SOx RECLAIM
Refinery Committee Meeting

October 14, 2010

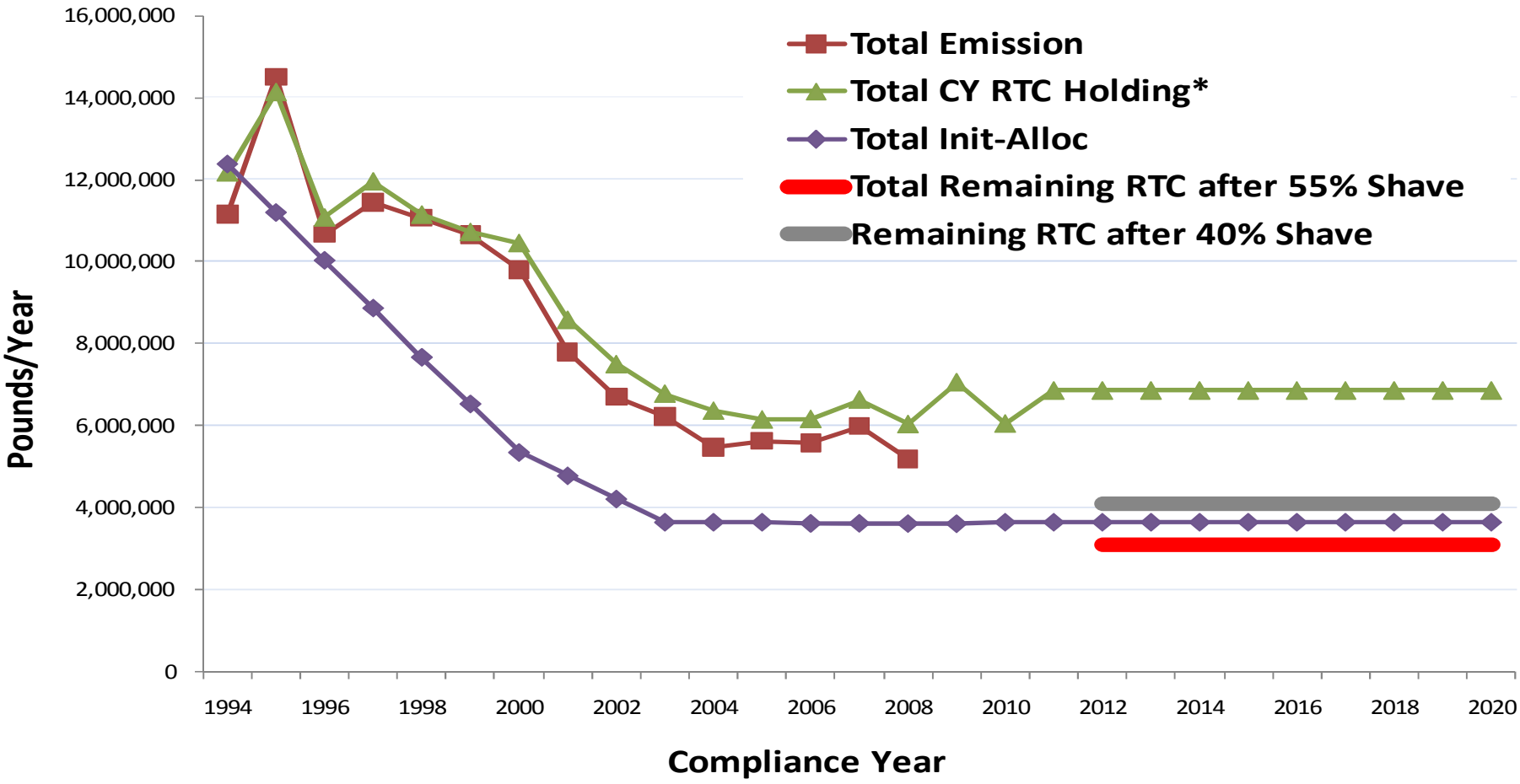
Outline

- Staff Proposal
- Cost Comparison (AQMD versus WSPA)
- Safety Valves
- Cost Effectiveness versus Percent Shave
- Water Demand & Supply
  - —Recycled Water Infrastructure
- Socioeconomic Analysis

Staff Proposal

- Total RTC reductions = 6.1 TPD (55% Shave; 5.4 TPD actual emission reductions)
- Two-phased reductions: 4.5 TPD by 2014, Remaining 1.6 TPD by 2019
- Limited exemption for certain small emitters
- Provisions for market viability
  - Set-aside RTC amounts similar to NOx RECLAIM
  - Board review if SOx RTC price greater than $50,000 per ton SOx

Refineries under RECLAIM



Cost Comparison

AQMD's Main Strategy						
		Limit	Reduction (TPD)	Range of Costs ($Million)		CE ($/ton)
FCCU	4 WGS	5 ppmv	2.01	360	389	$20K - $21K
SRU	3 WGS	5 ppmv	0.60	174	187	$31K - $44K
Other Units	1 WGS and other process modification	10 ppmv	0.31	27	62	$9K - $22K
Early Reductions (FCCU, SRU)	1 WGS and other process modification	5 ppmv	1.00	-	-	
Sub Total			3.92	561	638	$16K- $18K

WSPA's Main Strategy					
		Limit	Reduction (TPD)	Costs ($Million)	CE ($/ton)
FCCU	2 WGS	5 ppmv	1.60	328	$22K
	3 DeSOx	6-35 ppmv			
SRU	2 WGS and other process modification	5-25 ppmv	0.36	331	$101K
Other Units	1 WGS and other process modification	Not specified	0.98	177	$20K
Early Reductions (FCCU)	1 WGS	5 ppmv	0.87	-	
Sub Total			3.81	836	$24K

