XTL Diesels Scenario Analysis

Gas-to-Liquids
Coal-to-Liquids
Petroleum Coke-to-Liquids

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Key Issues

- Diesel Demand
- Crude Oil Price
- XTL Supply (volume and timing)
  - GTL (World Supply)
  - CTL (National Supply)
  - PTL (California Supply)
- Projected Response to Incentives
  - 0.25¢-$1.00/gallon

XTL Technology

Biomass

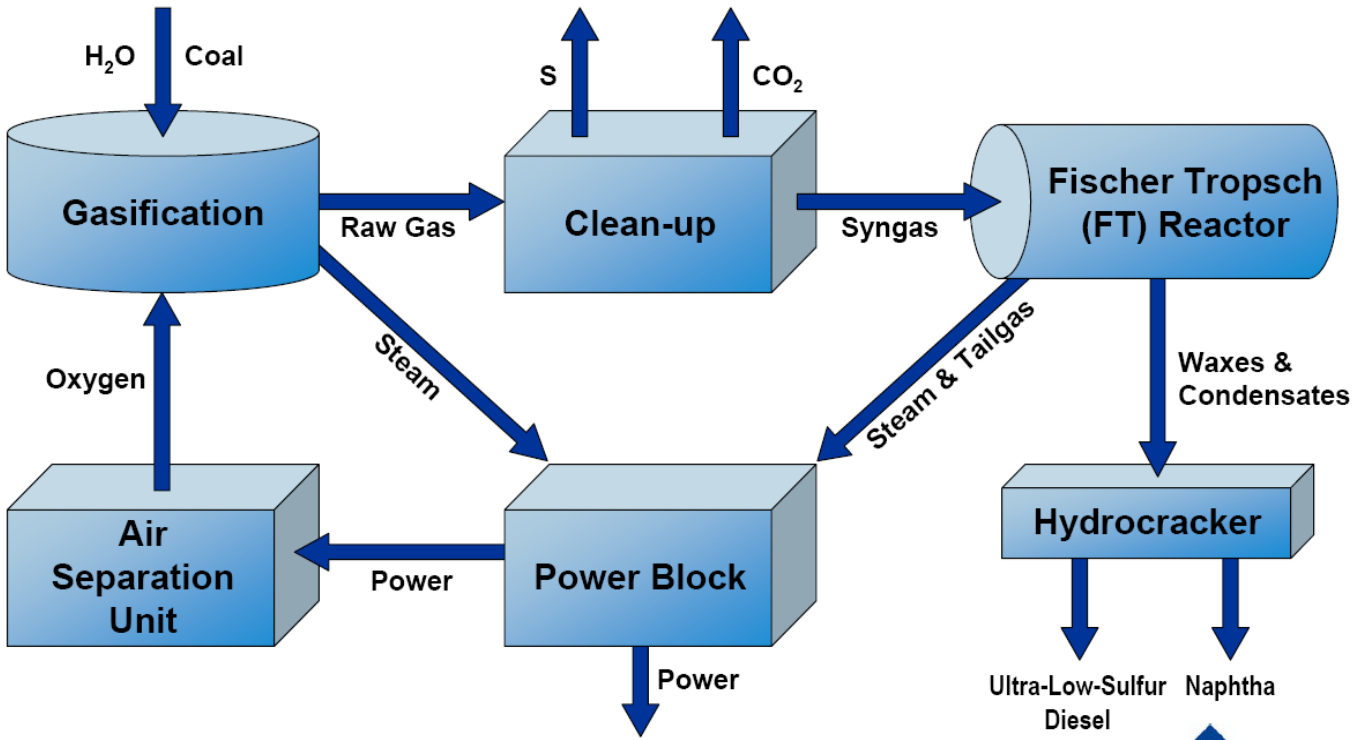
Coal

Land-Fill Gas

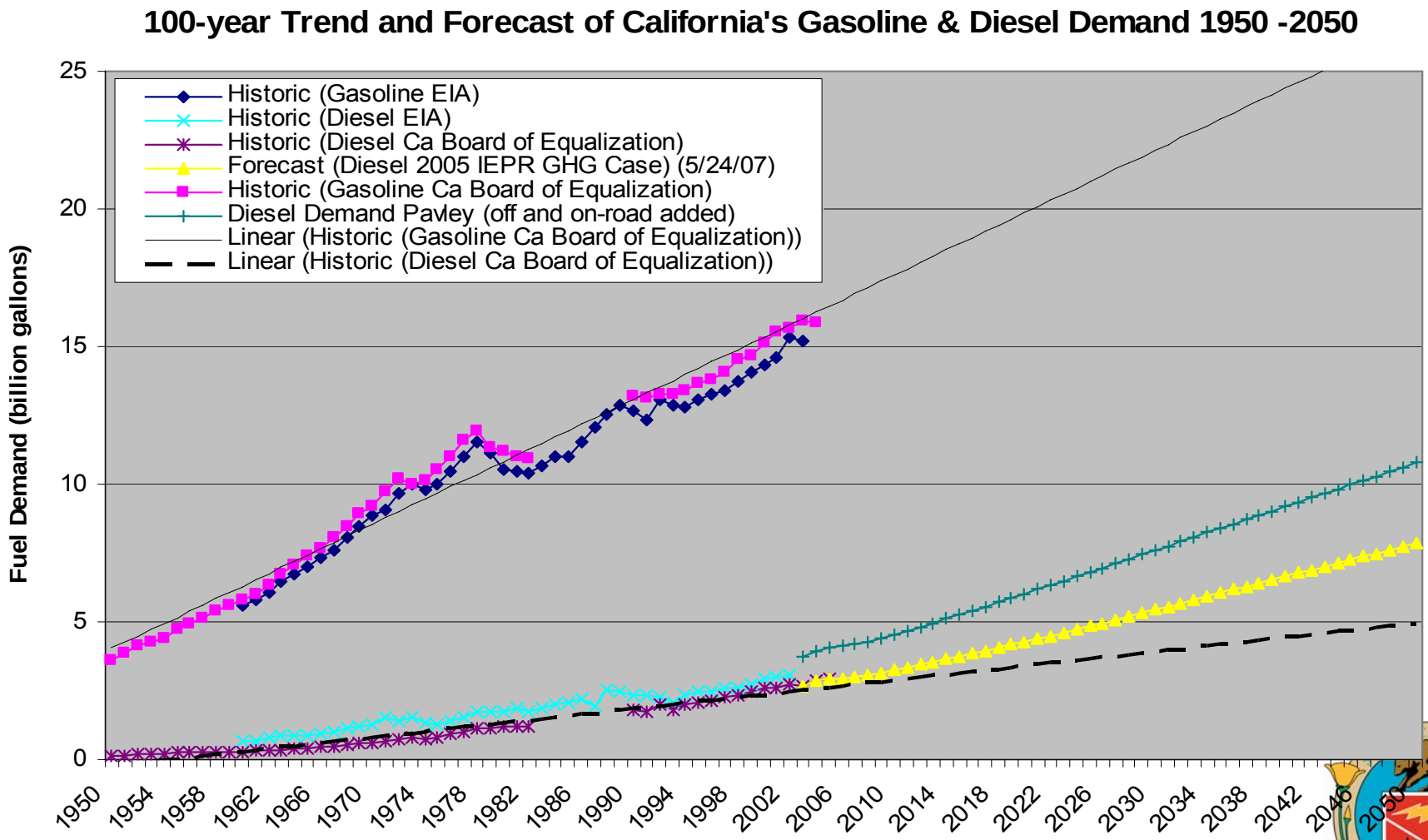
Natural Gas

Petroleum Coke

