	160
Total	175	280	360

5 th PLAN	2005	2009	2014
Lost-Opportunity @ \$100/MWh	15	40	85
Retrofit @ \$60/MWh	120	120	120
Total	135	160	205

Reality Check



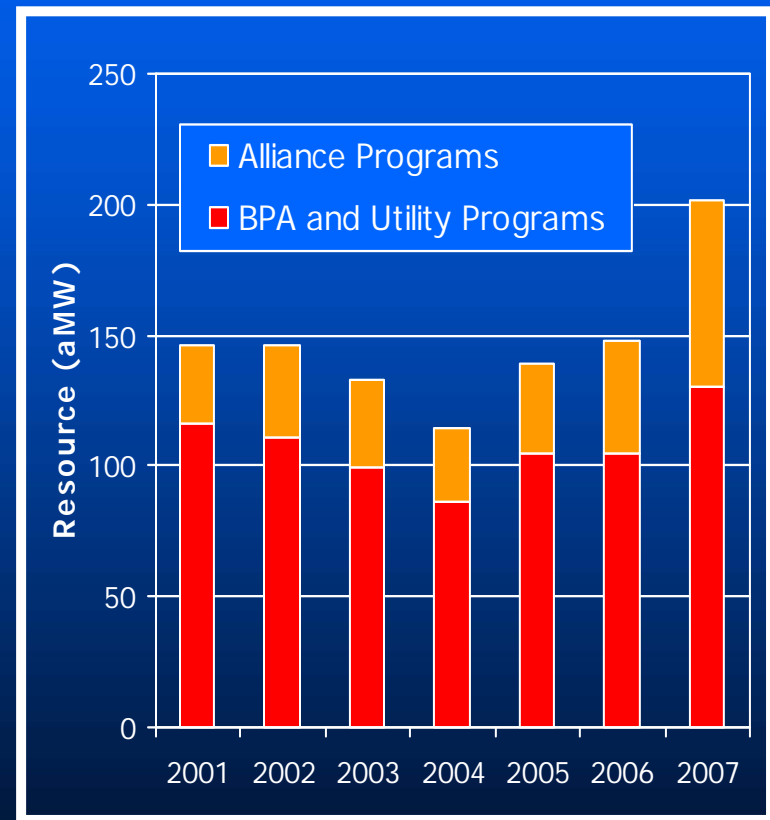
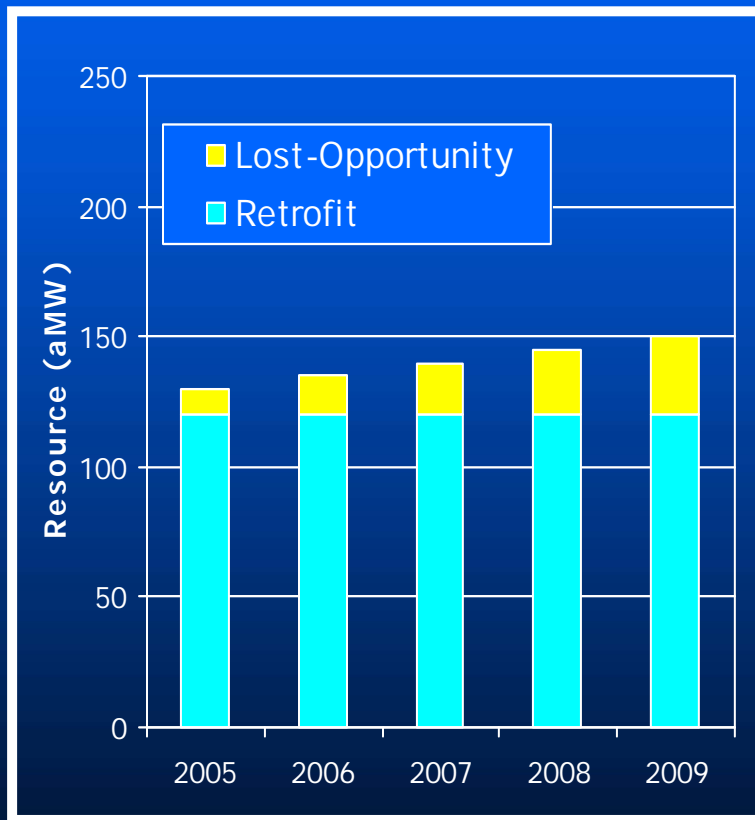
Reality Check

