Energy Market Strategies and Policies: “Customers First” Approach

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Problem: Each Energy Market is Different
(With Different Customer/Stakeholder Needs)

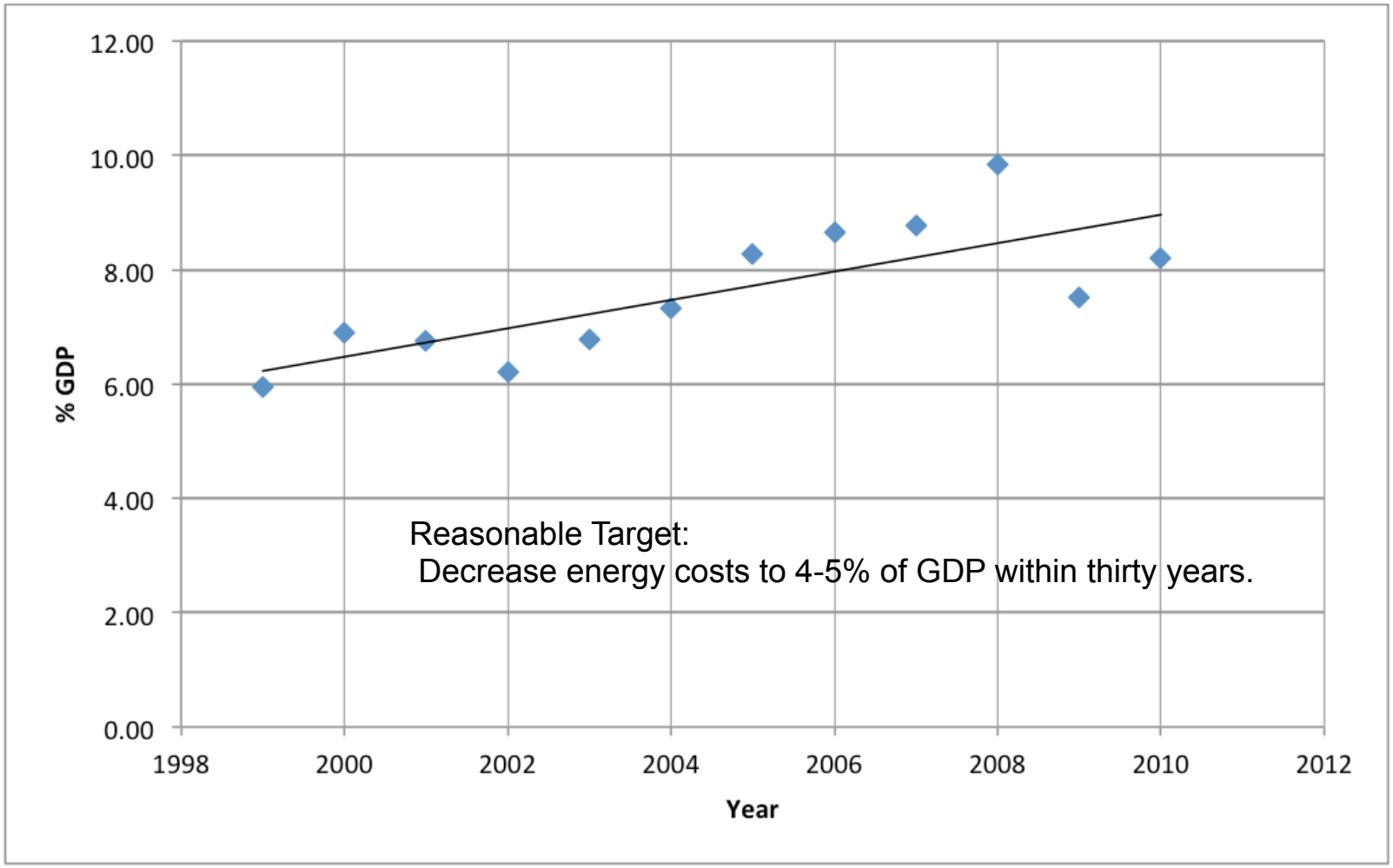
The three largest energy markets: vehicle fuels, electricity, and natural gas.

