NY RPS *Main Tier* Cost Study 2008/2009 Updates

October 28, 2009

NY PSC Commissioner's RPS Workshop

Bob Grace, Sustainable Energy Advantage, LLC

Carrie Gilbert, La Capra Associates, Inc.

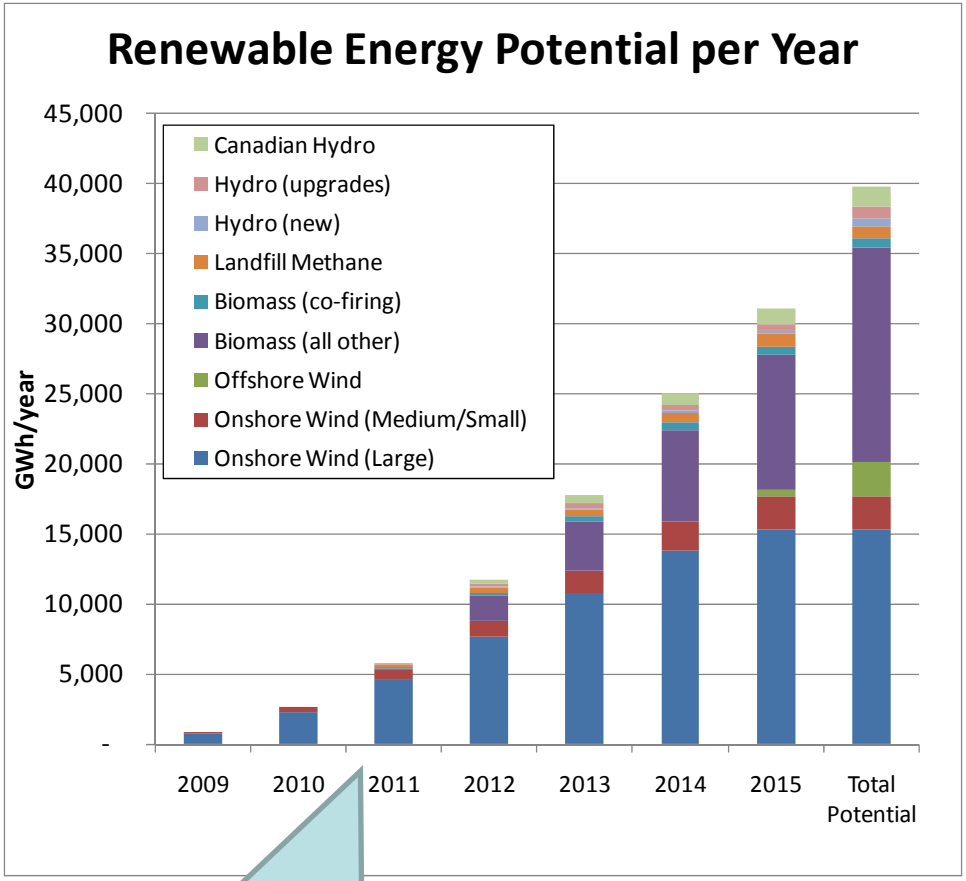
Overview

- Methodology & Key Assumptions
  - Resource Potential
  - Derivation of Annual Main Tier Procurement Target
  - Resource Cost Assumptions
  - Estimating Main Tier Cost ➔ Supply Curve
- Results
  - Main Tier Cost/MWh
  - Projected Supply Mix
  - Sensitivities & Considerations
- Key Take-Aways

Resource Potential Assumptions

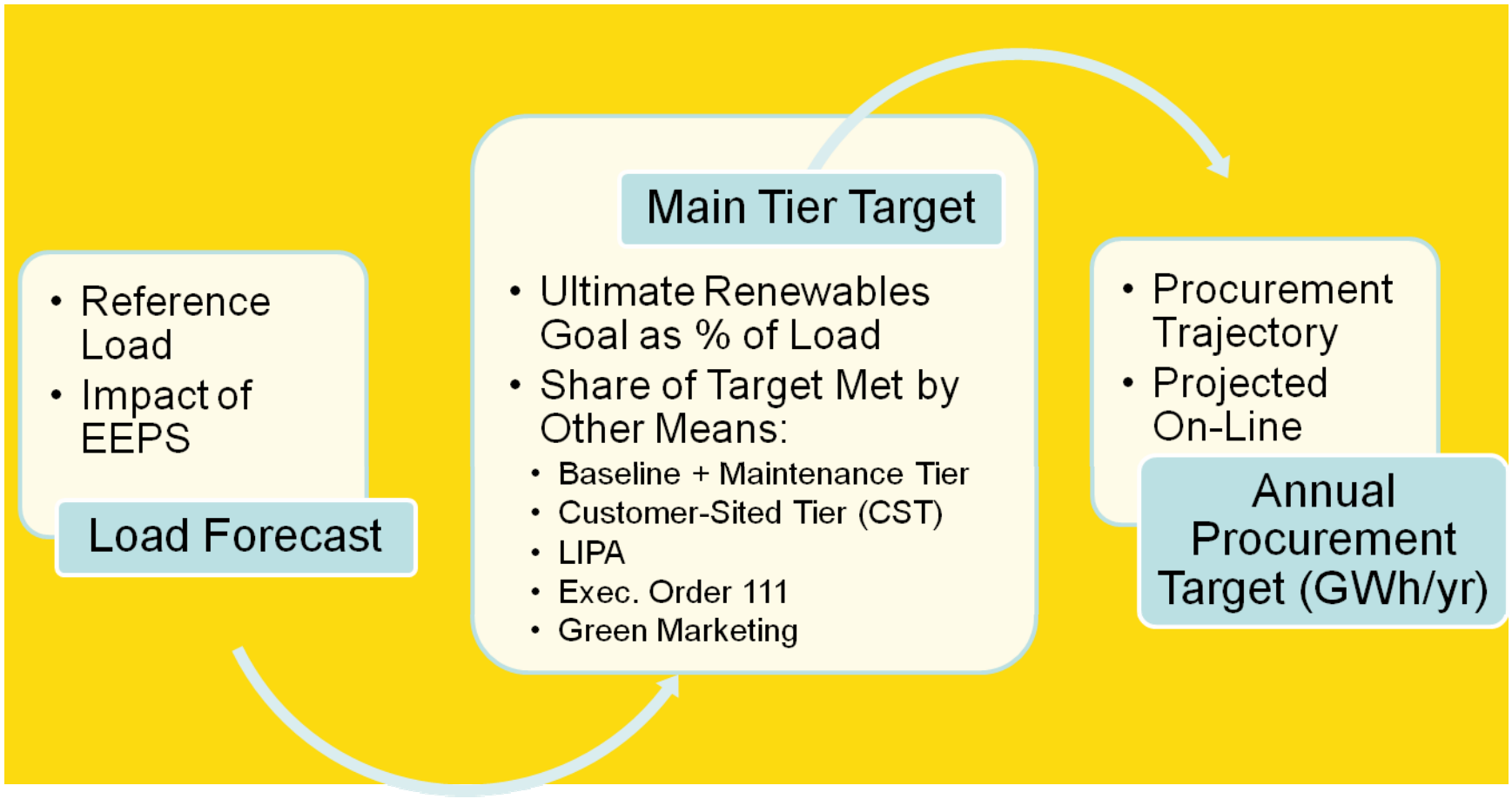
Resources Considered

- NY Wind (onshore & offshore)
  - 8,000 MW onshore potential (2007 AWS Study, as reduced for exclusions, etc.)
- NY Biomass, Hydroelectric, Landfill Methane
- Imports
  - 2004 study: capped in-state wind at 2000 MW, forced reliance on imports
  - 2009 update: no import cap… Rather, constrained by potential, transfer capacity & competing demands
  - Policy change requiring hourly delivery ➔reduced projected role of imports
  - *Proxy cost adder used to reflect econ. development evaluation criteria*