- Achieved over 200 MWa in 2007
- Expect over 200 MWa in 2008
 - Most programs exceed 2007 & NEEA too
 - Of the 200 MWa about 70 MWa was CFLs
 - » But CFL savings not in 6th Plan targets
- Many New Measures
- Higher Avoided Costs
- Federal Standards Push
- State Code Revisions in the Works

5th Plan Targets Seemed Daunting

5th Plan Targets
(130 to 150 MWa)

Historic Performance



Part 2:

Ramp Rate Sensitivity Testing

- Purpose:
 - What is the Value of Going Faster?
 - What is the Cost of Going Slower?
 - What are the Resource Consequences?
 - What are the Revenue Requirements?
- Tool: Portfolio Model
 - Test Slow & Fast Achievable Penetration
- Issue: What Ranges?

Ramp Rate Sensitivity Testing Staff Proposal

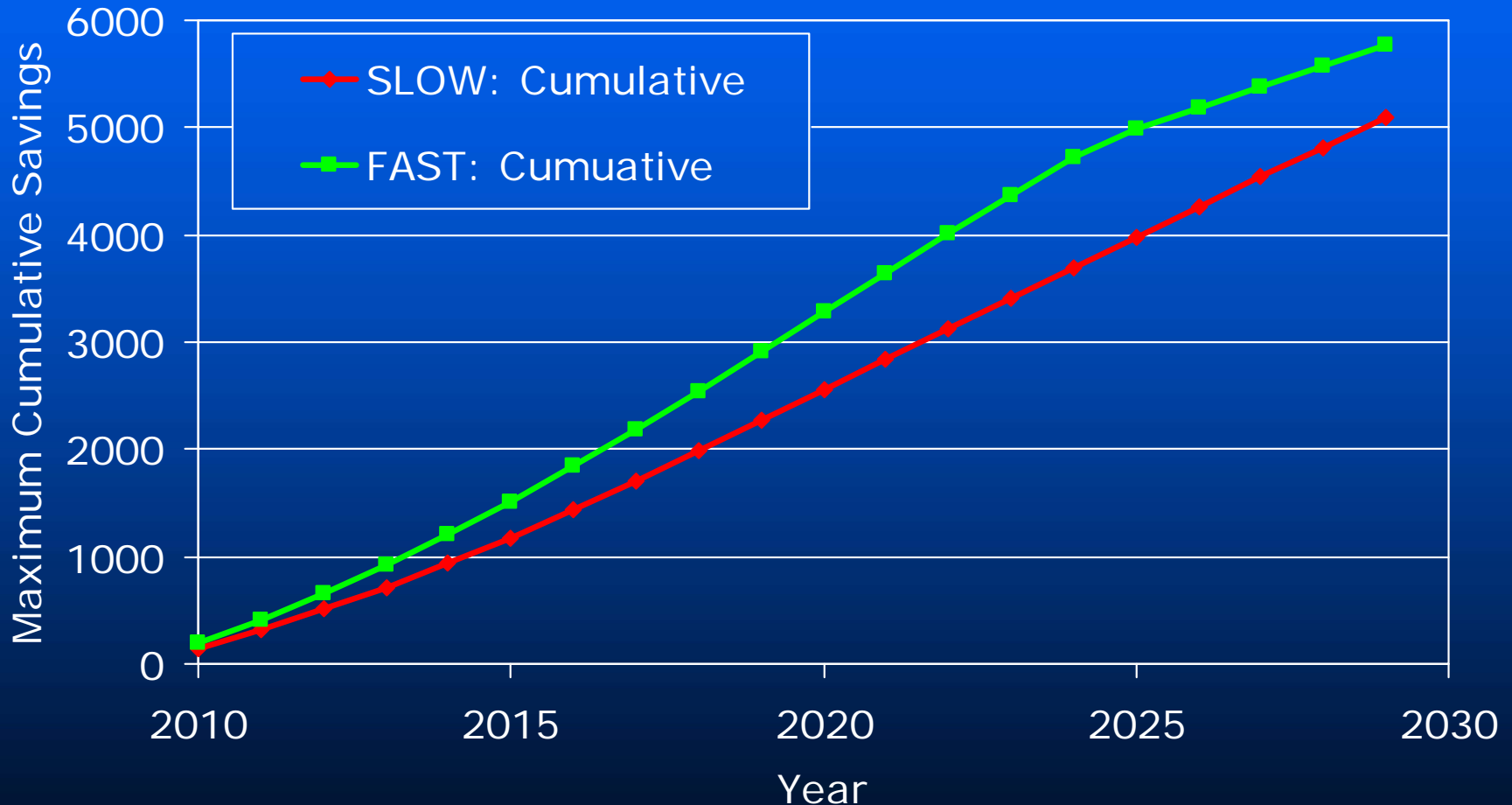
- Lost-Opportunity
 - *SLOW*: Up to \$60 / MWh levelized cost
 - *FAST*: Up to \$120 / MWh levelized cost
- Non-Lost-Opportunity
 - *SLOW*: 5th Plan Rate
 - *FAST*: Washington I-937 rate
 - » All Cost-Effective in 10 years – evenly paced