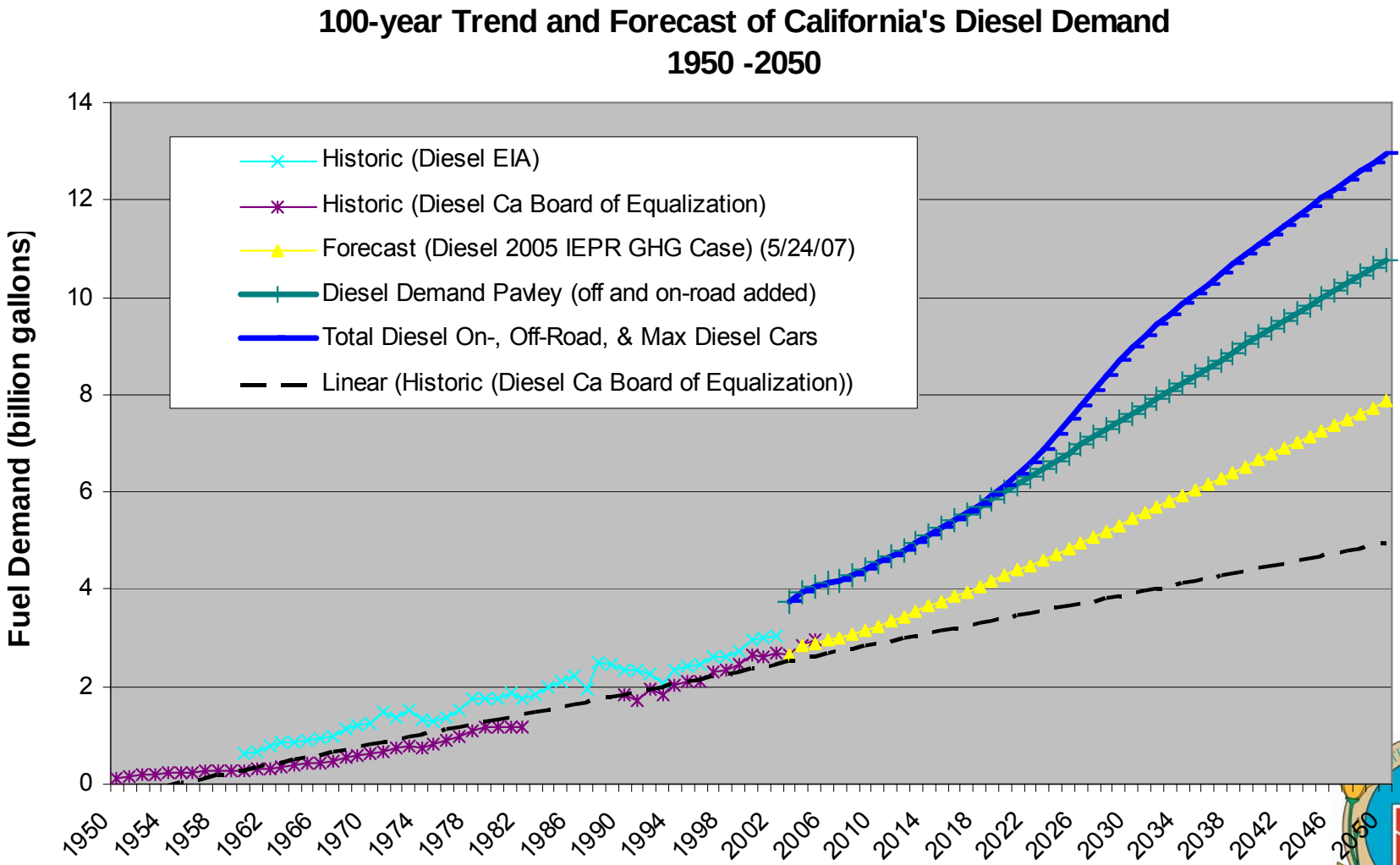
CTL Technology



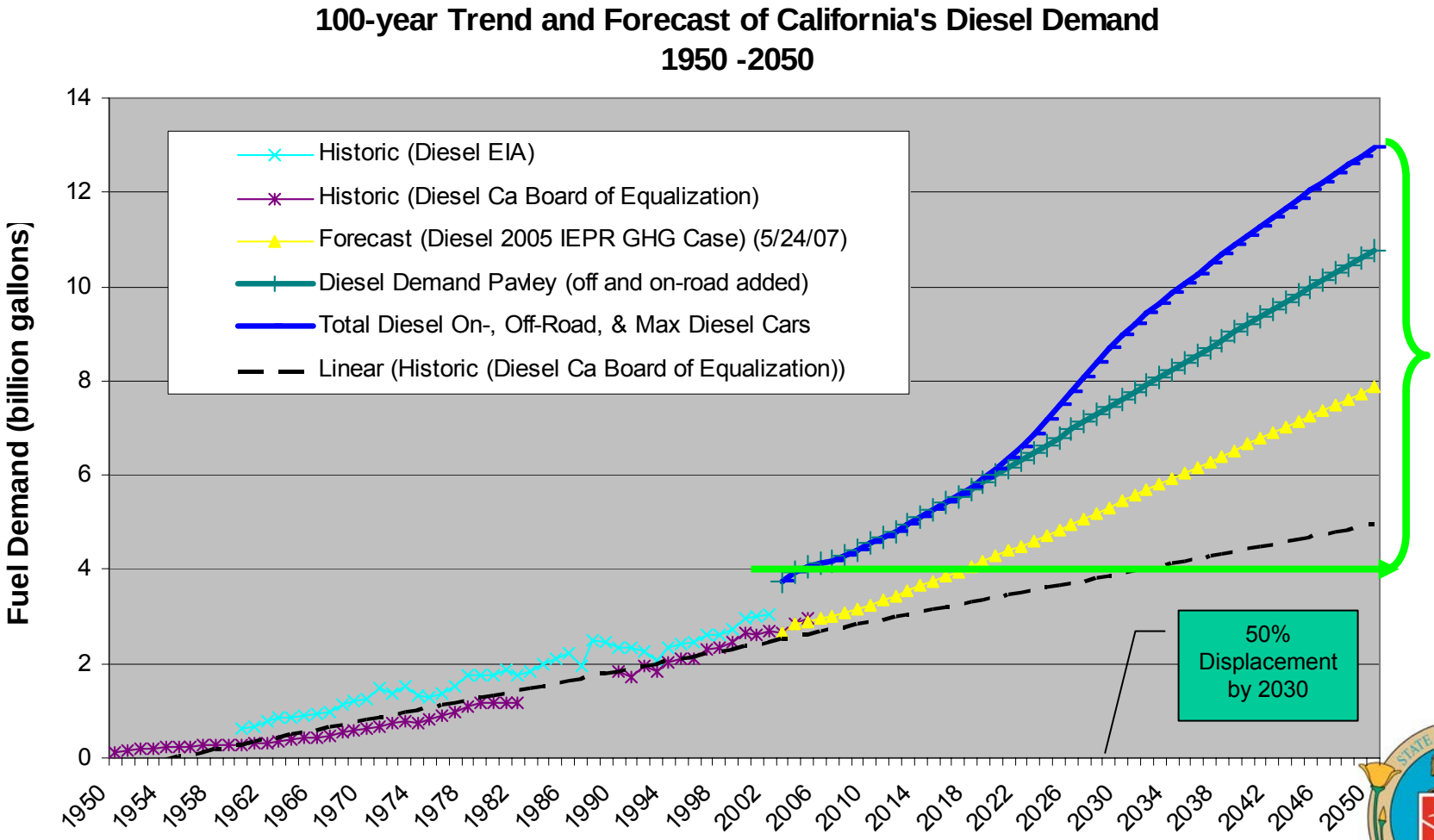
California's Fuel Demand is Strong and Steady



Diesel Demand



Opportunity for Alternative Fuels to Displace 60% Before Impacting Current Levels