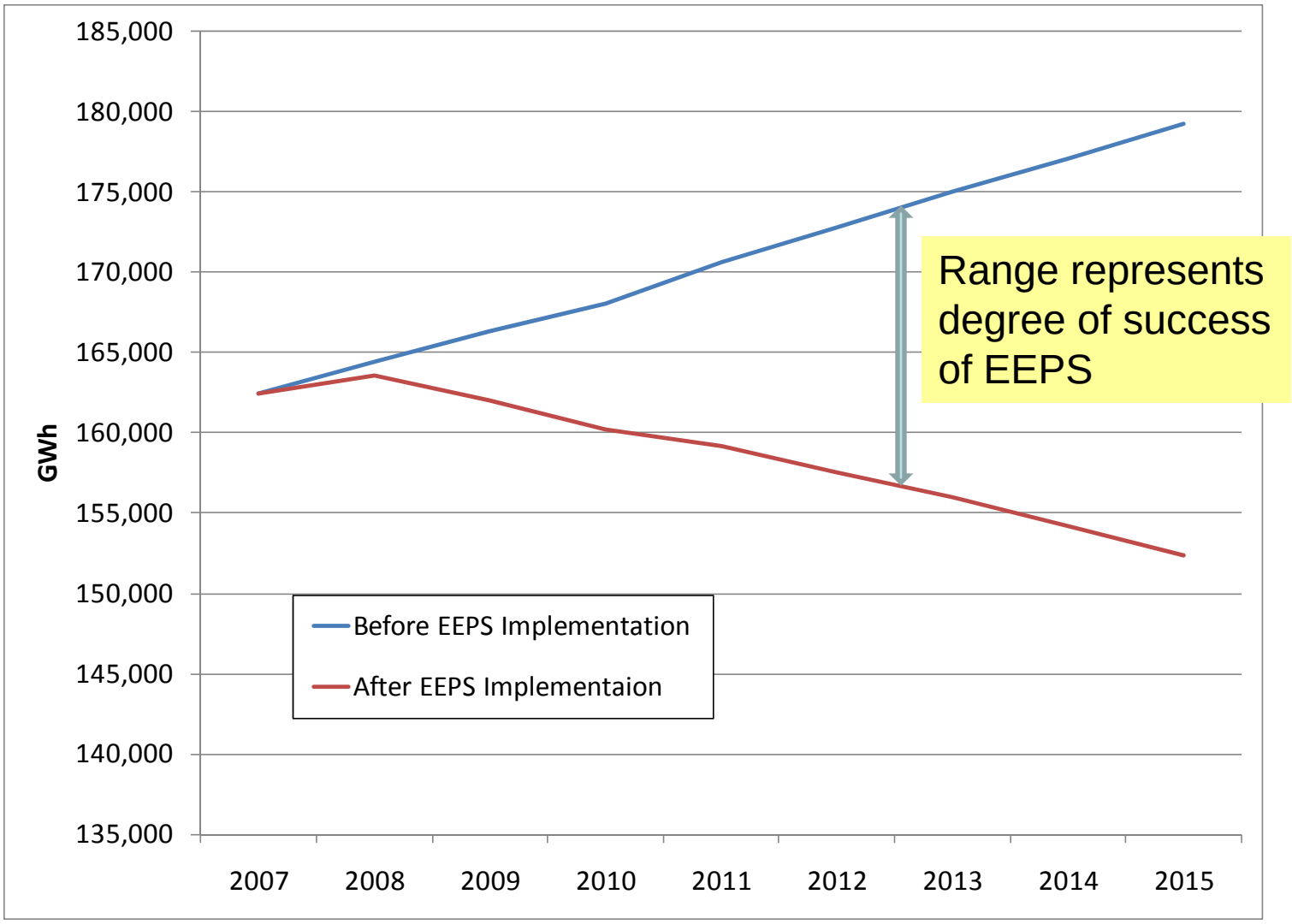


Phase in assumed to reflect estimated lead time to develop projects, etc.

Derivation of Annual Main Tier Procurement Target



Load Forecast

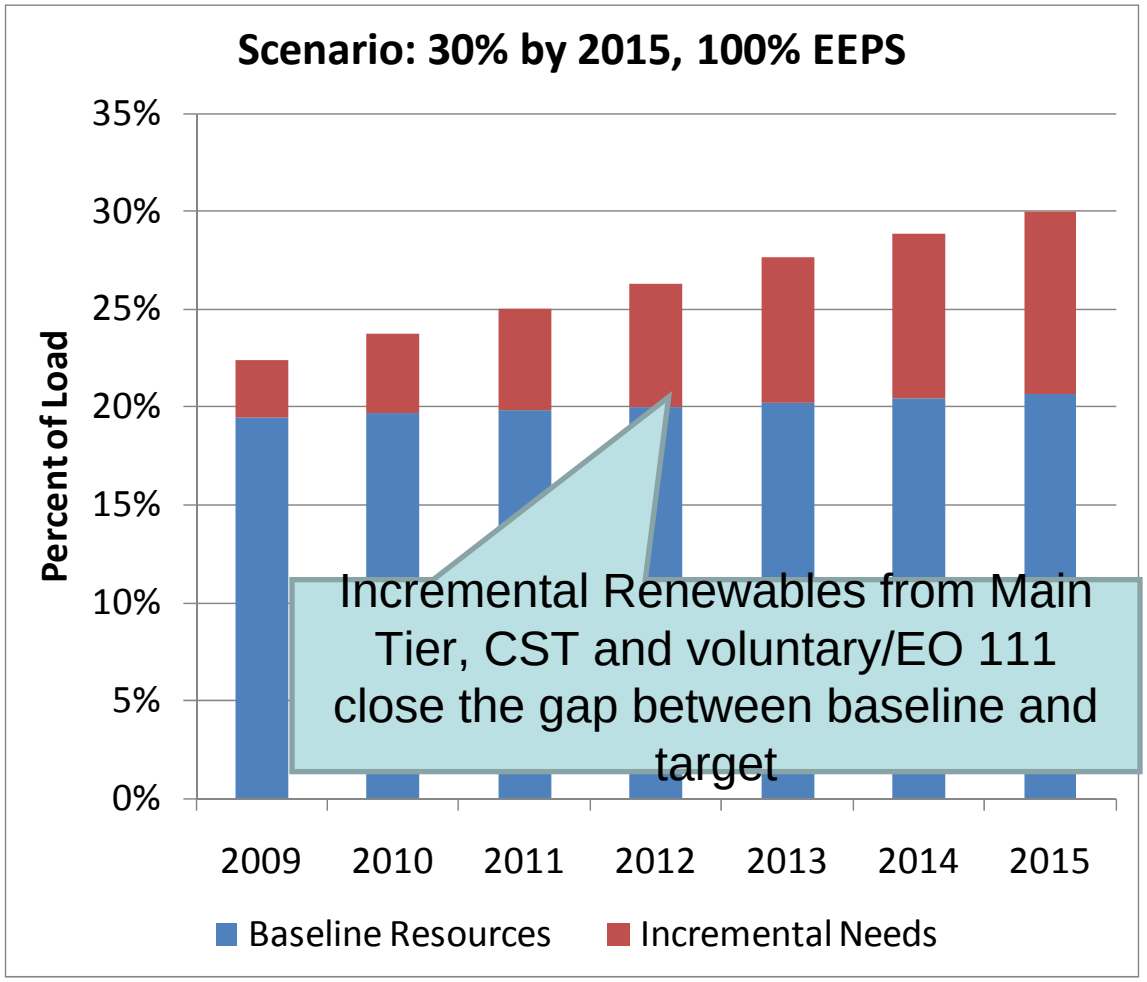


Source: EEPS Docket Load Forecast, before and after consideration of EEPS implementation