Costs for WSPA's "Other" Strategies

Project		Reduction (TPD)	Costs ($Million)	Cost Effectiveness ($/Ton)
SRUs	15 ppmv	0.13	253	213,277
Fuel Gas Treatment	<40 ppmv	0.49	467	104,445
CEMS Improvements	3 projects	0.26	4	1,686
RTCs		1.24	77	6,805
Total for Others		**2.12**	**801**	**41,406**
Total for Others (excluding cost-ineffective projects)		**1.5**	**81**	**5,918**

Likely Refinery Compliance Strategy

RTCs Needed for 55% Shave = 5.17 TPD

WSPA Strategies	Reduction (TPD)	Costs ($Million)
1. WSPA's Main Strategy	3.81	836
2. "Other" Cost-Effective WSPA Strategies	1.5	81
Total Actual Reductions & Costs	**5.31**	**917**
Average Cost Effectiveness = $18,925 Per Ton		

Other Potentially Available RTCs = 1.44 TPD

- Rem. Unused RTCs by Refineries = 0.37 TPD (2005)
- Investor-Owned RTCs = 0.002 TPD (Current)
- RTCs from Non-Refinery Sector = 0.54 TPD
- RTCs from Refinery Sector = 0.53 TPD ?

Grand Total Available = 5.31 + 1.44 = 6.75 TPD

Surplus = 6.75 – 5.17 =1.6 TPD

Key Question

IS WSPA's ASSUMPTION FOR ADDITIONAL COSTS AND REDUCTIONS ($801 MILLION, 2.12 TPD) REASONABLE?

- Not reasonable under a market based program such as RECLAIM
- Relies on getting reductions at each facility (similar to Command-and-Control program)
- Discounts key principle and benefits of a cap and trade program that cost-effective off-site reductions will substitute for cost-ineffective on-site controls

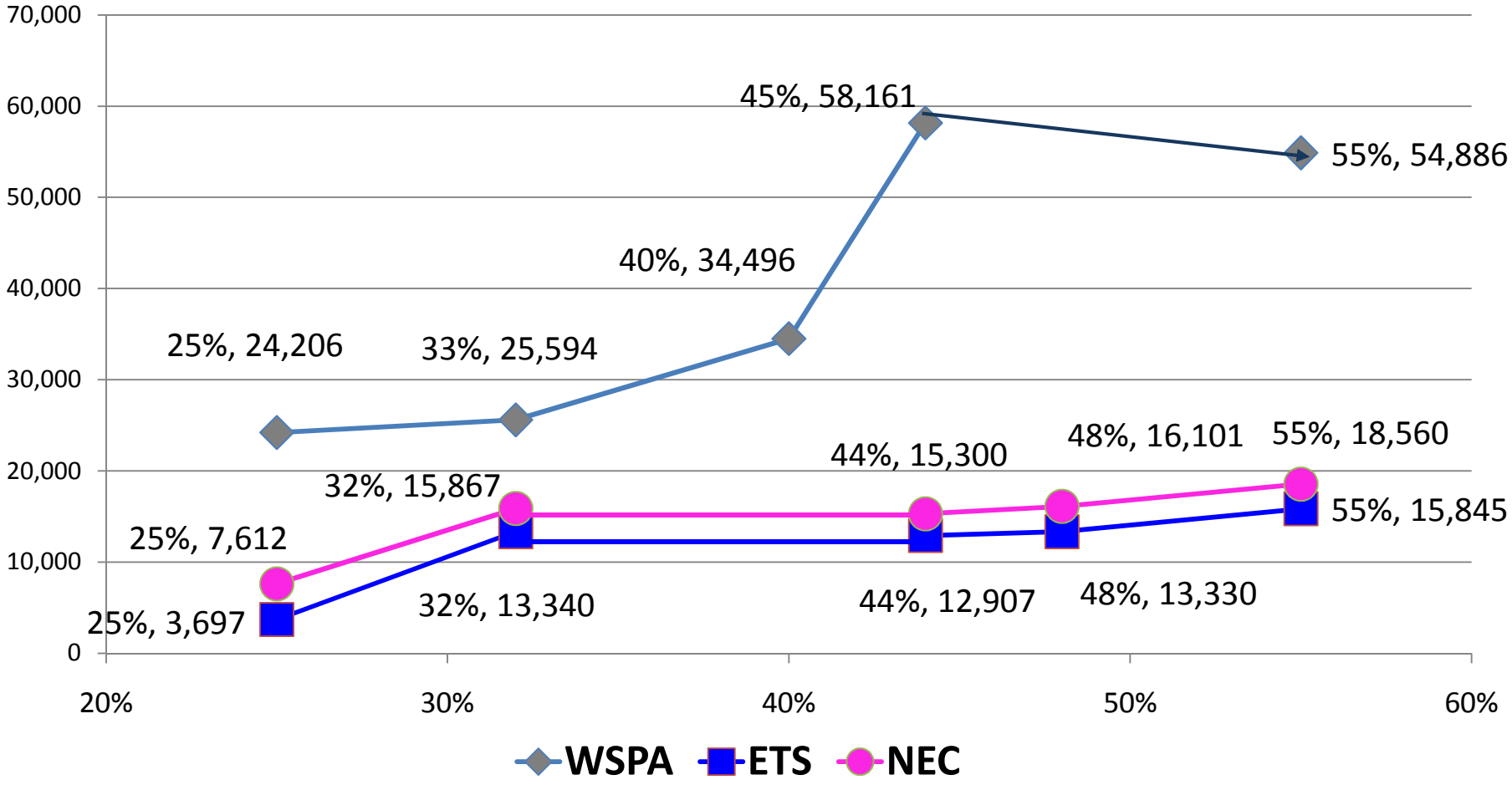
Key Question (Cont.)