Three Crude Oil Price Scenario

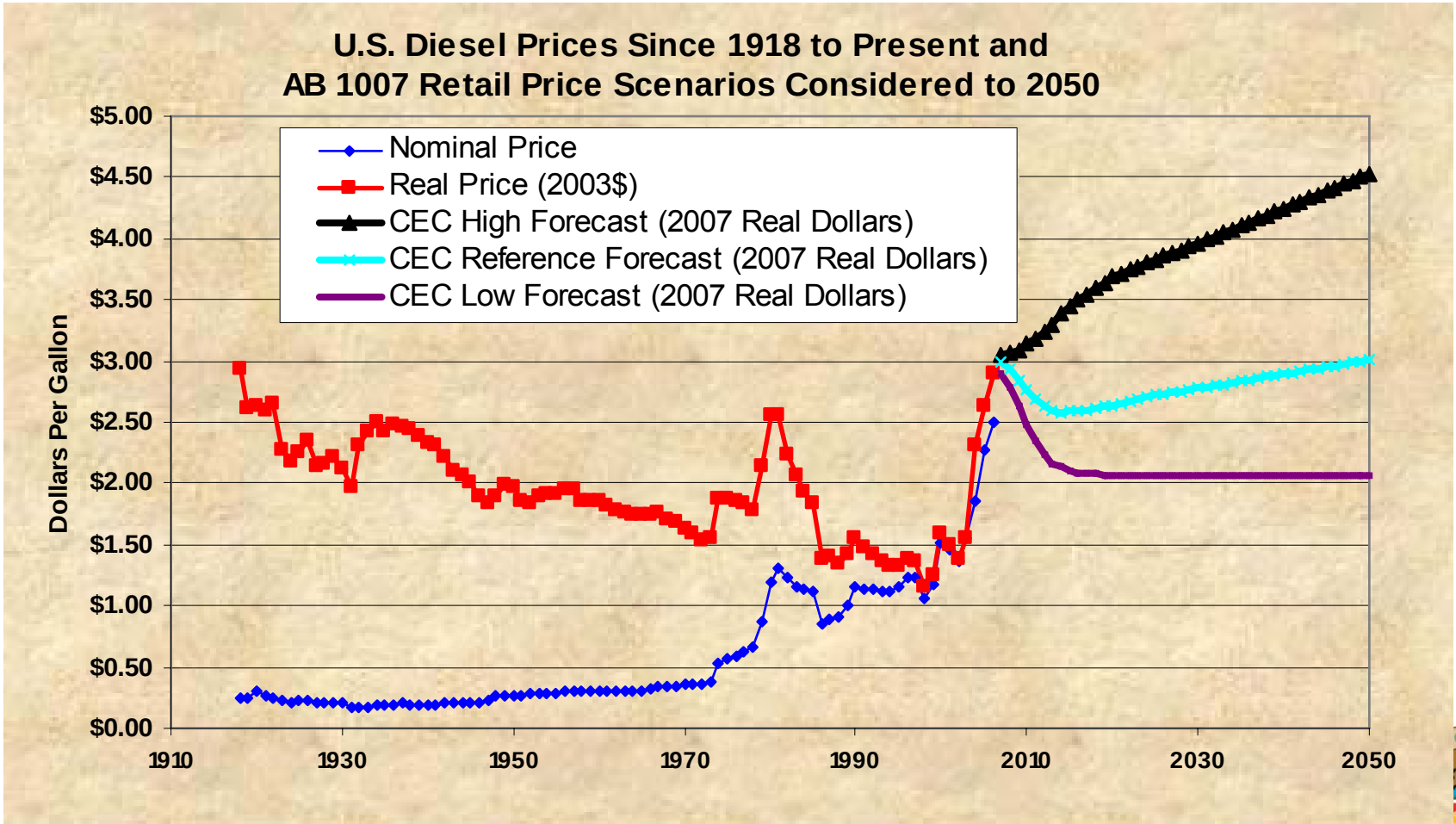
Crude Oil Price Scenario	2007	2012	2017	2022	2030	2050
High	63	70	83	90	99	121
Reference	63	49	48	51	55	64
Low	63	37	31	31	31	31

Prices are dollars per barrel, in constant 2007 dollars

Staff Linear Extrapolated EIA values to 2050

Source: 2007 EIA AEO

Retail Diesel Price Scenarios



New XTL Supplies

(In Billion Gallons)

Supply in a Low Fuel Price Scenario (Volumes)

Supply Options	2012	2017	2022	2030	2050
GTL	1	2	2	8	11
CTL	0	0	1	1	2
PTL	0.0	0.0	0.1	0.1	0.2
Total	1	2	3	10	13

Supply in a High Fuel Price Scenario (Volumes)