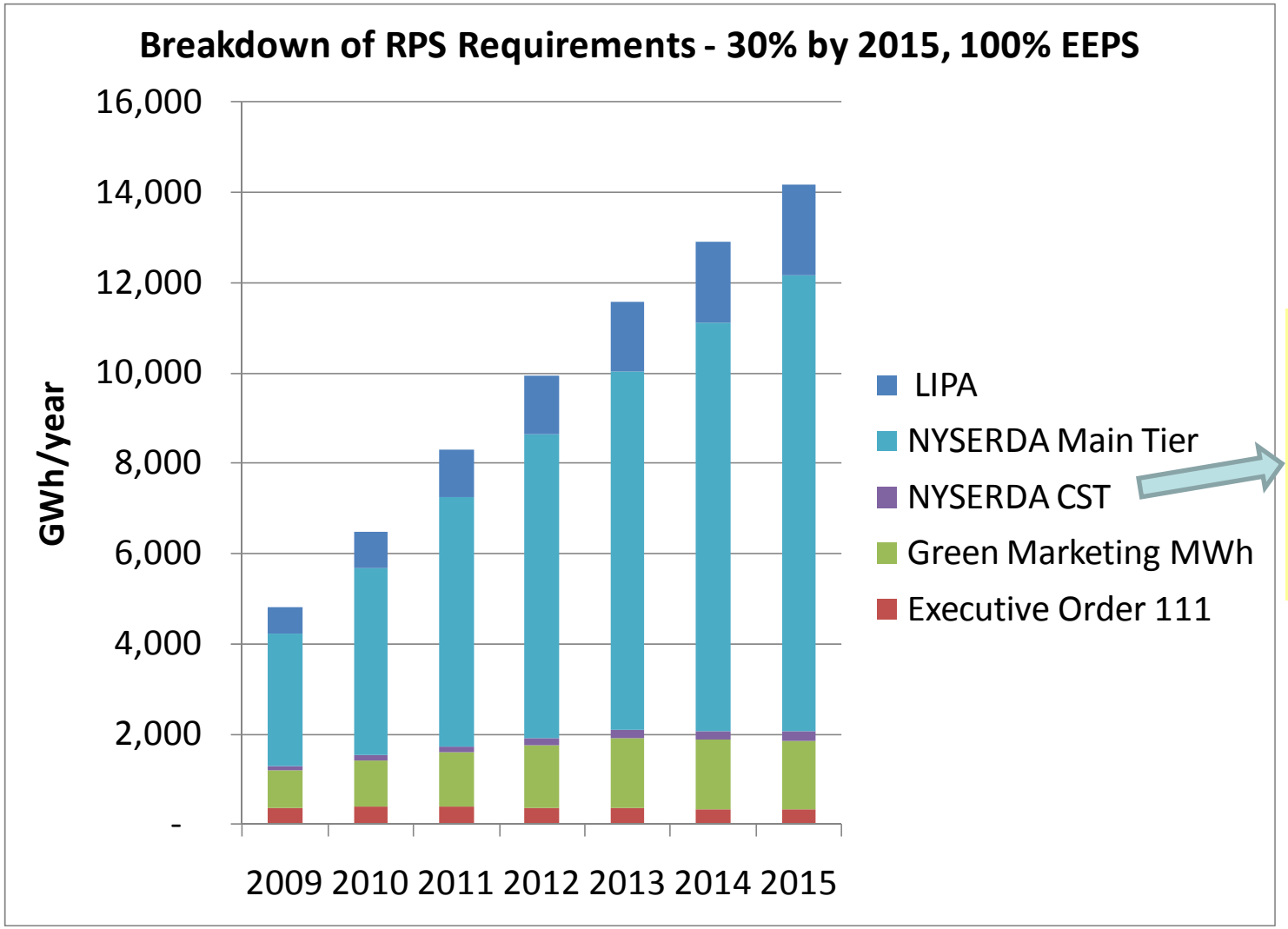
Three Renewables Goals Examined
as of % of load

Scenarios examined:

- 25% RE by 2013, no EEPS
- 25% RE by 2013, 100% EEPS
- 30% RE by 2015, 100% EEPS [as shown]