Test Slow & Fast Deployment Rates

Proposed Annual Maximum Limits on Deployment in MWa

	2010	2014	2019
Lost-Opportunity SLOW Up to \$60/MWh	29	100	168
Lost-Opportunity FAST Up to \$120/MWh	36	123	206
Non-Lost Opportunity SLOW 5 th Plan Maximum	120	120	120
Non-Lost Opportunity FAST All Cost-Effective @\$60/MWh in 10 years (I-937)	160	160	160

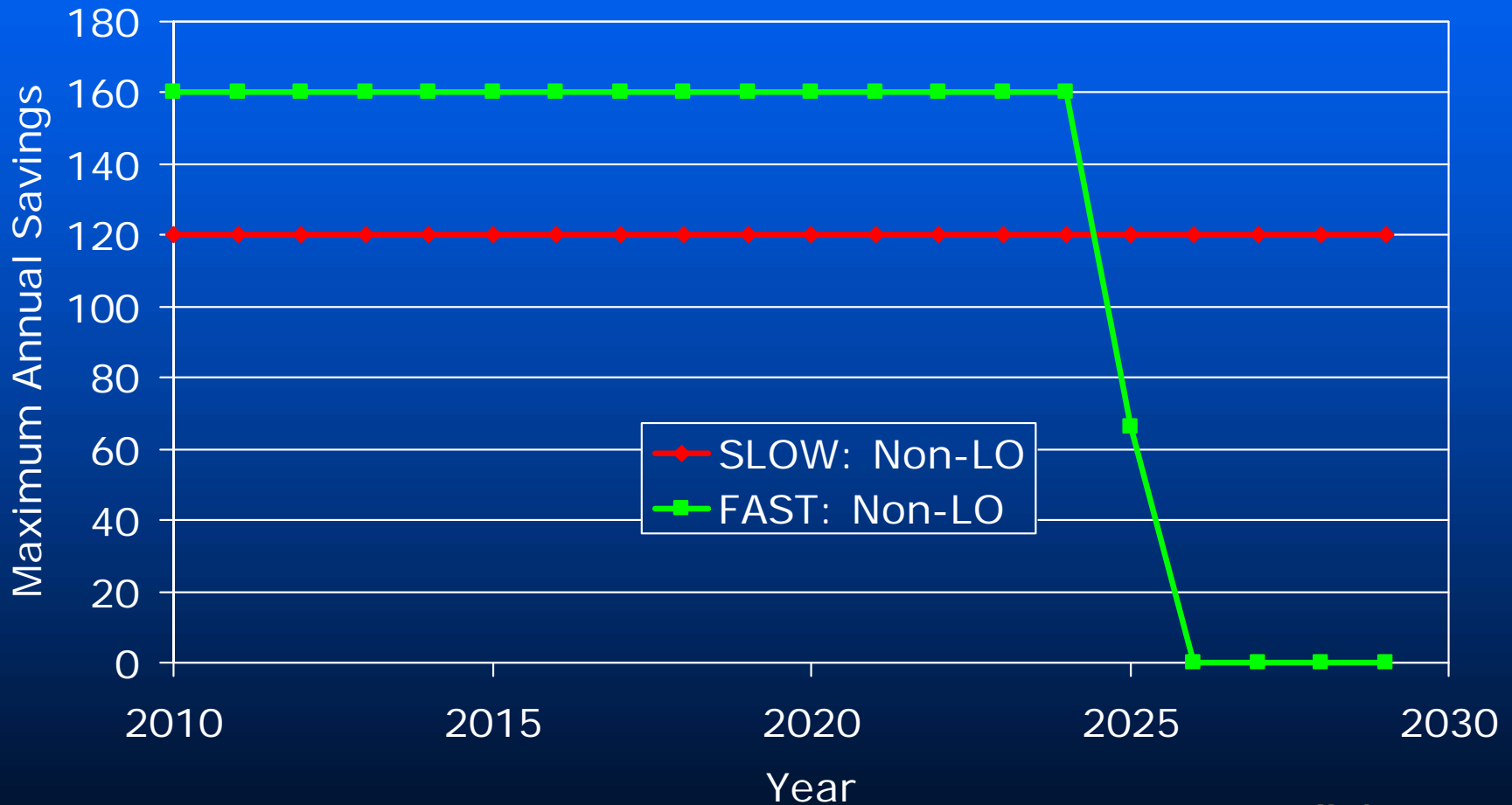
Cumulative Deployment Rate for All Resources