- Each energy market needs customized/optimized energy policies
  - Reaching an optimal solution set requires a knowledgeable “pick and choose” process.
  - A different set of optimal solutions work best for each energy market.
  - Different solutions have substantially different capital cost/ operating cost structures, with debt financing often the key to providing best value to stakeholders.

- Current energy policies rely on the value judgment “free market is best”.
  - Free energy markets have never functioned properly.
  - All the major energy markets currently exhibit dysfunctional outcomes inconsistent with perfect free market theories.
  - Using the “free market is best” value judgment to guide energy policies has increased customer and supplier costs substantially.

- The energy markets do not have level playing fields; privately owned projects receive subsidies larger than publicly owned projects.

Recent Rising Energy Cost Drag on U.S. Economy



Household Energy Expenses

Household Total Expenses approximately $50,000 annually include:

Housing energy expenses = $2000 annually (4.0%)

- Household electricity cost = $1300 annually (2.6%)
- Household natural gas or heating oil = $700 annually (1.4%)

Transportation fuel costs

- Gasoline and diesel expenses = $2300 annually (4.6%)
- Large variation with oil price

Household energy expenses are 8.6% of total expenses

Historical data:

- In 1980, expenses were approximately 12%.
- In 2000, expenses were approximately 7%.
- Over 90% of expenses are spent on fossil fuel based energy.

Reasonable Target:

In 2040, energy should comprise only 4% (four points) of total expenses.

- Fossil fuel based energy should comprise less than 1 point of this target.
- Green energy sources should comprise 3 points of this target.
- Vehicle fuels/energy should add 1 point to this target, comprising only 25% of household expenses versus 55% today.

Set-up for Three-Case Comparison

	Current Energy Policies (“Suppliers First”)	Price GHG Emissions + Green Energy Standards	“Customers First” Energy Policies
Results and Outcomes	Use wars to secure energy supplies.	Raises energy prices; but energy costs level due to improved efficiency.	Lowers energy costs.
	Provides safe reliable market for high cost crude oil.	Relies on “free market” participants for intelligent decisions.	Relies on expert decision makers for important energy decisions
	Makes the World safe for …. … well, not for humans!	Helps make the world safe for people!	Saves our home planet!
	Depletes America’s natural gas at low prices.	Reduces natural gas reserves quickly.	Conserves natural gas reserves for use over the long haul.
	Damages or destroys America’s farms, ranches, forests, fisheries, coasts, etc.	Slow to mitigate substantial environmental degradation.	Best shot to substantially reduce environmental degradation.