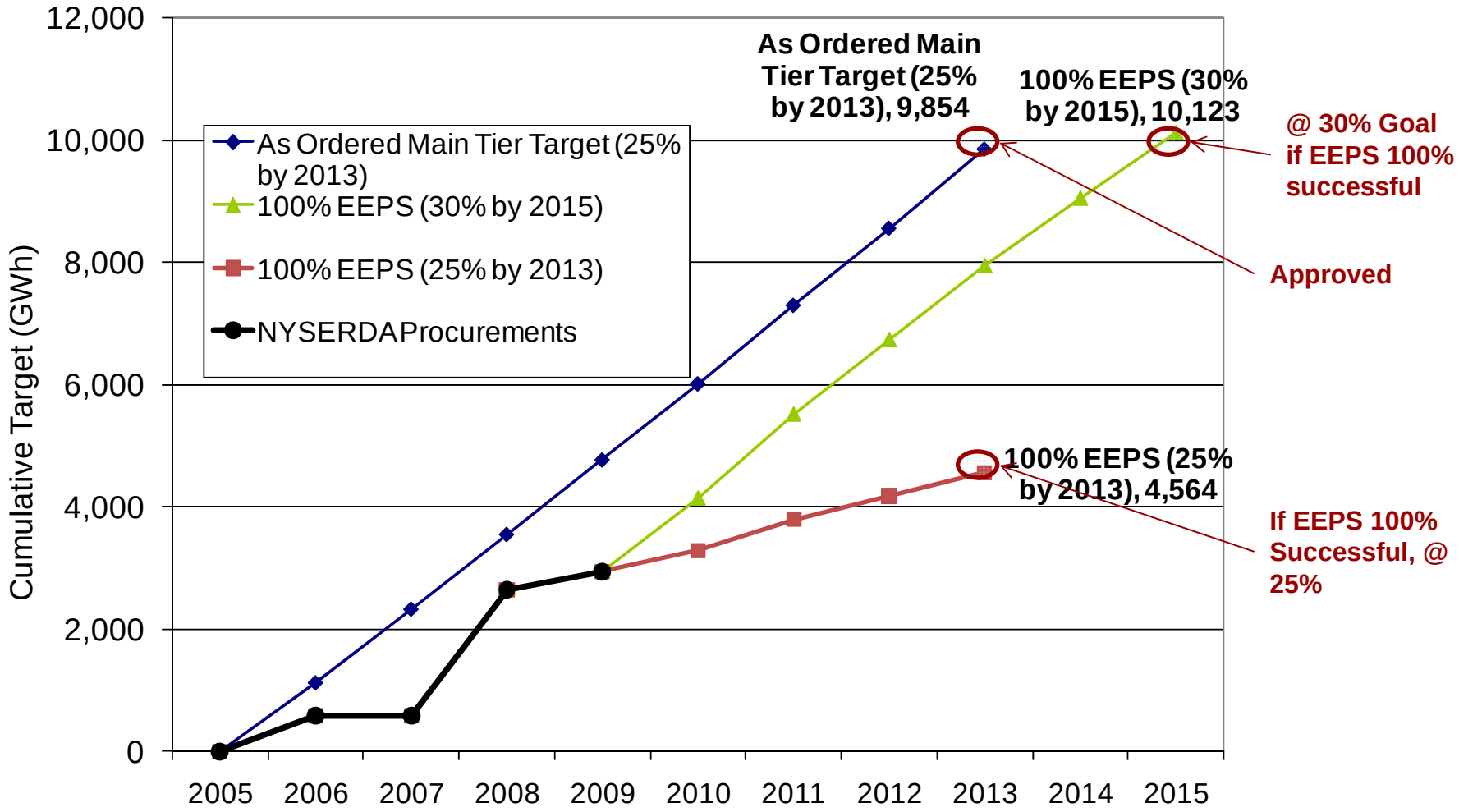


NYSERDA Main Tier is a portion of the larger RPS requirements



Our modeling assumed CST = 2% of incremental renewables by 2015

NYSERDA RPS Main Tier Targets



Resource Cost Assumptions
for every technology (1)

- Installed capital cost
  - Generation & interconnection
  - *Reflects post-recession impact: equipment costs down from 2008 peak*
- Operating costs
- Financing
  - Cost of debt and minimum equity returns
  - Debt/Equity ratio
  - debt term
  - contract duration
  - *Reflects post-recession impact: modest increase in finance costs*

Resource Cost Assumptions
for every technology (2)

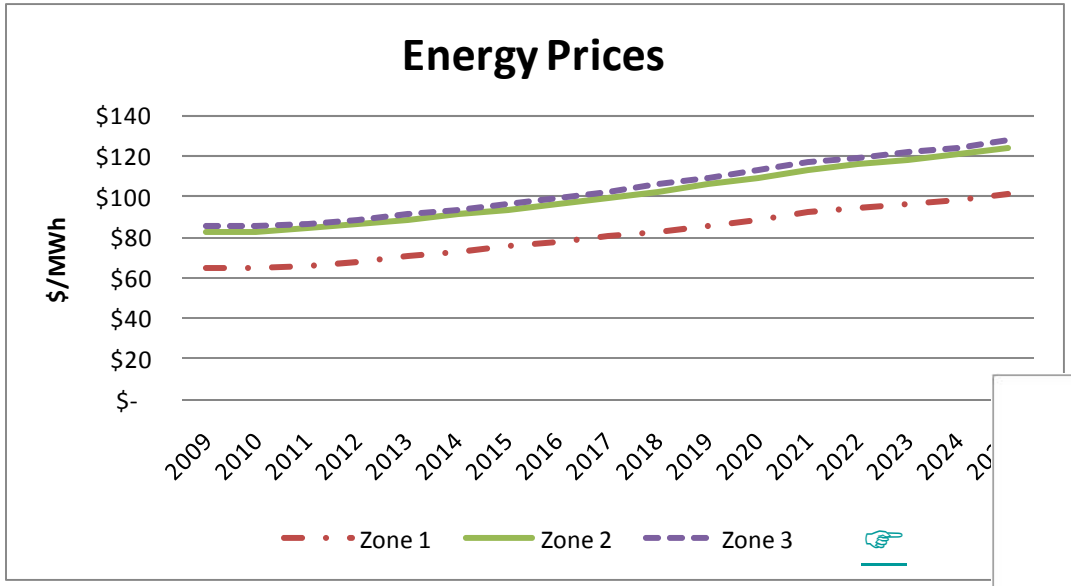
- Incentives updated for Federal Stimulus (ARRA)
  - Production Tax Credit (PTC) extension (2012/2013)
  - Choice of Income Tax Credit (ITC) or PTC (2012/2013)
- PTC
  - Assumed available for entire study period as a *proxy* for federal carbon C&T
  - If Federal Carbon legislation adopted ➔ consistent with PTC phase-out while Federal carbon targets phase in
- ITC in lieu of PTC, where favorable
  - ITC favorable for high capital cost, low capacity factor projects

Resource Cost Assumptions
not considered in analysis

- Did not assess and assign the following categories of cost directly to projects:
  - transmission network upgrade costs, wind 'integration' costs
  - *Unclear whether such costs would be borne by RPS program bid prices*
- Potential cost reductions from Federal ARRA Loan Guarantees for projects under construction by 9/30/2010
  - Details released Oct. 2009 (some details still taking shape)
  - Require competitive bids, potentially onerous/challenging criteria
  - Impact could not be assessed ➔ can't assume all projects benefit
  - *Might* materially reduce costs for some 2011/2012 projects relative to projections (as much as $10-20/MWh)

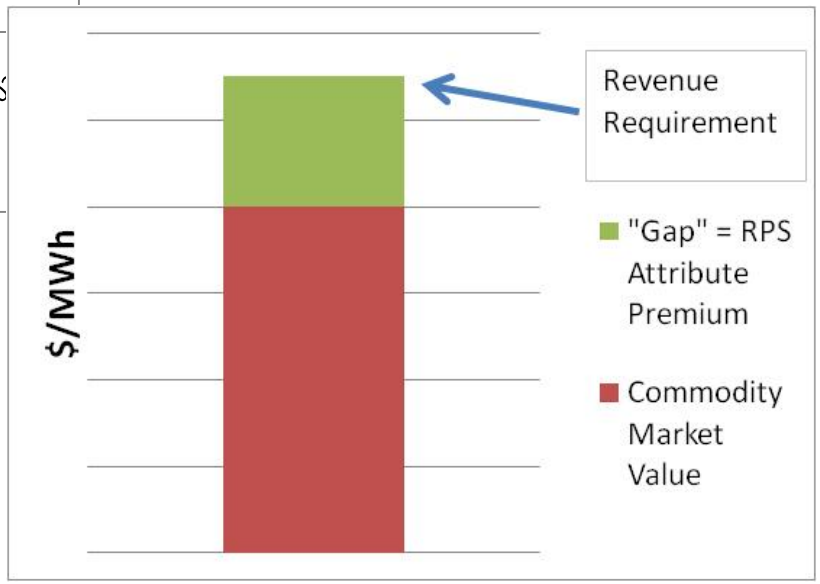
Estimating Costs of Main Tier RPS Procurement

1. Commodity energy revenues forecast provided by DPS



Source: DPS Long Run Cost Projection
Note: Energy price forecast doesn't include Federal carbon cap