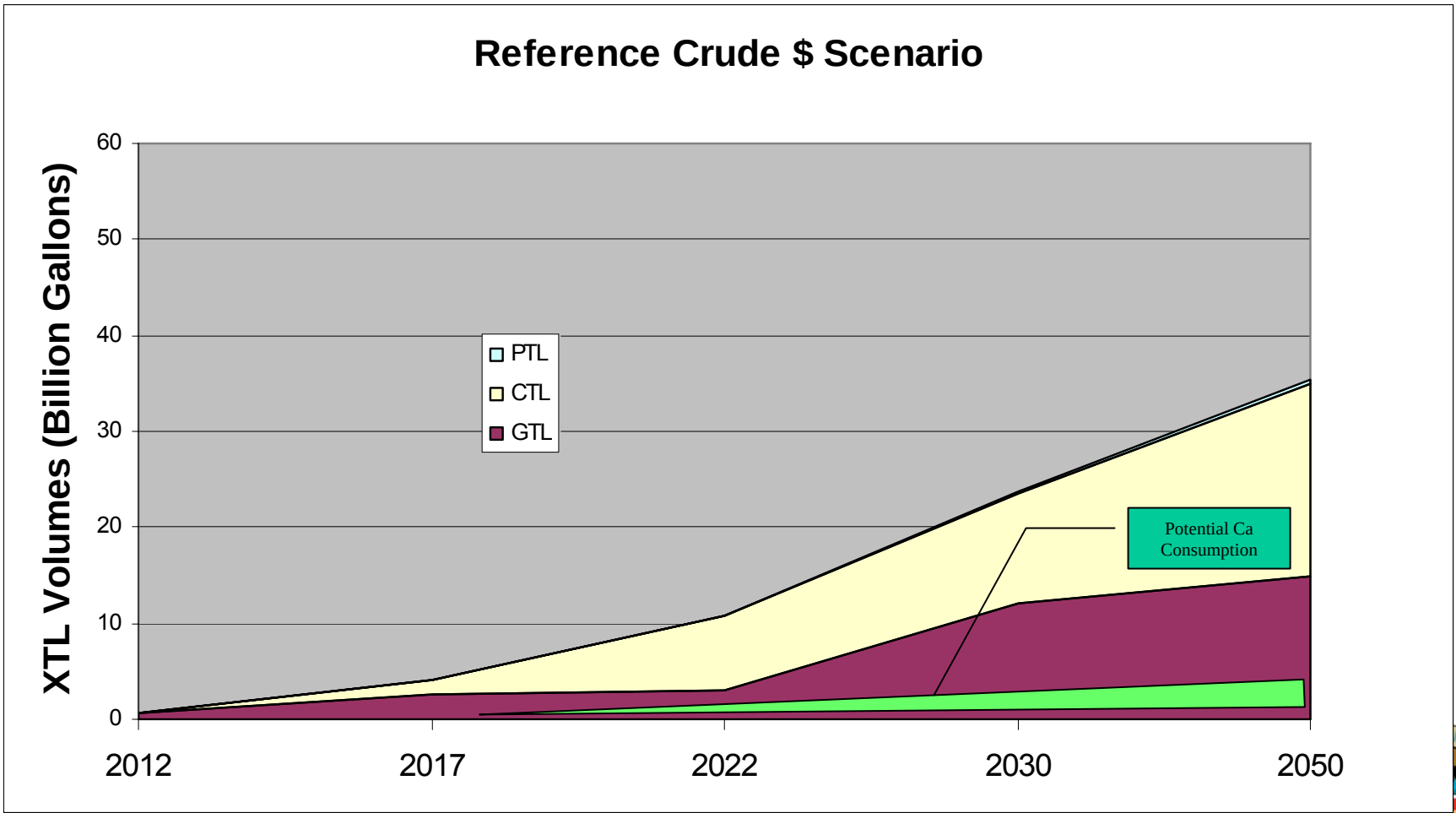
Supply Options	2012	2017	2022	2030	2050
GTL	1	3	4	16	20
CTL	0	0	21	26	31
PTL	0.0	0.0	0.2	0.3	0.4
Total	1	3	25	42	51

Supply in a Reference Fuel Price Scenario (Volumes)