- Underestimates reduction potential of main strategies:
  - —DESOX CATALYSTS CAN ACHIEVE 5 ppmv. (WSPA assumes 6 ppmv – 35 ppmv)
  - —WGS CAN ACHIEVE 5 PPMV (WSPA assumes 5 – 25 ppmv)
- Cost-effective reductions from other non-refinery facilities/sectors and investors will be available, will be used , and MUST be considered
- Staff Proposal Provides Other Safety Valves

Safety Valves
(Included in Staff Proposal)

- Gradual annual reductions with extended compliance schedule (2012-2019)
- Staff to begin monitoring RTC price trends (12-month rolling average)
- Hold Public Hearing if RTC price exceed $50,000 per ton (discrete price)
- Ability for Board to set-aside (give back) up to 100% of RTC reductions for any year when RTC price exceeds $50,000 per ton

Cost Effectiveness versus Percent Shave



AQMD & Consultants

55% - Staff's proposal

48% - Exclude SRU/TG control, **44%** - Exclude SRU/TG and cement control

32% - Exclude SRU/TG, cement and glass, **25%** - only coke calciner and sulfuric acid control

WATER
DEMAND & SUPPLY

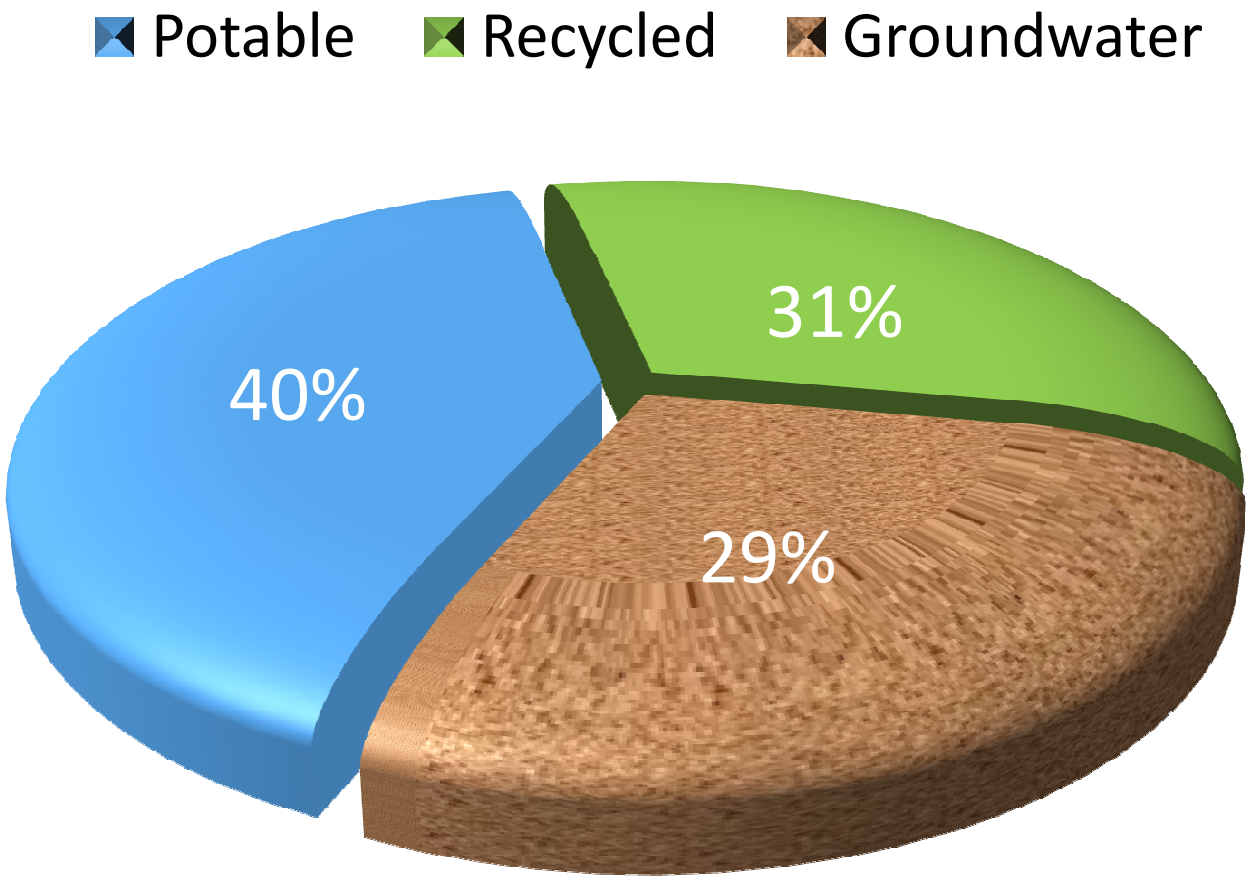
Water Demand

Facility	Baseline (Million Gals/Day)	Increase (Million Gals/Day)	% Increase
Refinery 1	2	0.04	2%
Refinery 2	9	0.2	2%
Refinery 3	10	0.2	2%
Refinery 4	6	0.06	1%
Refinery 5*	9	0.02	<1%
Refinery 6	12	0.2	2%
Sulf. Acid	0.7	0.02	3%
Coke	1	0.04	4%
Glass	0.1	0.06	48%
Cement	3	0.1	3%
Total	53 Million Gals/Day 163 Acre-Ft/Day 59 Thousand Acre-Ft/Yr	1 Million Gals/Day 3 Acre-Ft/Day 1 Thousand Acre-Ft/Yr	2%