2. RPS Attribute Premium = renewable energy resource costs less commodity energy revenues (levelized)



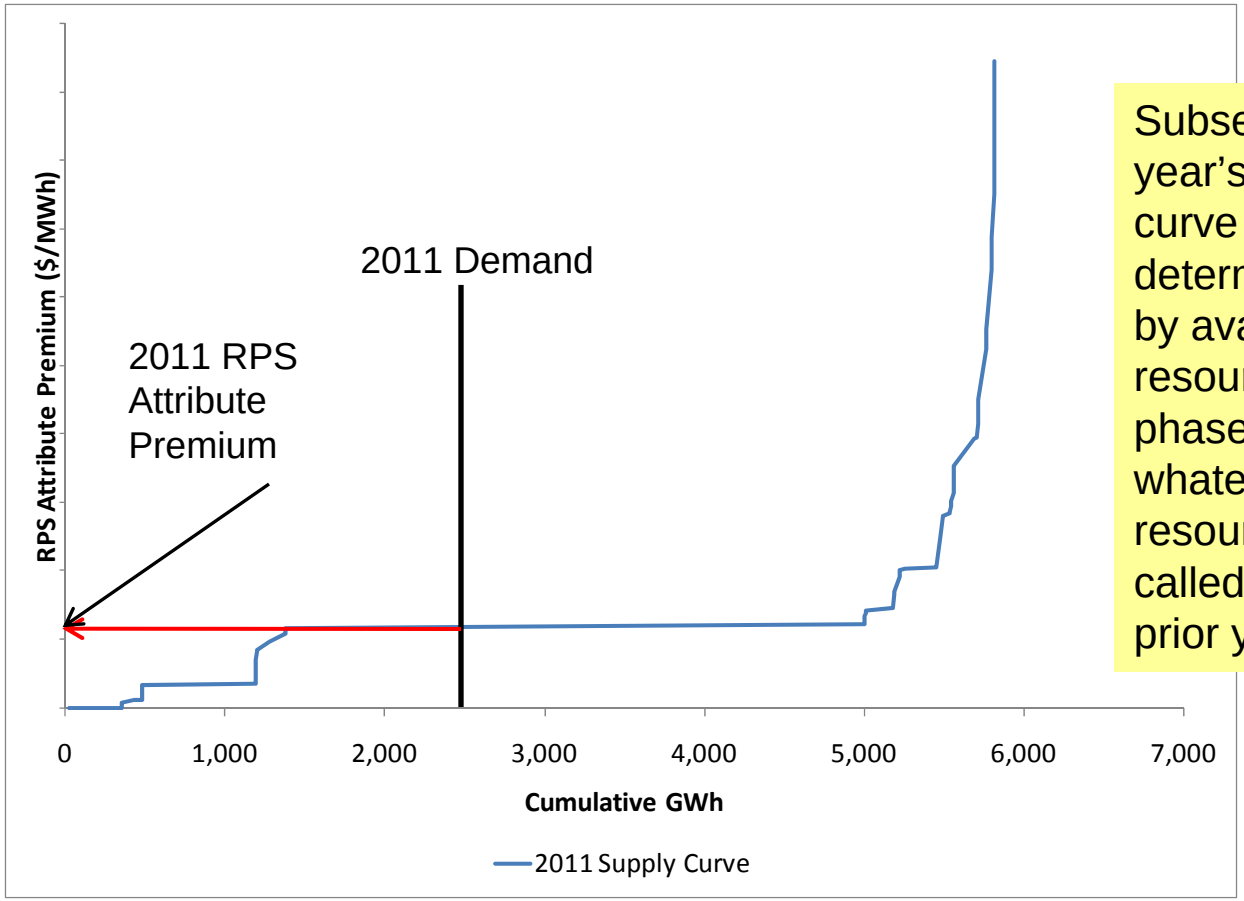
3. Supply curve

➔low to high required RPS Attribute Premium

4. Market clears for RPS Attributes

➔Supply = Demand

Supply Curve
Clearing Price Methodology

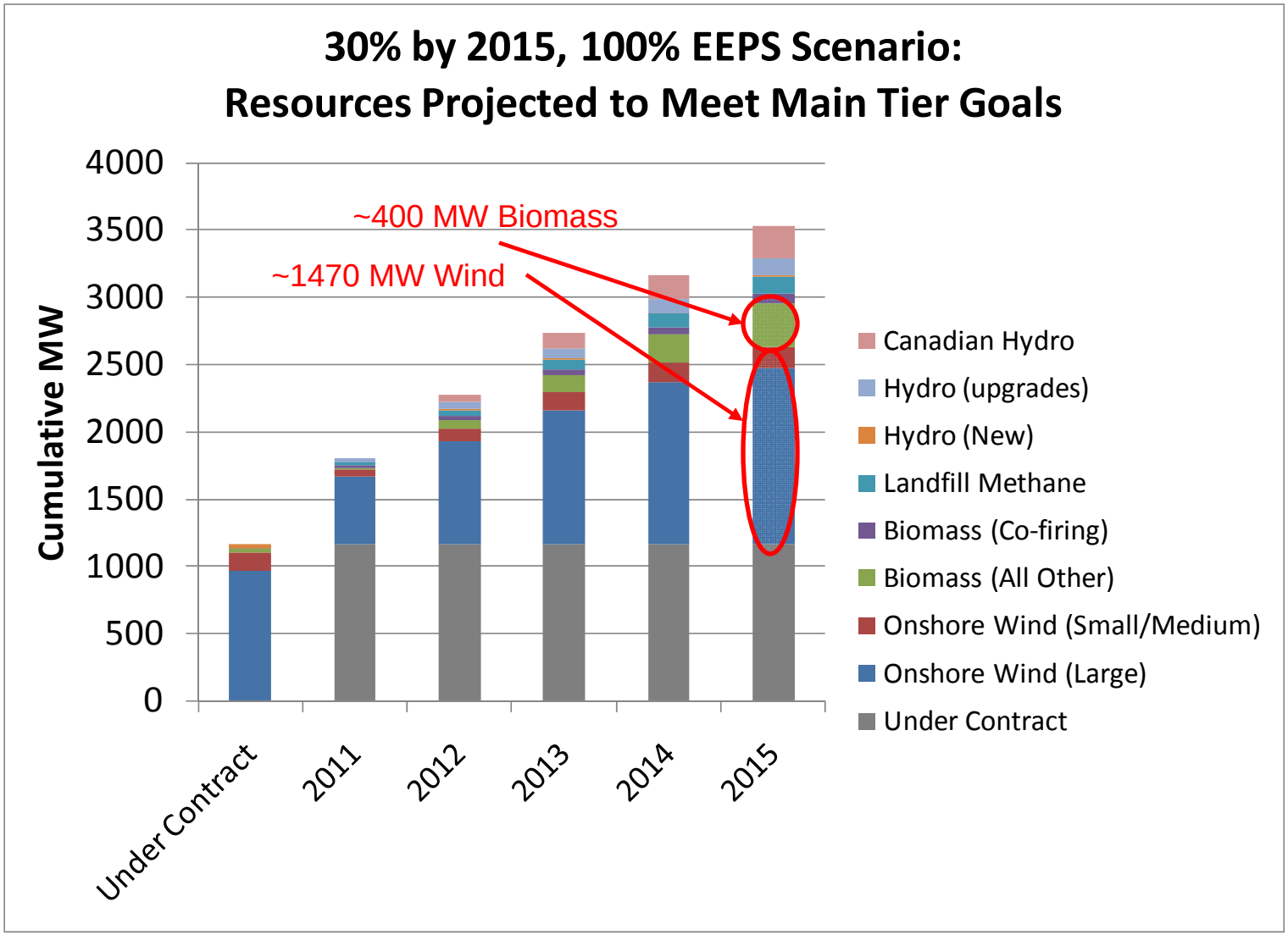


Subsequent year's supply curve determined by available resource phase-in, less whatever resources called upon in prior year(s)

Main Tier Clearing Prices
(RPS Attribute Premium)

Using DPS Long Run Cost Projection ($/MWh)					
	2011	2012	2013	2014	2015
25% RPS, 0% EEPS	$24.34	$24.59	$31.21	NA	NA
25% RPS, 100% EEPS	$16.28	$14.57	$14.90	NA	NA
30% RPS, 100% EEPS	$24.34	$24.59	$31.21	$27.45	$34.19