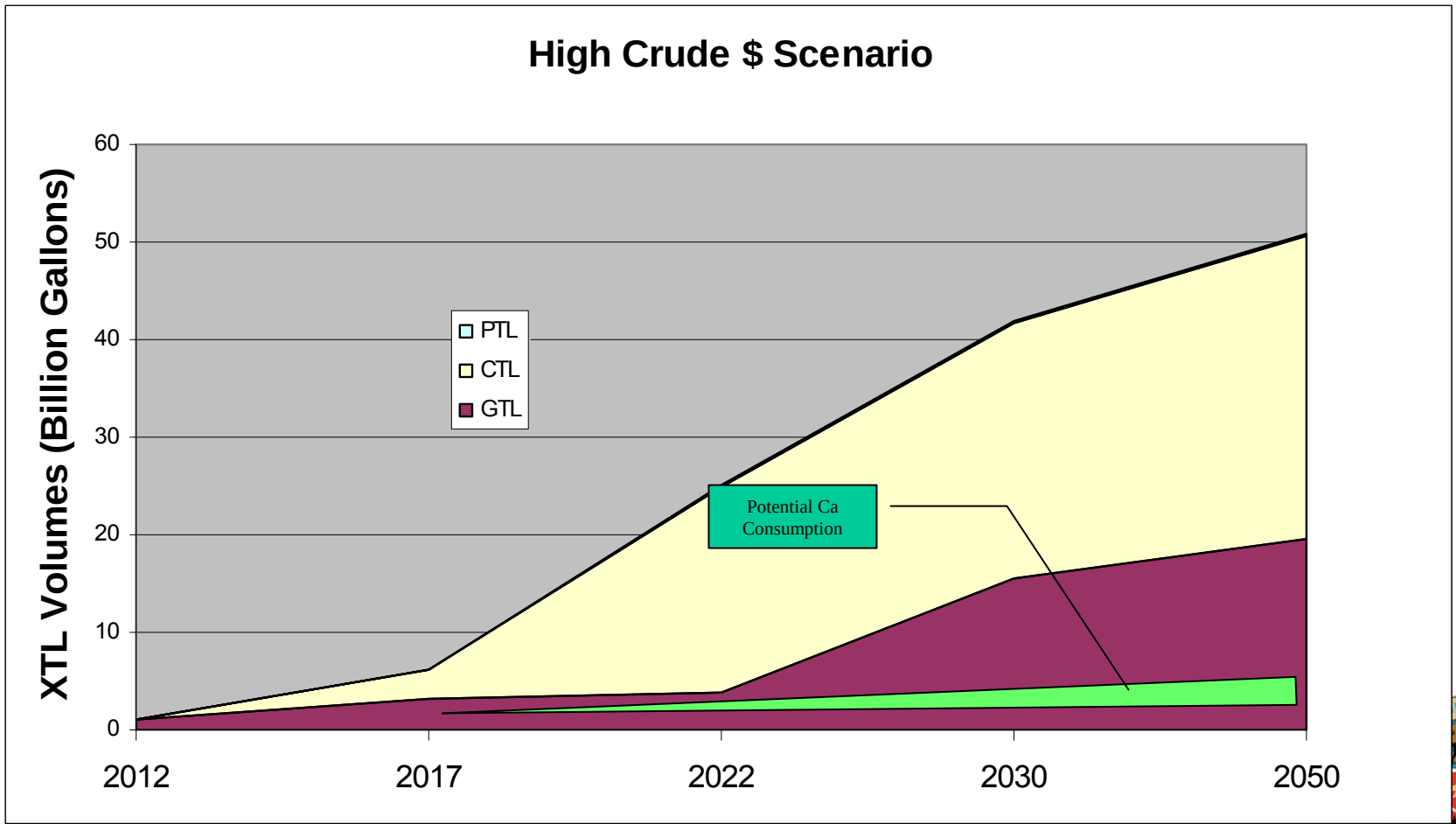
Supply Options	2012	2017	2022	2030	2050
GTL	1	3	3	12	15
CTL	0	1.5	8	12	20
PTL	0.0	0.0	0.2	0.2	0.3
Total	1	4	11	24	35

Sources: 2006, 2007 EIA AEO, Western Governor's Association Working Group, Oil & Gas Journal, Rentech, Shell, and Sasol-Chevron.

XTL Volumes – Reference $



XTL Volumes – High $



Greenhouse Gas Emissions

- GTL +-10% Reduction / Increase (LCA)
- CTL & (PTL) + 200% (LCA)

- Potential Zero net CTL and PTL GHGs[1]
  - 36-43% CoFeed Biomass
  - $30/ton GHG - $50 crude

[1] Source: Western Governors Association – CTL Working Group, Robert Williams, Princeton Environmental Institute Princeton University

Scenario Analysis - Baseline

- Less than 5% of Ca demand is met with XTL
- GTL sold to Europe, Pacific Rim, East Coast
- CTL sold to other nearby states
- Pet-Coke continues sold to Pacific Rim countries as sold fuel for power generation

Alternative Scenarios

- Production incentives: 25¢, 50¢, 75¢, & $1.00/gallon
- Facilitate Siting Petroleum Infrastructure Port Facilities, & Bulk Storage
- 10-year off-take contracts for CTL, PTL
- Favorable Tax Credits for PTL instate.
  - Pulls XTLs into Ca market
  - Accelerate CTL and PTL plants, and volume.

The Weakest Link
Market Supply Responses to Incentives

Table 4. 2030 Assumed XTL Supply Response to Incentives (per gallon)

	CTL Analysis		12%
Incentive	Low	Reference	High
0	0%	0%	0%
`25¢	0%	2%	3%
`50¢	0%	4%	6%
`75¢	1%	7%	10%
$1.00	1%	7%	11%
	10%		155%

	GTL Analysis		
Incentive	Low	Reference	High
0	1%	2%	3%
`25¢	6%	8%	10%
`50¢	14%	20%	26%
`75¢	17%	24%	31%
$1.00	18%	26%	34%
	70%		130%

	Pet Coke Analysis		
Incentive	Low	Reference	High
0	6%	10%	13%
`25¢	15%	25%	31%
`50¢	30%	50%	63%
`75¢	45%	75%	94%
$1.00	60%	100%	125%
	60%		125%

% of National Supply

% of World Supply

% of Ca Supply

Scenario Model Analytics

- Constructed for AB 1007 Criteria
- XTL and Renewable Diesels use same backbone - projected diesel demand vs % displacement
- Percent of XTL supply – Incentives
- ∑ Cost (Consumer, Gov, Fuel Prices, Fuel energy impacts)
- Emissions, Petroleum Reduction Cost effectiveness is quantified to 2050

Cost Effectiveness Results

XTL's Cost Effectivness Results for $1.00 per gallon incentive, 28% penentration
(keeps petroleum refining volume flat @ 2030)

Cumulative Years	Consumer's Incremental Expense (billion $)	Gov't Tx Revenue Expense (billion $s)	Gov Incentives Expense (billion $s)	Total Gov Expense (billion $s)	Petroleum Reduction (billions)	Alt Fuels Demand (billions)
2007 to 2012	0.00	0.00	0.03	0.03	0.03	0.03
2007 to 2017	0.00	0.00	0.74	0.74	0.74	0.74
2007 to 2022	0.00	0.00	5.47	5.47	5.47	5.47
2007 to 2030	0.00	0.00	20.56	20.56	20.56	20.56
2007 to 2050	0.00	0.00	75.35	75.35	75.35	75.35