Water Demand

- South Coast Regional Water Demand = 6.37 Million Acre-Ft Per Year
- Total Water Increase for SOx RECLAIM = 1,000 Acre-Ft Per Year. Only 0.02% of South Coast Water Demand
- Water Suppliers Can Meet Demand for Next 20 Years (2005 Urban Water Management Plans)
- Potable Water Increase = 0.3 Acre-Ft per Day = 110 Acre-Ft per Year. **Negligible Effect on Governor's Goal of 20% Potable Water Reduction by 2020**
- **Recycled Water & Well Water Available**

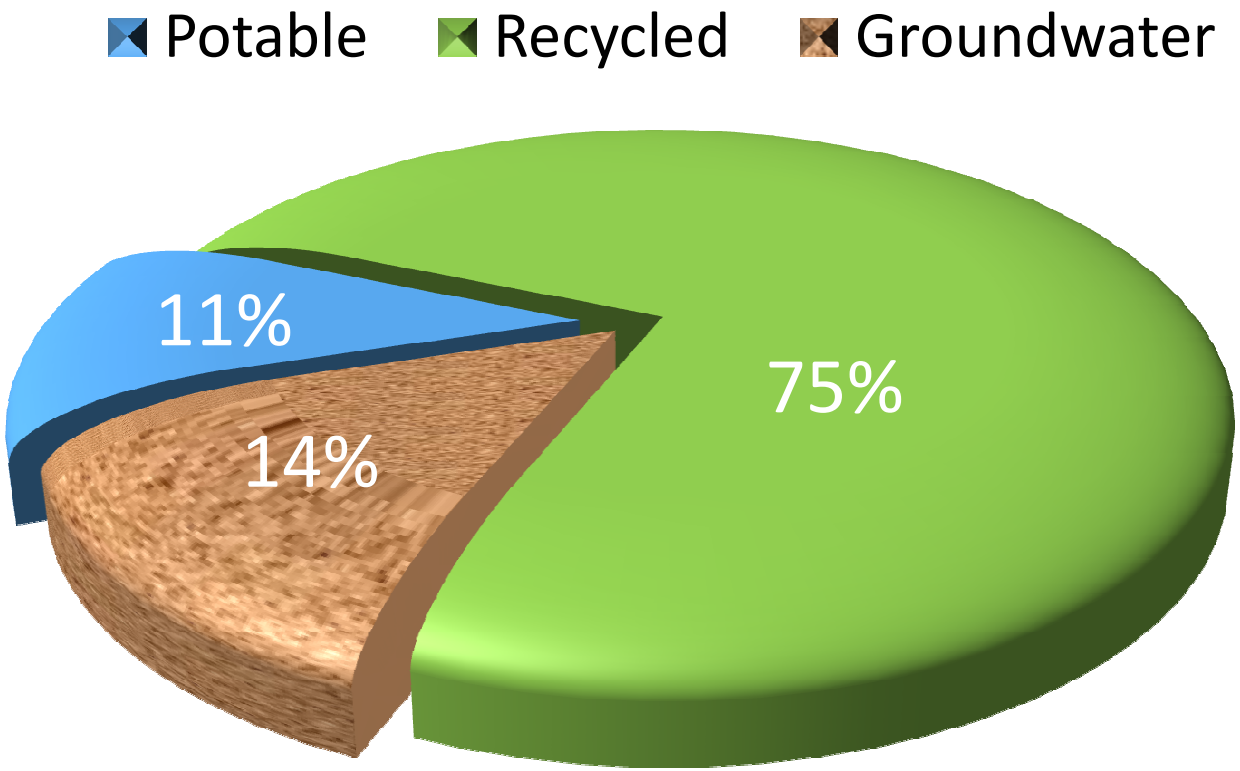
Current Water Demand



Total Baseline Water Use in CEQA = 57,790,000 gallons per day (based on previous CEQA documents)

Future Water Demand

With Wet Gas Scrubbers (Option 1) If Future Supplies of Recycled Water ARE Available