Projected Main Tier Resource Mix



Sensitivities & Considerations

- General Factors
  - Energy prices → biggest factor (prices have dropped sharply, risks understating cost)
  - ARRA loan guarantees – *may* offset cost increase in near-term for some projects
  - Various modeling assumptions (next page)
- NY RPS-Specific Factors
  - EEPS success in reducing load
  - CST targets/budget
    - e.g. if provide funding for > 2% CST, Main Tier MWh, cost decrease
  - LIPA success in meeting their share of target
  - Effectiveness of Exec. Order 111 & voluntary green market in meeting their share of targets

Sensitivities & Considerations

Implications	Varying….
RPS Attribute Premium up	• Energy/capacity or carbon price down • Project or finance costs higher, inflation higher • Imports less than forecast • Project delays • Higher demand • Network transmission upgrade requirements (if any) slow projected buildout
RPS Attribute Premium down	• Energy/capacity or carbon price up • Additional incentives available (such as ARRA loan guarantees) • Imports exceed forecast • Project or finance costs lower, inflation lower • Lower demand • If PTC (or similar) coexists in parallel with aggressive Federal Carbon cap & trade without phase-out

Key Take-Aways

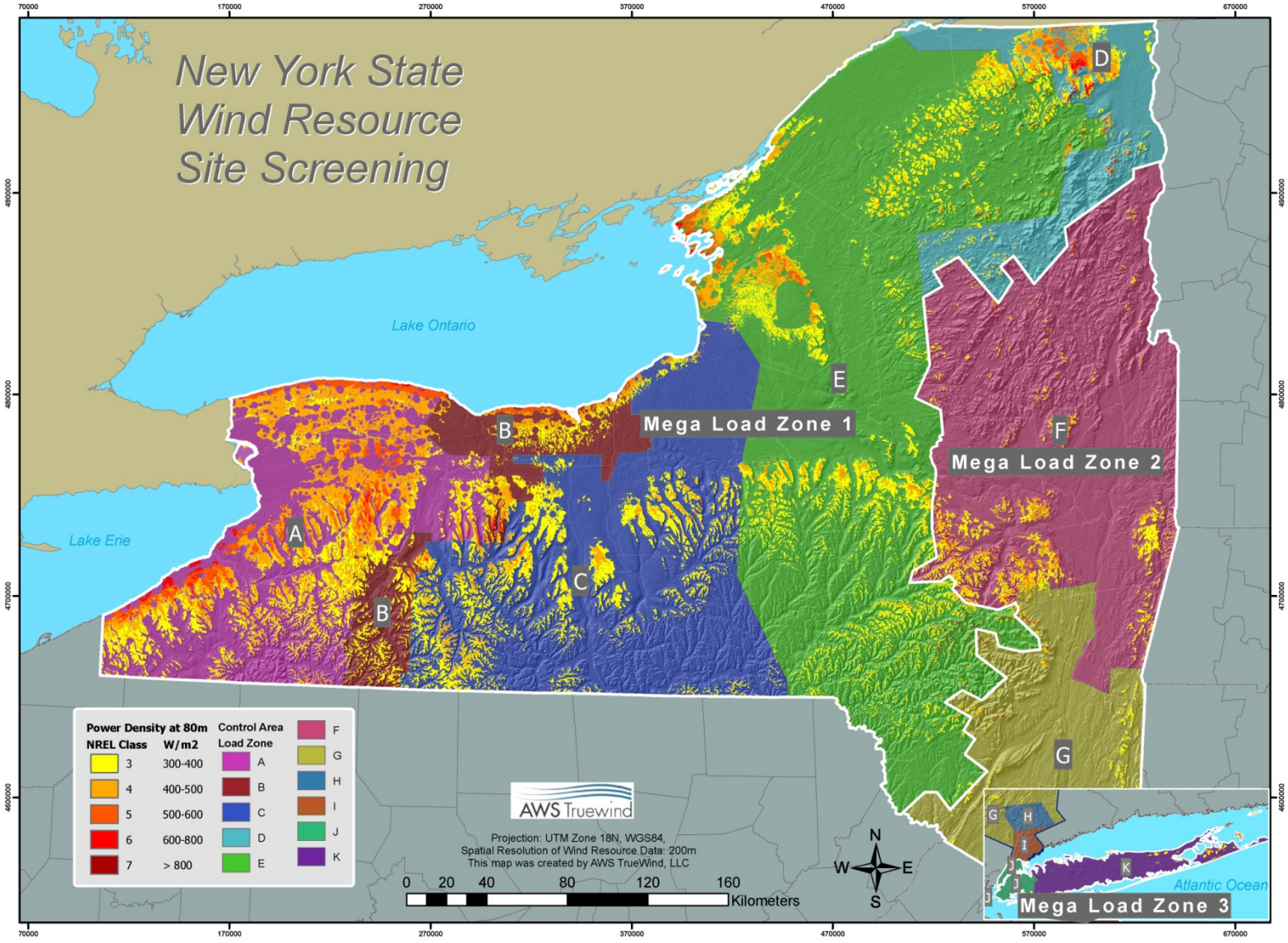
- Cost study methodology is widely used
- Ample resources to meet targets
- Assumptions used are internally consistent with those used by staff for EEPS analysis
- Assumptions chosen to be balanced… without conscious bias towards high or low…except for:
  - Energy price forecast used → *may* understate near-term cost
  - ARRA Loan Guarantees → *may* overstate near-term cost
  - Clearing Price methodology → *may* overstates 'as-bid' solicitation costs

SUPPLEMENTAL SLIDES

Resource Potential Details
Onshore Wind

- Wind potential based on 2007 AWS study based on 2003 dataset @ 80 meter hub height
- Blocks based on zone, project size, c.f., distance from transmission
- Exclusions applied to estimate developable potential
  - 100% (e.g. Nat./State Parks)
  - 50% (e.g. National Forests)
- Only a portion of remaining potential considered developable
  - 25% of small (<20 MW) &medium (20-100 MW), 5% of large (>100 MW)
- Result: ~ 8,000 MW developable potential