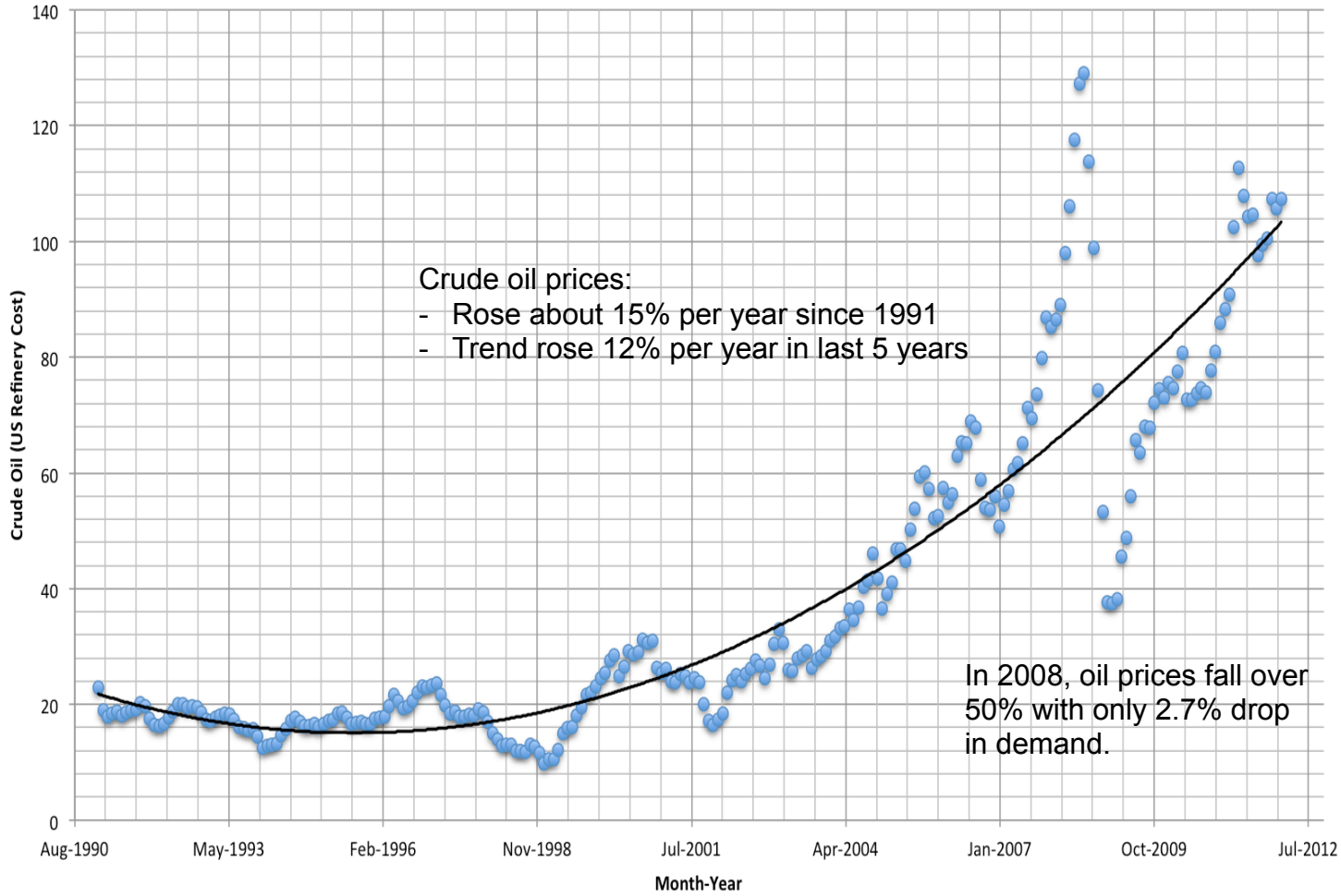
‘Customers First’ Energy Policies Work Better

How Well Do Alternative Policies Meet Customer Needs?	Voice of the Customer (VOC)			
Suggested Energy Policy Strategies	Reduce Total Cost	Decrease Environmental Risks	Increase Positive Economic Impact	Reduce National Security Issues
"Deny and Delay" - BAU and defer serious GHG mitigation efforts		increased risks	decreases growth	increased risks
Use 'Free Market' GHG Mitigation plans - e.g. carbon fee or cap-and-trade	increases costs			
'Customers First' policies and actions				