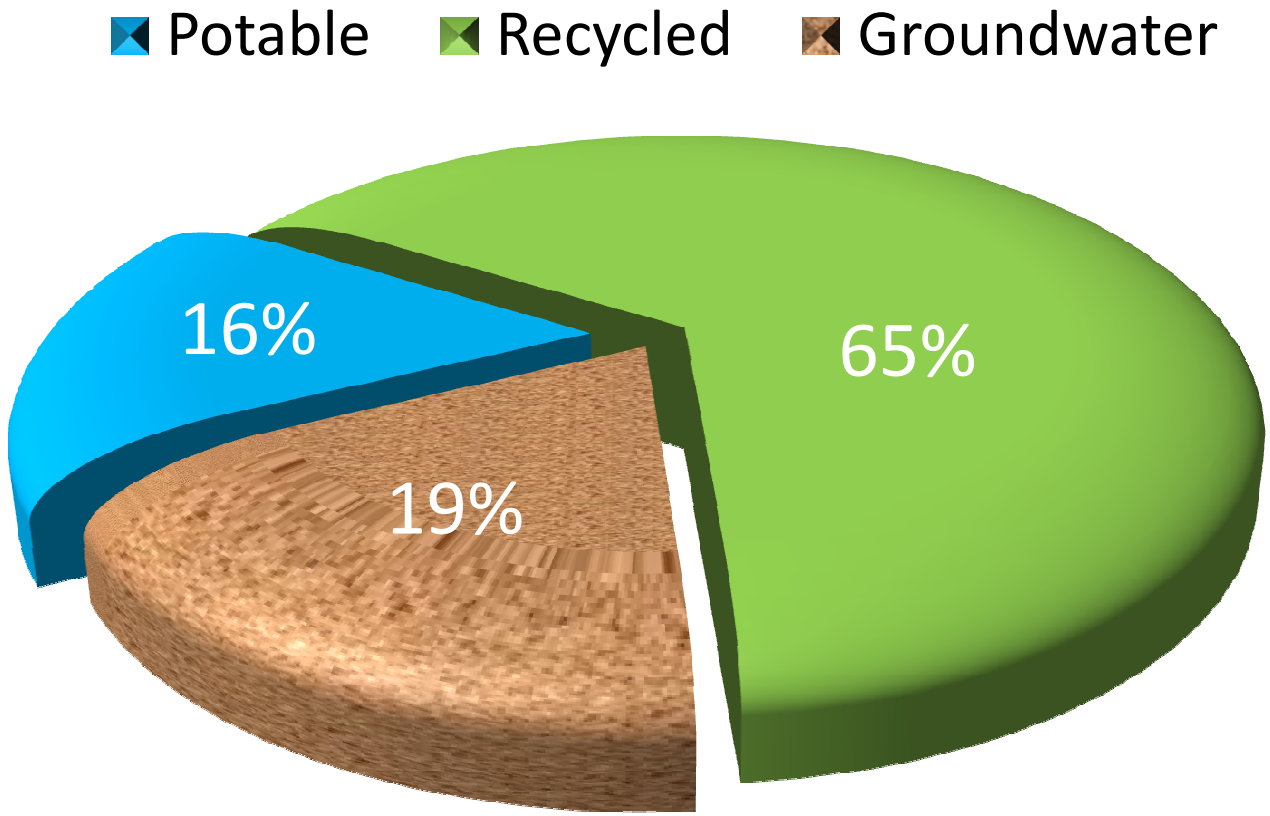


Increase in Water Use = 883,368 gallons per day

Potable water projected increase is below CEQA Significance Threshold

Future Water Demand

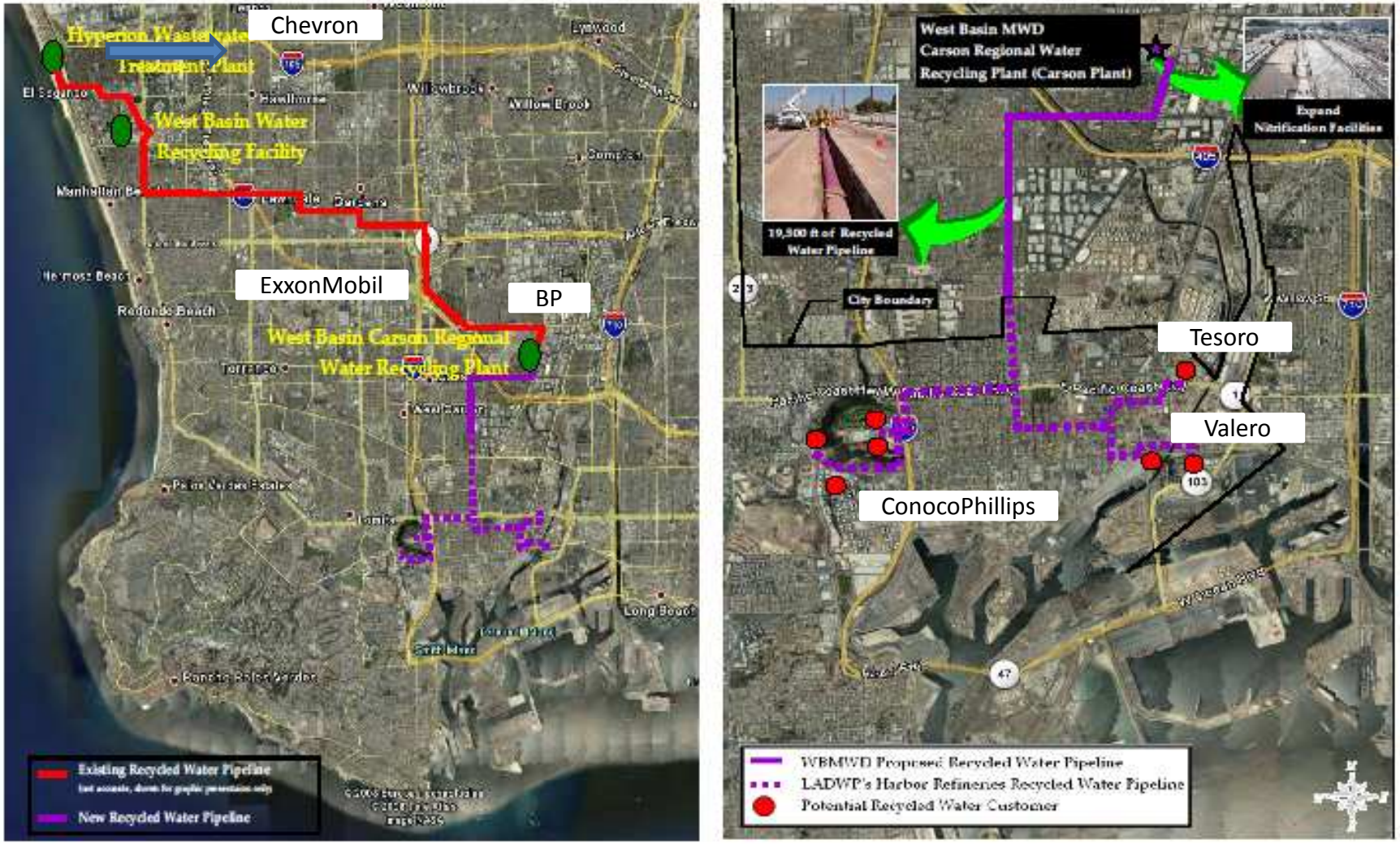
With SOx Reducing Catalysts (Option 2) If Future Supplies of Recycled Water ARE Available