Resource Potential - Wind



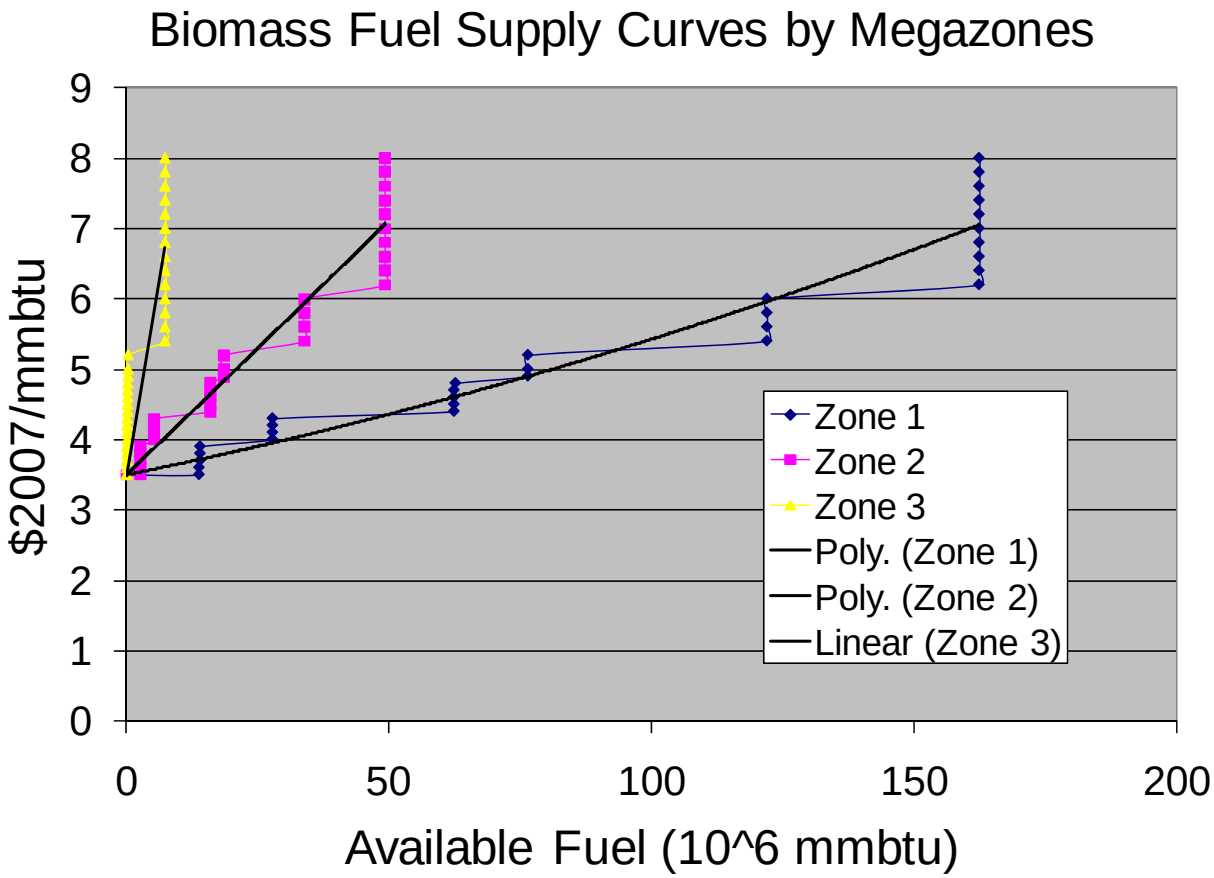
Resource Potential
Biomass & Hydro

- Biomass NY details
  - Technologies aligned into biomass supply curve
  - Potential determined by available facilities & fuel

  - Co-firing at coal plants
  - CHP Gasification (Repower & New)
  - Repowering former steam units with Fluidized Bed boilers
  - ‘Greenfield’ Stoker with SCR

- Hydro
  - Idaho National Lab Study
  - New Low-Impact & Incremental @ existing facilities

Resource Potential



Availability of Potential

- All of the renewable potential will not be available in 2009
- A phase in was assumed based upon the time to develop projects of each technology and the current pipeline of projects

Resource Type	2009	2010	2011	2012	2013	2014	2015
Biomass co-firing	0%	0%	20%	40%	60%	80%	100%
Biomass CHP	0%	0%	5%	20%	40%	60%	80%
Canadian Biomass co-firing	0%	0%	0%	0%	0%	0%	0%
Biomass (wood)	0%	0%	0%	10%	20%	40%	60%
Landfill Methane	0%	0%	20%	40%	60%	80%	100%
Onshore Wind	5%	15%	30%	50%	70%	90%	100%
Onshore Wind (Medium/Small)	5%	15%	30%	50%	70%	90%	100%
Canadian Wind	0%	0%	0%	0%	0%	0%	0%
Offshore Wind	0%	0%	0%	0%	0%	0%	20%
Hydro (upgrades)	0%	0%	20%	40%	60%	80%	100%
Hydro (new)	0%	0%	0%	20%	40%	60%	80%
Canadian Hydro	0%	0%	0%	20%	40%	60%	80%

Financing Assumptions

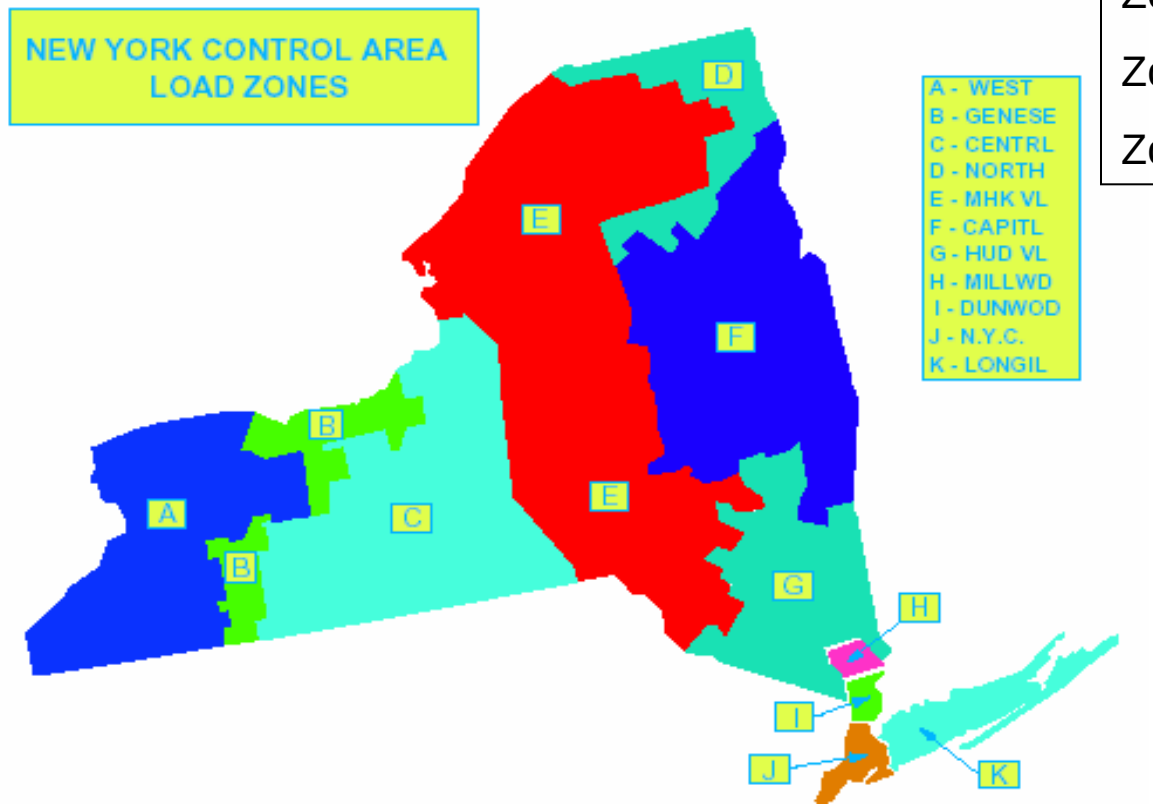
Technology	Levelized Carrying Charge Rate	Project/ Contract Life	Debt %	Equity %	Cost of debt	Cost of equity	Loan term	Depreciation Life	Depreciation Schedule
Biomass co-firing	17.00%	10	70%	30%	8.00%	12.5%	10	10.00	1.50
Biomass (wood)	14.00%	20	70%	30%	8.00%	14%	15	20.00	1.50
Landfill Methane	12.15%	20	70%	30%	8.00%	14%	10	7.00	2.00
Onshore Wind	11.70%	20	50%	50%	8.00%	12%	15	5.00	MACRS
Onshore Wind (Medium/Small)	12.20%	20	50%	50%	8.00%	13%	15	5.00	MACRS
Offshore Wind	13.85%	20	50%	50%	10.00%	15%	15	5.00	MACRS
Hydro (upgrades)	11.85%	25	70%	30%	8.00%	13%	20	20.00	1.50
Hydro (new)	11.85%	25	70%	30%	8.00%	13%	20	20.00	1.50