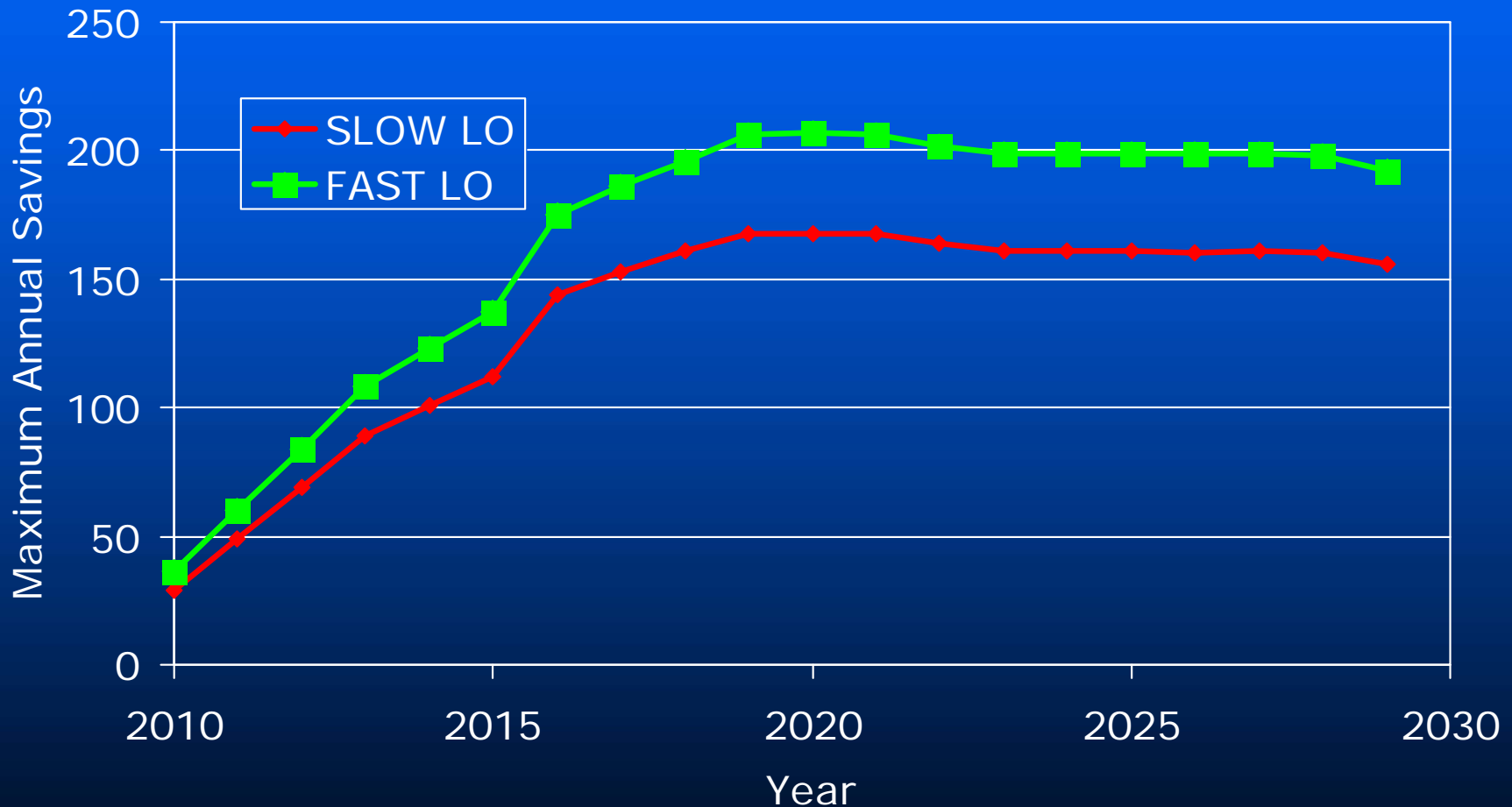
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Back Up Slides