Increase in Water Use = 642,272 gallons per day

Potable water projected increase is below CEQA Significance Threshold

Recycled Water Infrastructure



Reference: LADWP/West Basin Recycled Water System Serving Los Angeles Harbor Area

Recycled Water Project

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Los Angeles Harbor Area

Recycled Water Infrastructure Costs
(Outside Refinery's Boundary)

- Expansion Cost: ~ $150 Million
- Costs of delivering recycled water to the refineries to be born out by all rate payers in Los Angeles
- Onsite costs of conversion to be subsidized by LADWP
- Cost for recycled water not to exceed potable water cost
- Future piping structure has capacity to displace all types of water usage at refineries

Water Infrastructure Costs
(Inside Refinery's Boundary)

- **Consultants did include costs of piping infrastructure**
- **ETS/AEC** " … include in the cost estimates all the monies required to construct and/or supply utilities (such as steam, electricity, and water), as well as infrastructure (e.g., sewer and wastewater treatment), associated with each measure……." (p.33 Module 2 Report)

  "… Costs to obtain additional water either from an external source or by reallocating the water already used in a given refinery are one of the items covered in the contingency." (p. 51 Module 3 Report)
- **NEXIDEA** "It must be pointed out that (to handle) … utility upgrades that might be required to supply power and water….a 35% contingency was added to the base costs…. (p.11 Report for Sulfuric Acid Plants and Coke Calciner)
- **NEC** "… The original project estimate included an allowance for getting this water to the refinery and further to the new scrubber … The water allowance developed by the consultants was not intended to reflect the total cost of running new offsite water feed lines to the refinery but was intended to cover a prorata share of these costs… " (p.9 of Final Report)

SOCIOECONOMIC ANALYSIS

Scope of Socioeconomic Analysis

- **Analyzed Cost Input from:**
  - **ETS, Inc./NEXIDEA, Inc. (Present Value of $630 Million)**
  - **NEC**
    - **Developed Cost Adjustment Factors by Equipment by Facility Relative to ETS/NEXIDEA (Present Value $738 Million)**
  - **WSPA**
    - **Cost of Compliance is 3 times that of ETS/NEXIDEA (Present Value of $1.5 Billion)**
- **Evaluated Impacts of:**
  - **Staff Proposal**
  - **CEQA Alternatives**

Affected Facilities and Industries

- **11 Facilities**
  - **Petroleum Product Manufacturing**
    - **Six Refineries**
    - **One Coke Calciner Plant**
    - **One Sulfuric Acid Plant**
  - **Chemical Manufacturing**
    - **One Sulfuric Acid Plant**
  - **Non-Metallic Mineral Product Manufacturing**
    - **One Cement Plant**
    - **One Glass Plant**

Compliance Cost

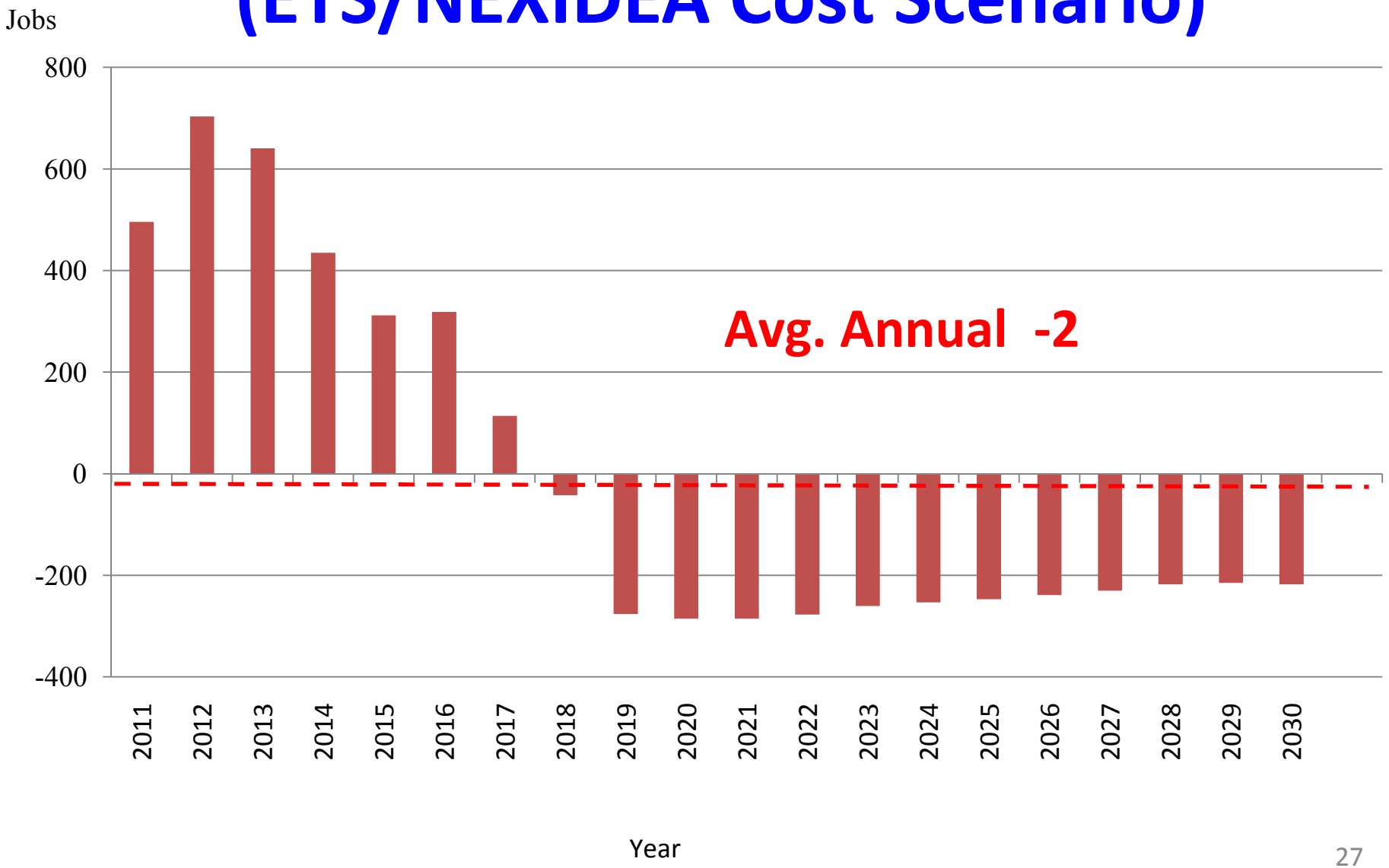
- One-Time Cost*
  - Capital Costs
    - Wet and Dry Gas Scrubbers
    - Emerachem ESX Catalyst
    - Consolv Upgrade
  - Installation Cost
    - Demolition, Concrete, Structure, etc.
    - Piping, Electrical, Contractor, etc.
- Operating and Maintenance Costs
  - Utilities
  - Labor and Materials