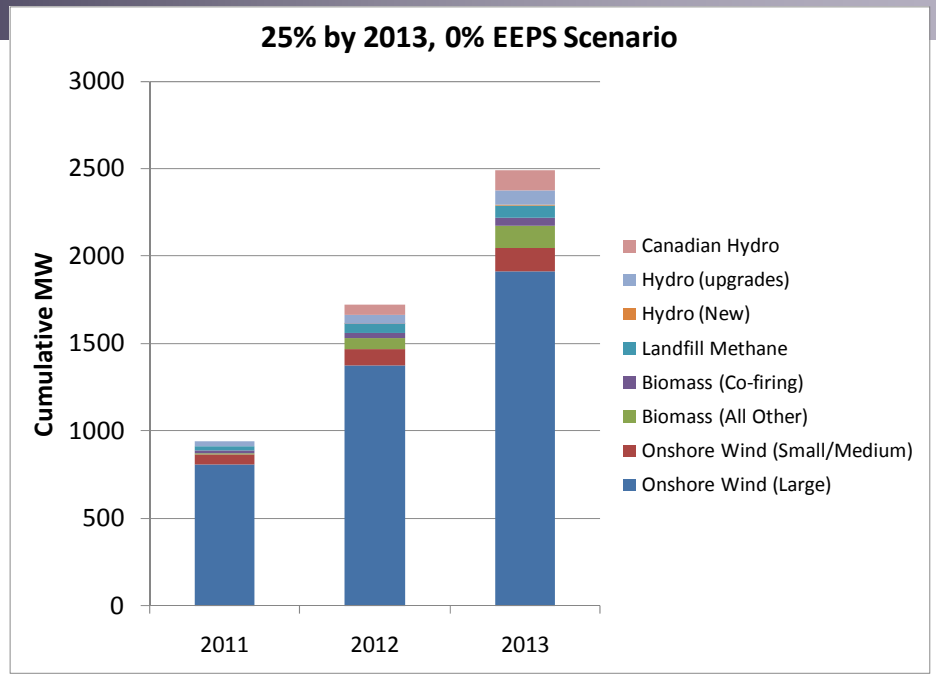
Aggregated Zones used for Modeling

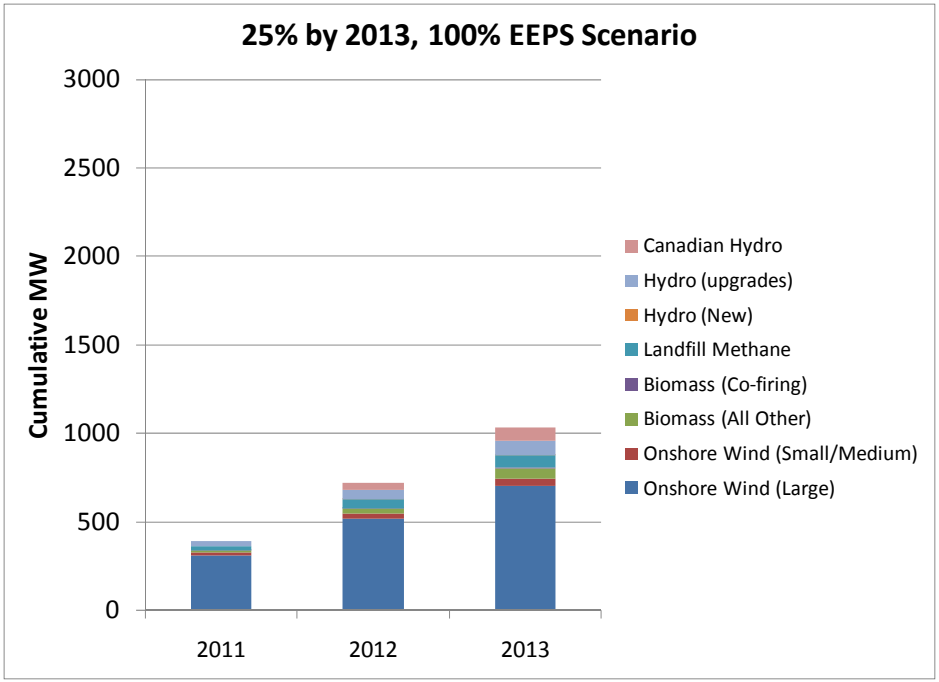
Zone 1 = A, B, C, D, E

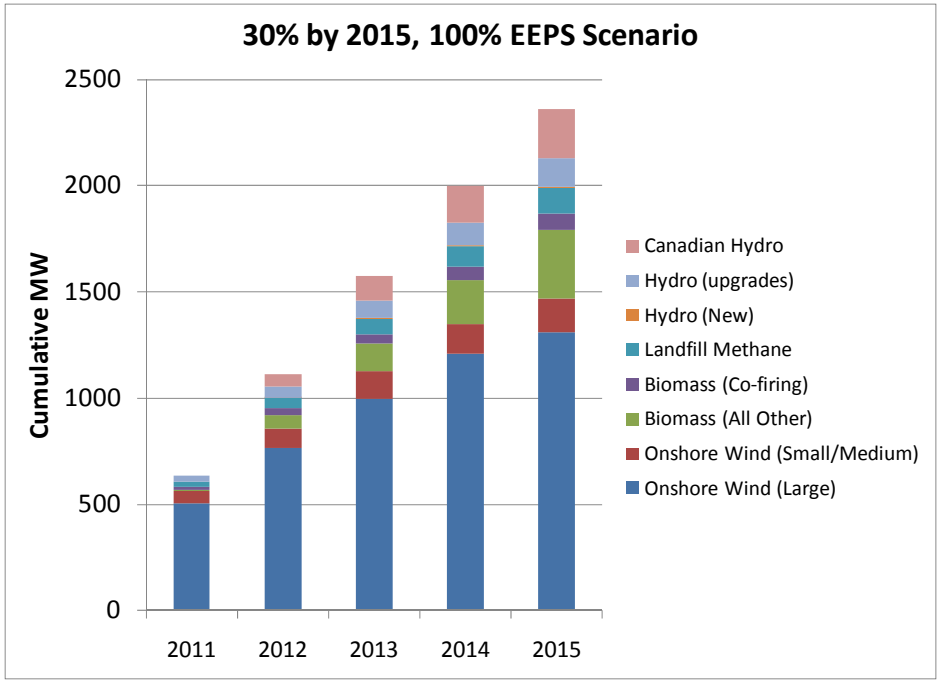
Zone 2 = F, G, H, I

Zone 3 = J, K




25% by 2013, 0% EEPS Scenario
Cumulative MW
3000
2500
2000
1500
1000
500
0
2011
2012
2013
Canadian Hydro
Hydro (upgrades)
Hydro (New)
Landfill Methane
Biomass (Co-firing)
Biomass (All Other)
Onshore Wind (Small/Medium)
Onshore Wind (Large)


25% by 2013, 100% EEPS Scenario
Cumulative MW
3000
2500
2000
1500
1000
500
0
2011
2012
2013
Canadian Hydro
Hydro (upgrades)
Hydro (New)
Landfill Methane
Biomass (Co-firing)
Biomass (All Other)
Onshore Wind (Small/Medium)
Onshore Wind (Large)


30% by 2015, 100% EEPS Scenario
Cumulative MW
2500
2000
1500
1000
500
0
2011
2012
2013
2014
2015
Canadian Hydro
Hydro (upgrades)
Hydro (New)
Landfill Methane
Biomass (Co-firing)
Biomass (All Other)
Onshore Wind (Small/Medium)
Onshore Wind (Large)