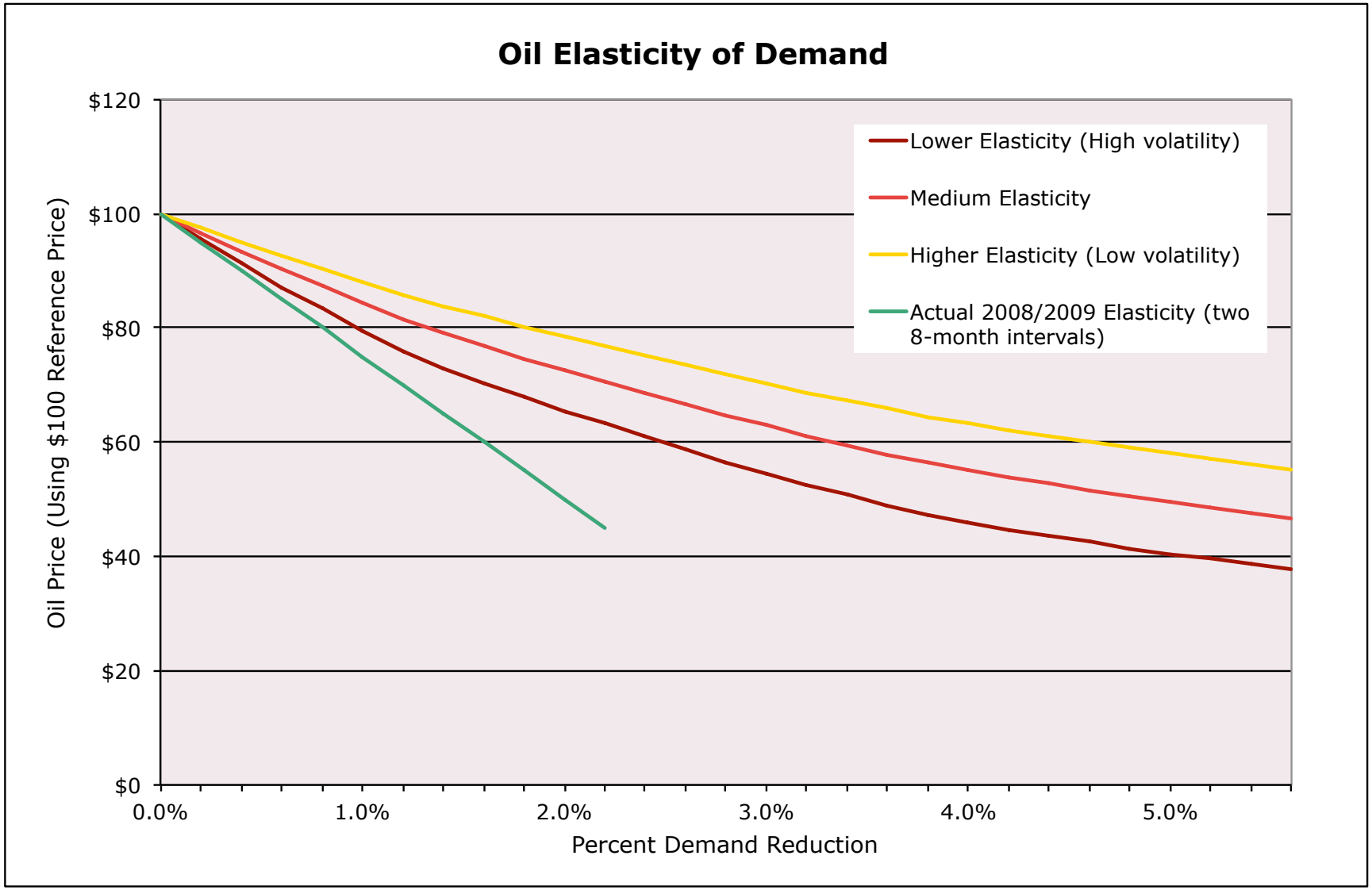
Vehicle Fuels Market: Analysis Overview

- Dysfunctional Crude Oil Market
  - Oil price greatly exceeds crude oil cost (= finding cost + lift cost)
  - Subsidies for fossil fuel projects and investments, plus lack of cost for externalities has resulted in a huge misallocation of capital
- Substitute Fuels or Substitute Vehicles Reduce Demand for Crude Oil
  - Oil price volatility and impact from 5+% substitution in the global markets drives down oil prices.
  - Cost savings to customers greatly exceeds cost of substitute products capturing 5% of the oil products market.
- Setup a Green Vehicle Group (GVG) to invest in substitutes
  - Levy a crude oil tax (based on falling oil prices) to capture a fraction of the customer cost savings.
  - Use the tax proceeds to fund GVG investments in substitutes