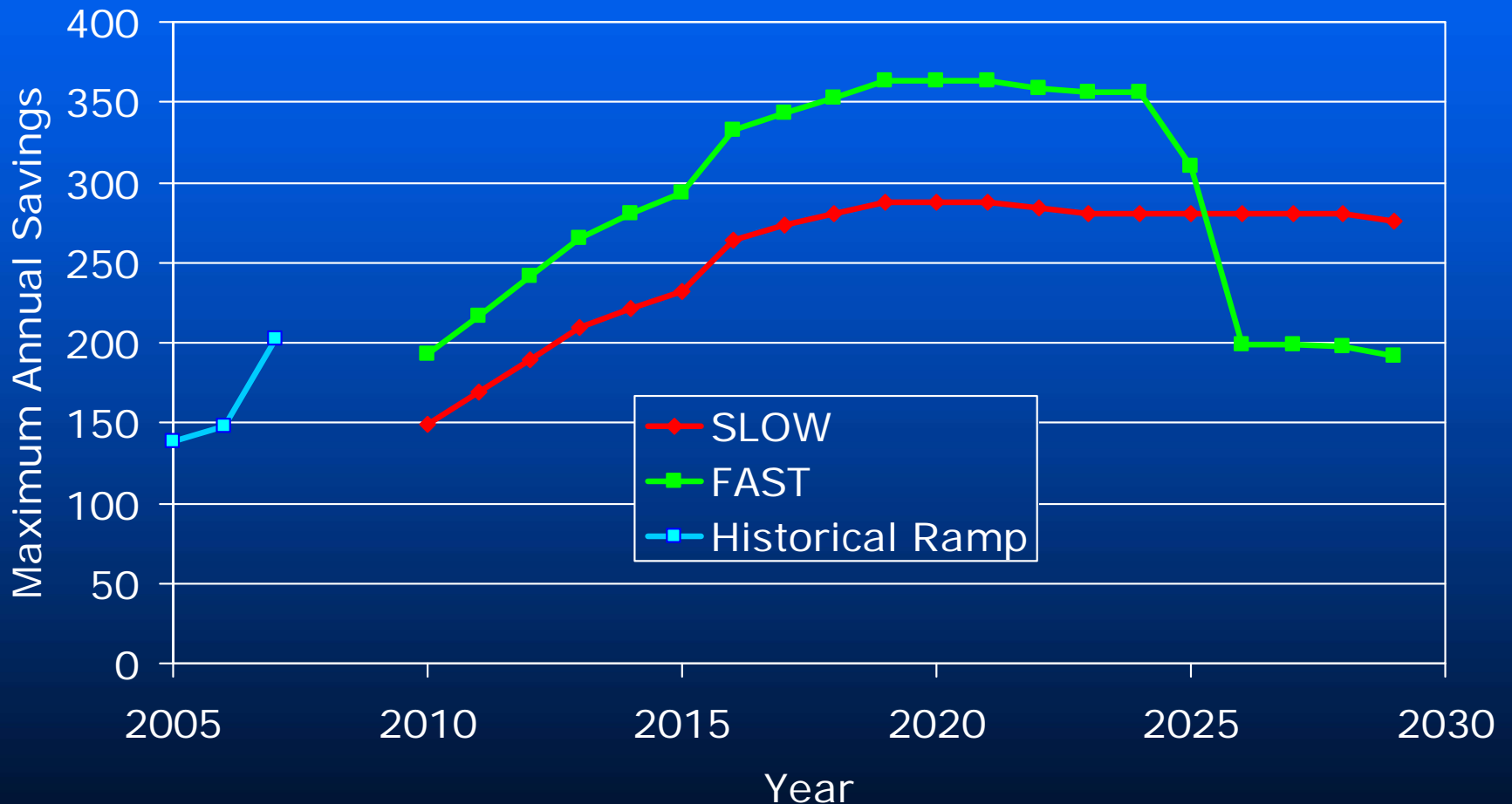
Annual Deployment Rates for Non-Lost Opportunity Resources