*Annualized @ 4% interest rate and 25-year equipment life

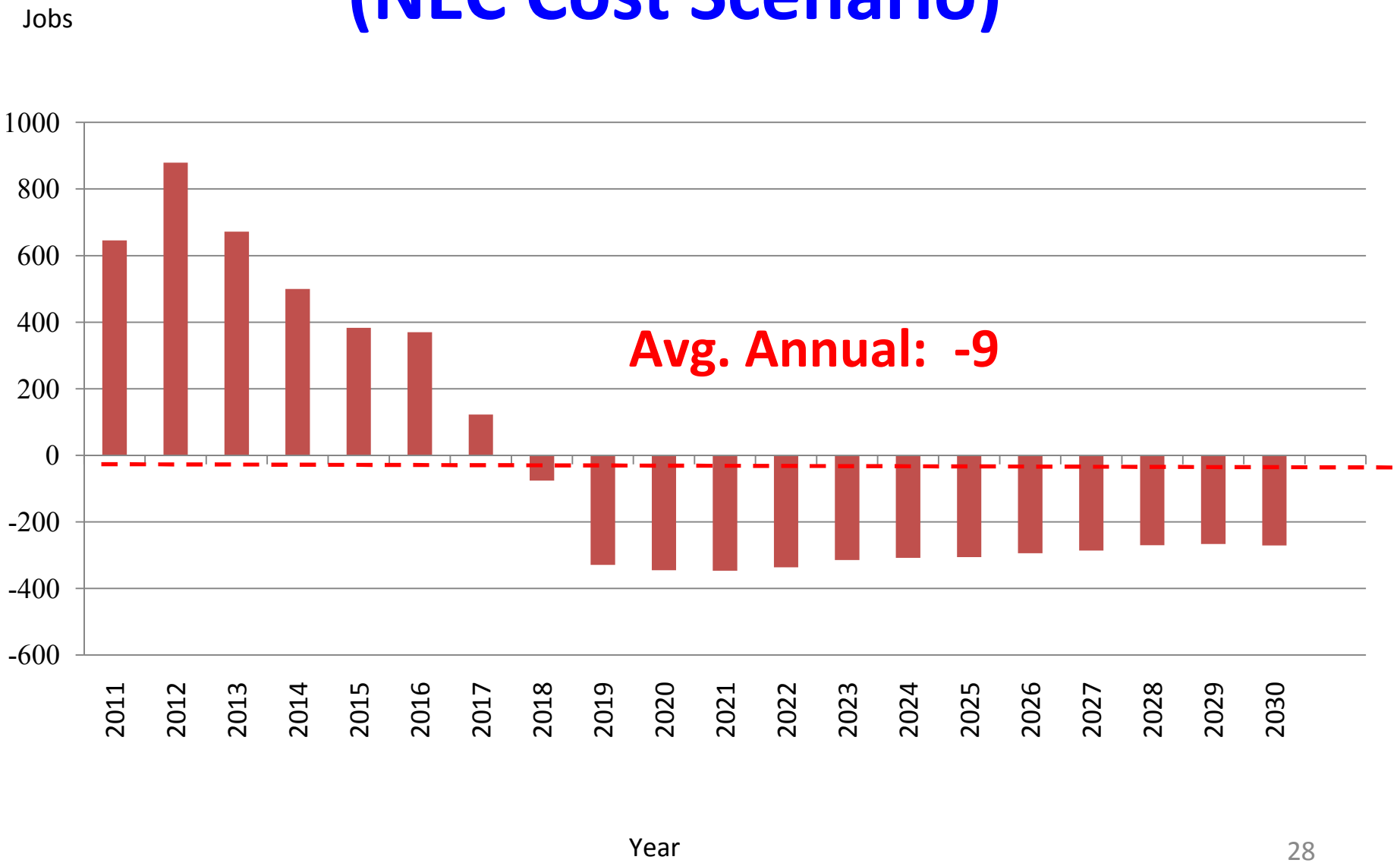
Average Annual Cost and Job Impacts (2011-2030)