Crude Oil Prices: Since 1990



Oil Market Price Volatility



Green Vehicle Group (GVG) Strategy

- Form a jointly owned, independent company to promote initiatives and subsidies that will encourage growth in the green vehicle market .
- Propose and enact policies to incentivize public and private companies to reduce crude oil consumption
- Use the crude oil cost savings to reimburse the Green Vehicle Group's investments and subsidies.
- Fuel substitution decreases the fossil energy cost per mile driven by over 80%, although, investments in green vehicle manufacturing, battery storage, biofuels, and power distribution increase substantially as investments shift to these sectors.
- Possible Green Vehicle Group members:
  - Vehicle manufactures
  - Battery manufacturers
  - Power generators and distributors
  - Cities and States
  - Major oil companies

Examples that Reduce Crude Oil Demand

- Provide increased incentives to green vehicle manufacturers and marketers, reducing green vehicle costs to customers:
  - Increase green vehicle incentive to over $15,000 for PHEVs or EVs
  - Increased incentives substantially increase fleet penetration
- Provide incentives to biofuel producers
  - Increase biofuel compensation 20-50% (received by biofuel producers)
  - Reduces biofuel prices to customers to less than gasoline or diesel
- Invest to deploy more fuel efficient vehicles, or alternate vehicles
  - Incentives to deploy electric motorcycles or scooters, or even bicycles
- Expand and improve mass transit in key areas of the county
- Expand and improve high speed rail both short and long distances
- Provide incentives for homeowners to switch from heating oil to heat pumps

Increase Green Vehicle Incentive

Provide increased incentives to green vehicle manufacturers and marketers, reducing green vehicle costs to customers:

- Current green vehicle incentive not attractive to many customers
  - Currently US tax credit maximum = $7500 (California adds $2500 to max $10,000)
  - Current cost premium for green vehicles exceeds $20,000
  - Current incentive reduces cost premium to customer to $12,500 (CA = $10,000)
  - Average customer saves $1200-$1800 per year in fuel costs (6-10 year payout)
- Increase green vehicle incentive to over $15,000
  - Higher incentive reduces cost premium to less than $5000
  - Results in 3-4 year payout for customers

Analysis of Fleet Penetration and Tax Credits

Incentivized Green Vehicle Penetration into the American Vehicle Fleet

Adding extremely generous incentives to existing tax credit should capture 40-50% of new vehicle market by 2020, with fleet penetration over 20%.

Annual Vehicle Additions/Replacements

	Annual Growth	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Vehicle Fleet Additions	0.2%	24	24	24	24	24	25	25	25	25	25	25	25	25	26	26
Biofuel	30%	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.3	1.7	2.2	2.9	3.8
PHEV & EV	S-curve	1.6	2.5	4.5	6.0	7.5	9.0	10.4	11.5	12.1	12.1	12.1	12.1	12.1	12.1	12.1
CNG	25% / 20%	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8
Mogas & Diesel	0.20%	22	21.4	19.5	18.1	16.6	15.1	13.7	12.5	11.9	11.7	11.5	11.1	10.6	10.0	9.1
Green Vehcile Market Penetration		7.1%	10.9%	19.2%	25.5%	31.8%	38.0%	44.1%	48.6%	51.4%	52.1%	53.0%	54.3%	56.1%	58.4%	61.5%
Extra Incentive per vehicle	*Thousand $*	*14.0*	*12.0*	*11.0*	*10.0*	9.0	8.1	7.3	6.6	5.9	5.3	4.8	4.3	3.9	3.5	3.1
Cost of Incentives	*Billion $*	22	30	50	60	68	73	76	75	71	64	58	52	47	42	38
Accumulative Cost	*Billion $*	22	52	102	162	229	302	378	**454**	525	589	647	699	745	787	**825**

Adding incentives to existing tax credit could cost over $800B in fifteen years, but could replace 50% of the fleet