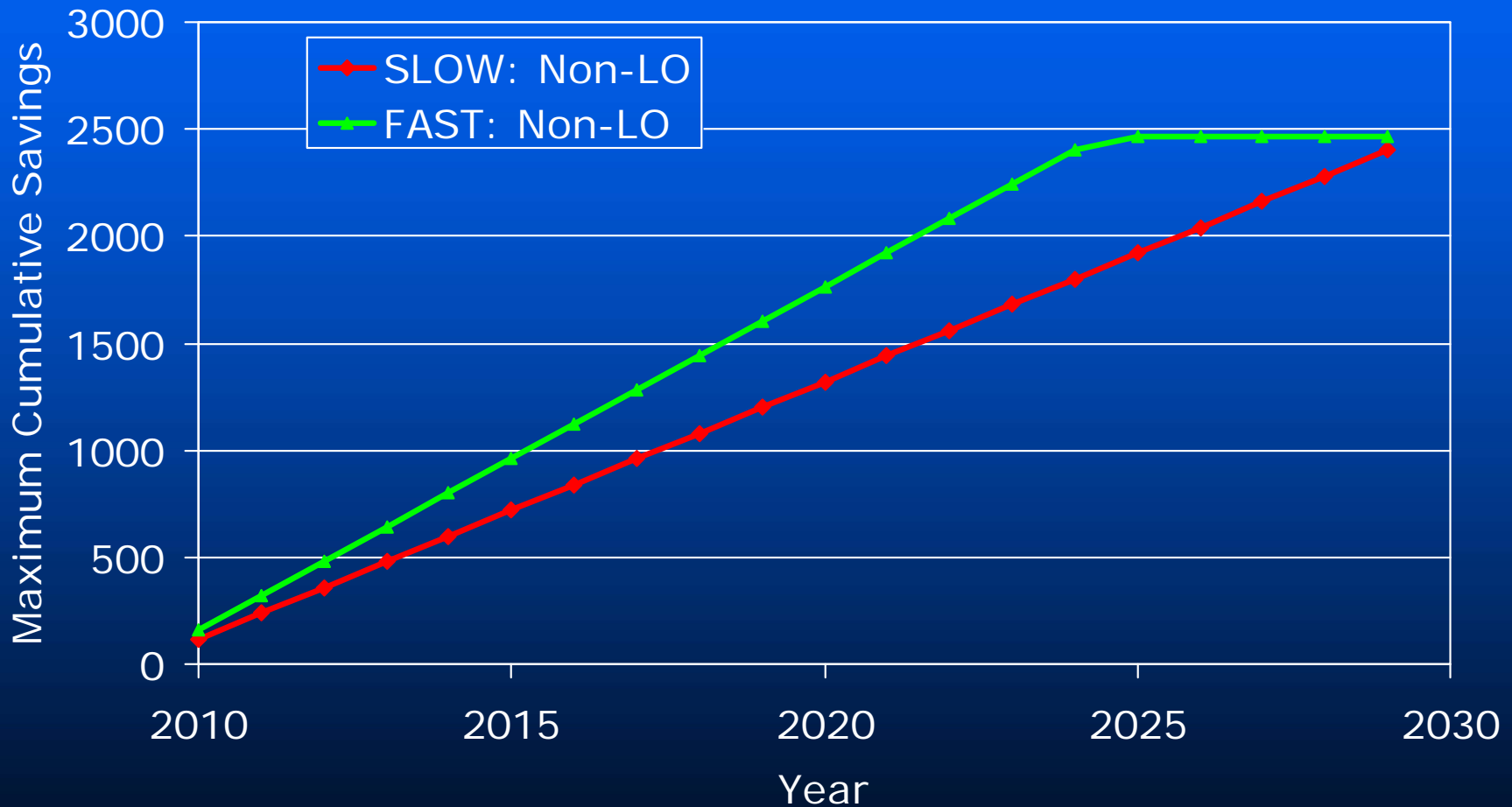
Annual Deployment Rate for Lost Opportunity Resources