Scenario	Cost (in millions)	Job Impact
ETS/NEXIDEA	$32	-2
NEC	$42	-9
WSPA	$85	+202

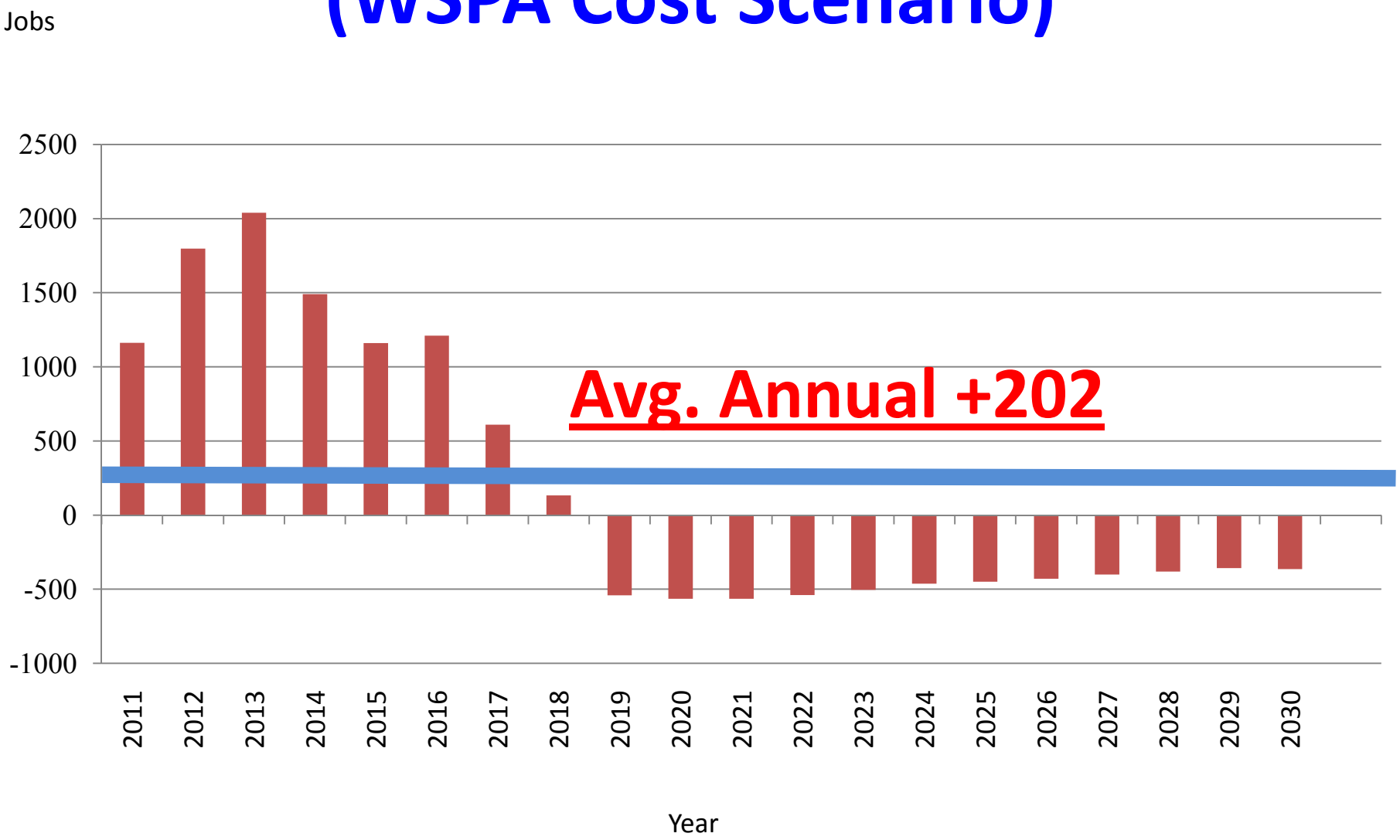
Annual Job Impacts (ETS/NEXIDEA Cost Scenario)



Annual Job Impacts (NEC Cost Scenario)



Annual Job Impacts (WSPA Cost Scenario)



Impacts on Petroleum Product Prices (in % Relative to U.S.)

Scenario	2014	2019	2030
ETS/NEXIDEA	0.06%	0.12%	0.11%
NEC	0.07%	0.15%	0.14%
WSPA	0.18%	0.36%	0.33%

CEQA Alternatives

- **Alternative A (No Project Alternative)**
  - **Existing SOx RECLAIM**
- **Alternative B**
  - **Only Sulfuric Acid, Coke Calciner, and Glass Plants are Affected (AQMP Scenario)**
- **Alternative C**
  - **Excludes Sulfur Recovery Units from the Proposed Amendments**

Average Annual Impact of CEQA Alternatives

Alternative	Cost (in millions)	Job Impact
Proposed Project	$32 to $42	-2 to -9
Alternative A	$0	0
Alternative B	$3 to $6	-29 to -36
Alternative C	$23 to $29	-37 to -69

Next Steps

- Draft revised Staff Reports & Socioeconomic Analysis released on October 5th, 2010 (30-day review). **Comments due by October 26**
- Three comment letters received on Draft PEA. Response to comment letters on-going.
- Continue discussion with stakeholders
- **Public Hearing – November 2010**