American Vehicle Fleet Composition

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Vehicle Fleet	230	230	231	232	233	235	236	237	238	239	241	242	243	244	245	247
Biofuel	0.4	0.5	0.6	0.8	1.0	1.2	1.6	2.1	2.7	3.4	4.5	5.8	7.5	9.7	12.6	16.4
PHEV & EV	0.0	1.6	4.1	8.6	14.6	22.1	31.1	41.6	53.1	65.1	75.6	85.1	92.7	98.7	103.3	106.4
CNG	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0	1.3	1.6	2.0	2.5	3.1	3.7	4.6
Mogas & Diesel	230	228	226	223	218	211	202	193	181	170	159	149	140	133	126	119
Green Vehicle Fleet Penetration	0.2%	0.9%	2.0%	4.0%	6.7%	10.0%	13.9%	18.4%	**23.4%**	28.6%	33.3%	37.6%	41.2%	44.4%	47.2%	**49.8%**

✧ An American Green Vehicle ramp could reduce world oil demand by 3-4% by 2020 due to 20+% fleet penetration…

… and within 15 years, America's green vehicle could reduce world oil demand by 9%.

✧ If other countries ramped green vehicles at half this rate, demand could fall almost 10% by 2020 ...

… and within 15 years, world oil demand could fall over 20%.

Impact of fleet change on American oil demand, plus lower substitution globally, on Global Oil Market

Demand In million barrels per day	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Mogas/ Diesel	13.0	12.9	12.8	12.6	12.3	11.9	11.5	10.9	10.3	9.6	9.0	8.4	7.9	7.5	7.1	6.8
Oil for Mogas/ Diesel	14.3	14.2	14.1	13.9	13.6	13.1	12.6	12.0	11.3	10.6	9.9	9.3	8.7	8.3	7.8	7.4
Total Oil consumption	16.9	16.8	16.7	16.5	16.2	15.7	15.2	14.6	13.9	13.2	12.5	11.9	11.3	10.9	10.4	10.0
Reduction: Oil Demand	0.0	0.1	0.2	0.4	0.7	1.2	1.7	2.3	3.0	3.7	4.4	5.0	5.6	6.0	6.5	6.9
World Oil Demand	89.0	89.0	89.0	89.0	89.0	89.0	88.1	87.2	85.5	83.8	82.1	80.5	78.8	77.3	75.7	74.2
% Reduction in Gobal Demand (due to lower American demand)		0.1%	0.2%	0.5%	0.8%	1.3%	1.9%	2.6%	**3.5%**	4.5%	5.4%	6.2%	7.0%	7.8%	8.5%	**9.3%**
% Reduction in Gobal Demand (due to lower foreign demand)		0.1%	0.1%	0.2%	0.4%	0.7%	1.0%	1.3%	1.8%	2.2%	2.7%	3.1%	3.5%	3.9%	4.3%	4.6%
% Reduction in Gobal Oil Demand		0.2%	0.3%	0.7%	1.3%	2.0%	2.9%	4.0%	**5.3%**	6.7%	8.0%	9.4%	10.6%	11.7%	12.8%	**13.9%**
Forecast Oil Price	$84	$88	$93	$94	$91	$85	$72	$53	**$41**	$39	$39	$40	$44	$46	$51	$56
Trend Oil Price 8% / year	84	91	98	106	114	123	133	144	155	168	181	196	212	228	247	266
Foreign fleet growth	1.00	1.02	1.04	1.06	1.08	1.10	1.13	1.15	1.17	1.20	1.22	1.24	1.27	1.29	1.32	1.35
% Reduction Gobal Demand (if GV penetration of foreign fleet is half US)		0.4%	0.7%	1.4%	2.4%	3.7%	5.3%	7.2%	**9.5%**	11.9%	14.1%	16.3%	18.2%	19.9%	21.5%	**23.0%**

Faster American Green Vehicle substitution increases the costs of existing tax credits:

- Over 15 years, the tax credits cost over $1 trillion, **but**…

  … **direct customer cost savings** due to lower volumes of crude oil purchased **exceed $3.5 trillion**.