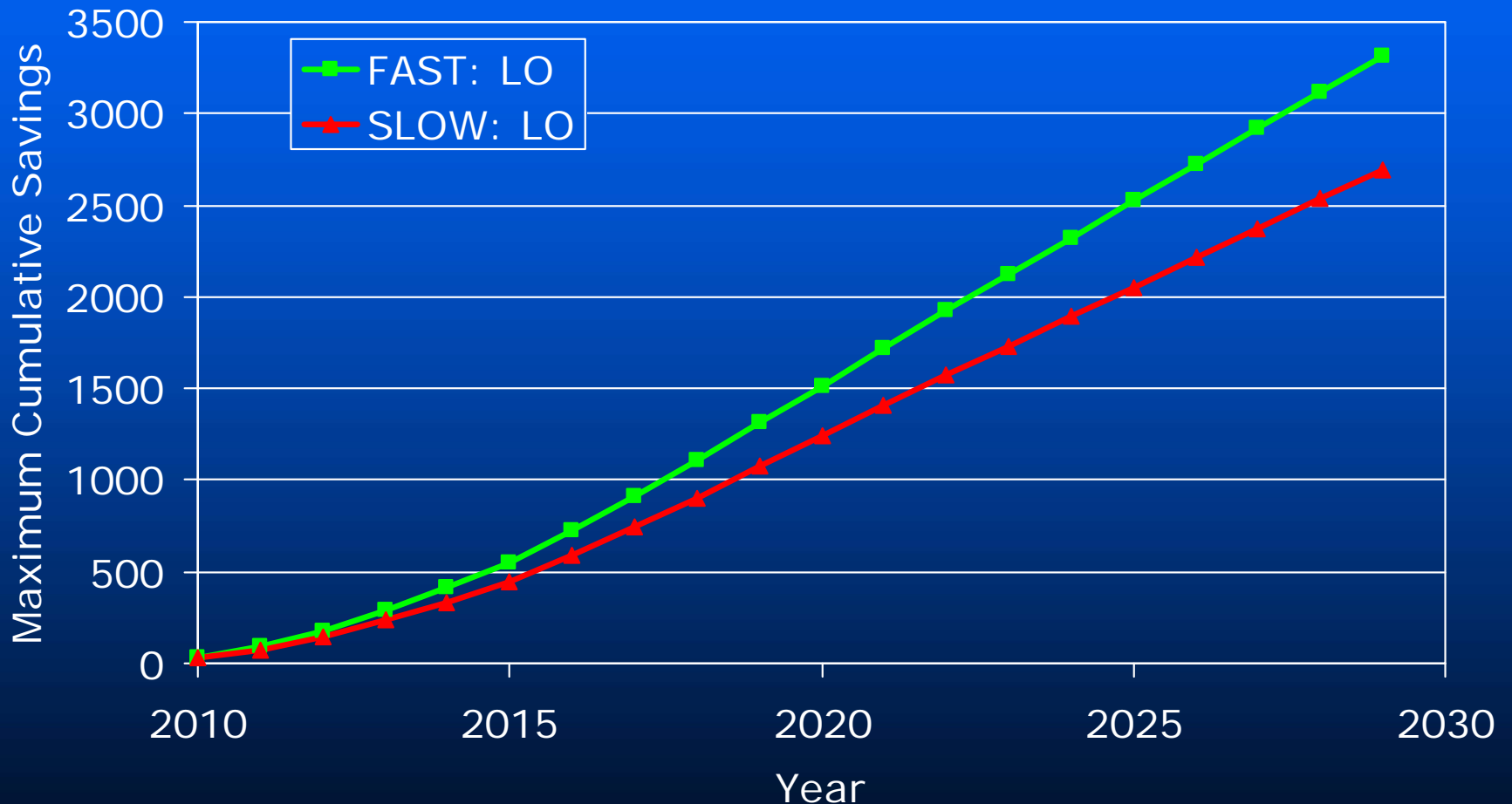
Annual Deployment Rates for All Conservation Resources



Cumulative Deployment Rate for Non-Lost Opportunity Resources



Cumulative Deployment Rate for Lost Opportunity Resources



Lost-Opportunity & Retrofit Stock Estimates

Lost-Opportunity Conservation

Incremental Cost & Savings Compared to **New Baseline**

Limited to Annual Stock or Unit Availability

New Homes, Buildings & Equipment
(Driven by Population Growth & Equip Saturation)

Replacement Systems & Equipment
(Driven by Stock Turnover Rates)

Retrofit Conservation

Incremental Cost & Savings Compared to **Retrofit Baseline**

Limited to Remaining Stock 2029

Existing Building Stock not addressed by turnover (e.g. weatherization)

Systems & Equipment with Slow Turnover Rates (e.g. windows)