NOTE: Positive Numbers are Reductions, Negative Numbers are Increases

Cost Effectiveness Analysis ($s per ton reduction)

Cumulative Years	Petroleum Reduction	NOx	CO	NMOG	Toxics	Particulate Matter	GHGs
2007 to 2012	1.000	8,681,394	331,001,242	28,354,793	29,734,278	410,859,729	732
2007 to 2017	1.000	8,693,100	331,001,242	28,354,793	29,774,213	410,859,729	732
2007 to 2022	1.000	8,857,409	331,001,242	28,354,793	30,334,711	410,859,729	732
2007 to 2030	1.000	9,662,014	331,001,242	28,354,793	33,078,203	410,859,729	732
2007 to 2050	1.000	10,854,660	331,001,242	28,354,793	37,141,126	410,859,729	732

Emissions & Petroleum Reduction

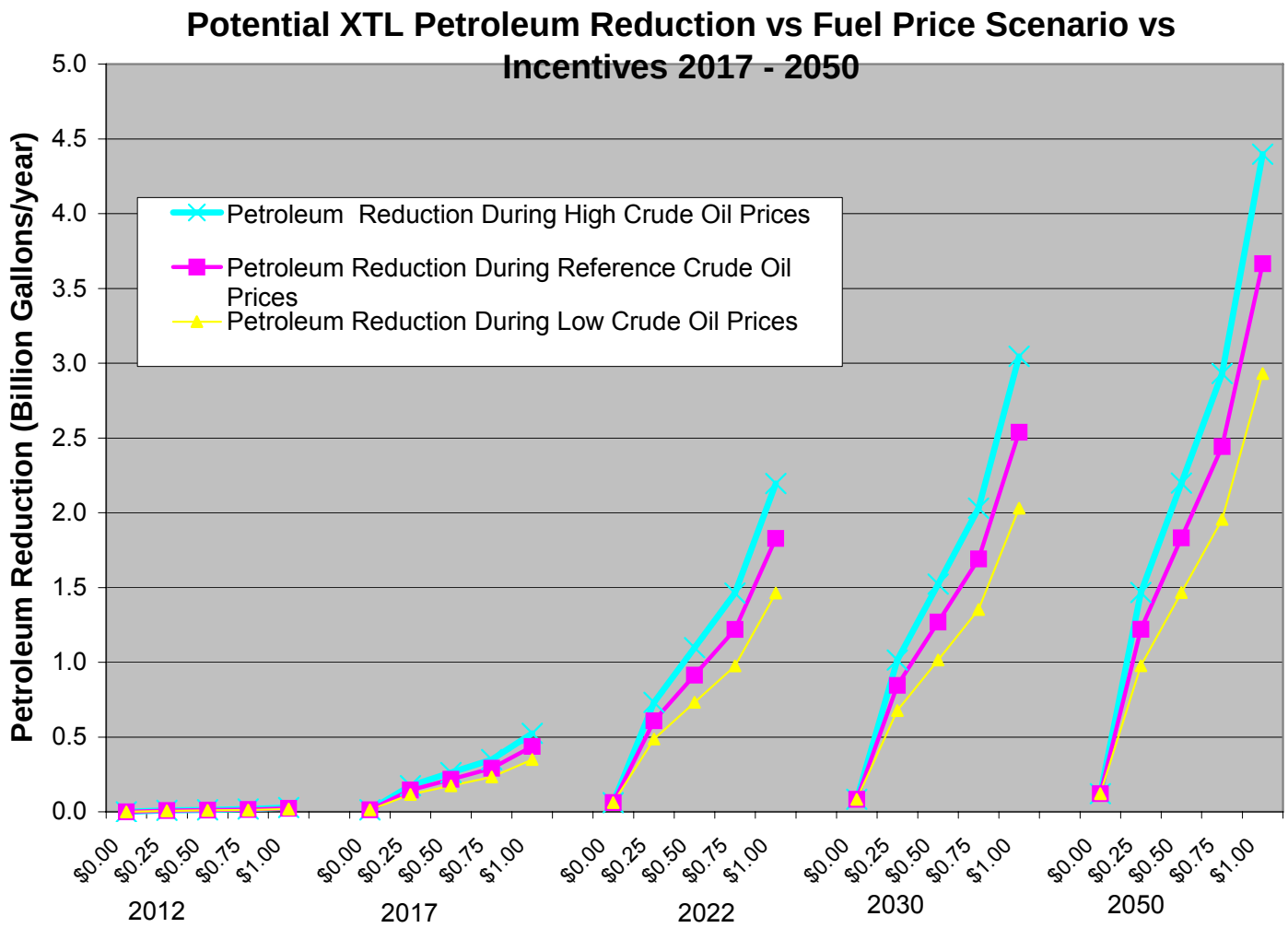
Based on 2005 IEPR Emission Analysis To Be Updated ASAP

XTLs 28%

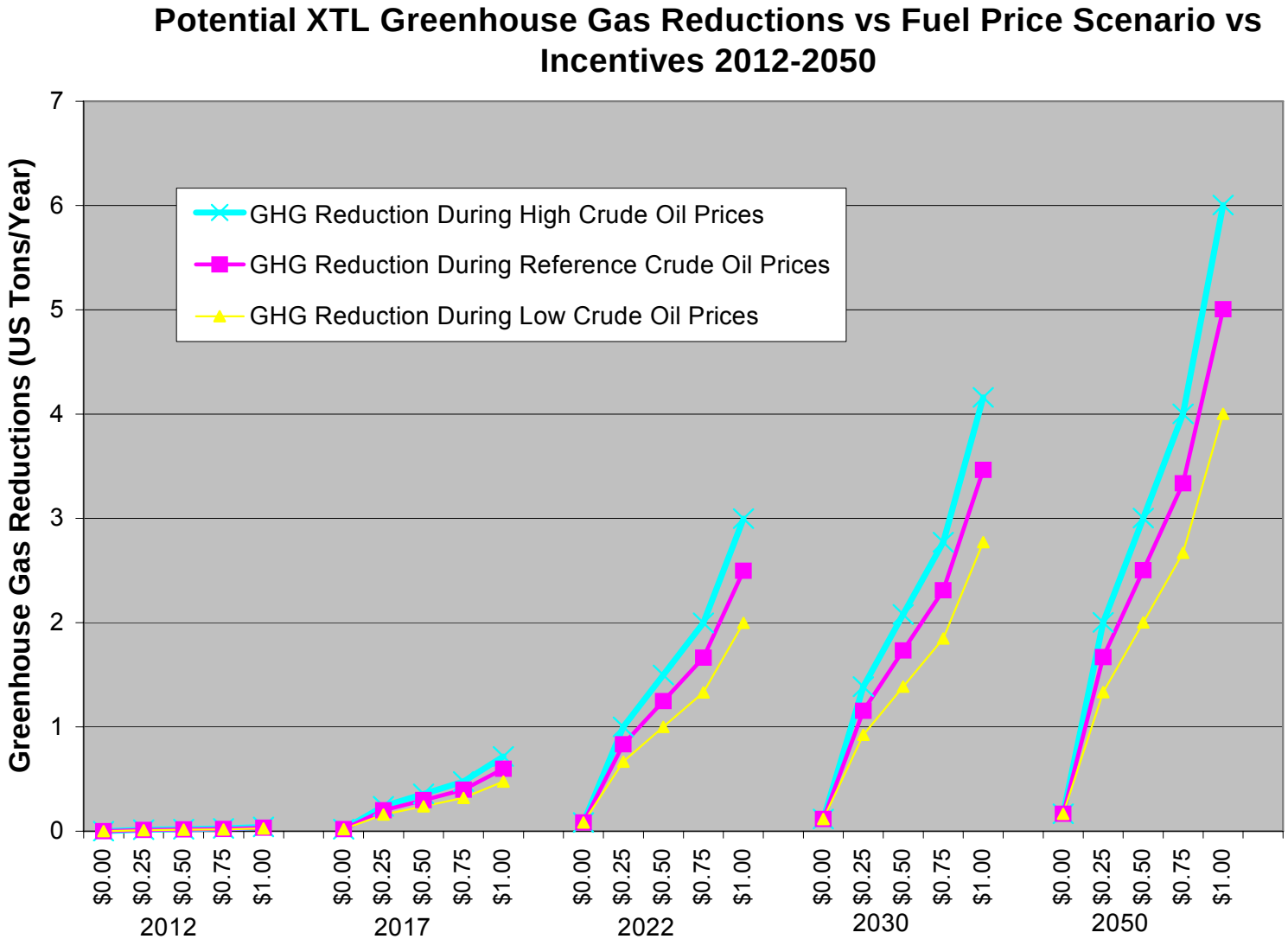
(Tons/year)

Single Year	NOx	CO	NMOG	Toxics	Particulate Matter	GHGs	Petroleum Reduction (billion gallons)
2012	2	0	1	0	0	23,850	0.017
2017	36	1	11	11	1	430,966	0.316
2022	151	4	48	44	3	1,869,812	1.369
2030	204	7	77	60	5	2,982,865	2.185
2050	274	10	113	80	8	4,371,849	3.202

Results Petroleum Reduction



GHG Reductions 10% GHG Benefit Assumed



Staff Recommendations

- Lack of bulk storage sufficient to receive XTLs shipments (and renewable diesels) from abroad and keep bulk XTLs segregated
  - Improved Permitting Process,
  - Legislature empower the Energy Commission to Oversee and facilitate the permitting process (at ports and inland).
- Lack of sufficient market demand for XTLs
  - DGS 10-year off-take contracts for in-state PTL plants
- Uncertainty about greenhouse gas sequestration mitigation.
  - Government needs to establish a sequestration framework, ie., regulation that provides regulatory certainty upon which plants could be built.
  - Evaluate and demonstrate carbon management

Continued - Staff Recommendations

- High risk of building PTL, coal, and bio-fed plants in California
  - Legislature should provide up to 50 cents per gallon /20-years for domestic XTL plants
    - Plants must: mitigate GHG to same levels as conventional petroleum refining
    - Credit applies to volumes produced when crude is below $50/bbl.
  - Accelerated depreciation tax rate

Comments - Suggestions