- Could we recover a portion of the cost savings to cover the cost of the tax credits?

  Direct customer cost savings cover the annual cost of tax credits in the 7th year, so some kind of tax could be levied to recover increased cost of existing tax credits due to faster substitution without imposing higher costs on customers (more on this later in this report).

Cost of Existing Tax Credits would Rise with Faster Green Vehicle Deployment, but Customer Direct Cost Savings Rise More

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
8% Oil Inflation Case:	Reference Oil Price based on 8% annual price increase (48 month rolling average), versus 10.7% annual increase over last 15 years																
Reference Oil Price		$84	$91	$98	$106	$114	$123	$133	$144	$155	$168	$181	$196	$212	$228	$247	$266
Direct Oil Cost Savings (reduced oil demand)	*Billion $*		4	7	16	31	53	82	121	170	229	291	359	429	503	582	668
Cumulative Direct Oil Cost Savings	*Billion $*		4	11	27	59	111	193	314	484	713	1004	1363	1793	2296	2878	**3546**
Cost of Tax Credits (with large GV fleet)	*Billion $*		12	19	34	45	56	68	78	86	90	90	90	90	90	90	90
Cumulative Cost of Tax Credits	*Billion $*		12	31	65	110	166	233	312	398	488	579	669	759	850	940	**1031**
Direct Oil Cost Savings less Cost of Tax Credits	*Billion $*		-8	-20	-37	-51	-55	-40	**2**	86	225	426	694	1033	1446	1938	**2515**

Costs of extra incentives to ramp American Green Vehicle fleet:

- Over 15 years, the extra incentives cost over $800 billion, but…

  … indirect customer cost savings due to lower prices for crude oil exceeds $6.6 trillion.
- Could we recover a portion of the indirect cost savings to cover the cost of the extra incentives?
- Customers' indirect savings cover the cost of the extra incentives within three years.
- Option to recover costs of both the tax credits, and additional incentives:

  Use a variable crude oil tax based on the decline in oil price below a reference oil price trend.

Reference Oil Price		$84	$91	$98	$106	$114	$123	$133	$144	$155	$168	$181	$196	$212	$228	$247	$266
Forecast Oil Price (48-month moving average)		$84	$88	$93	$94	$91	$85	$75	$65	$59	$54	$47	$44	$40	$40	$40	$40
	Note: Forecast oil price based on world oil demand elasticity of 0.06 for the first 3 percent of demand drop.																
Indirect Oil Cost Savings (reduced oil prices)	*Billion $*	16	33	73	136	223	323	419	492	547	614	659	710	747	787	829
Cumulative Indirect Oil Cost Savings	*Billion $*	16	49	122	258	481	804	1223	1714	2262	2876	3535	4245	4992	5780	**6609**
Cost of Extra Incentives	*Billion $*	22	30	50	60	68	73	76	75	71	64	58	52	47	42	38
Indirect Oil Cost Savings less Incentive Costs	*Billion $*	-6	3	24	76	155	250	343	416	476	550	601	658	701	745	791
Cumulative Cost of Extra Incentives	*Billion $*	22	52	102	162	229	302	378	454	525	589	647	699	745	787	**825**
Cumulative Indirect Savings less Incentives Costs	*Billion $*	-6	-3	**20**	96	252	502	845	1261	1737	2287	2888	3546	4247	4992	**5784**

Recovering costs of extra incentives using a crude oil tax based on 30% of customer crude oil purchase cost savings:

- ✧ Cumulative cash flow over 15 years exceeds $1.1 trillion.
- ✧ Highest cumulative net investment is approximately $85 billion in year 4 and year 5.
- ✧ Before-tax IRR equals 37%, and could be higher if crude oil prices fall due to reduced demand, as much as occurred in 2008.
- ✧ Forecast of crude oil price forecast assumes low to moderate levels of similar policies enacted by large oil consuming countries.

Green Vehicle Incentives Cost/Benefit Analysis

Incentive using Inflating Reference Price: Cost Savings Share: **30%**

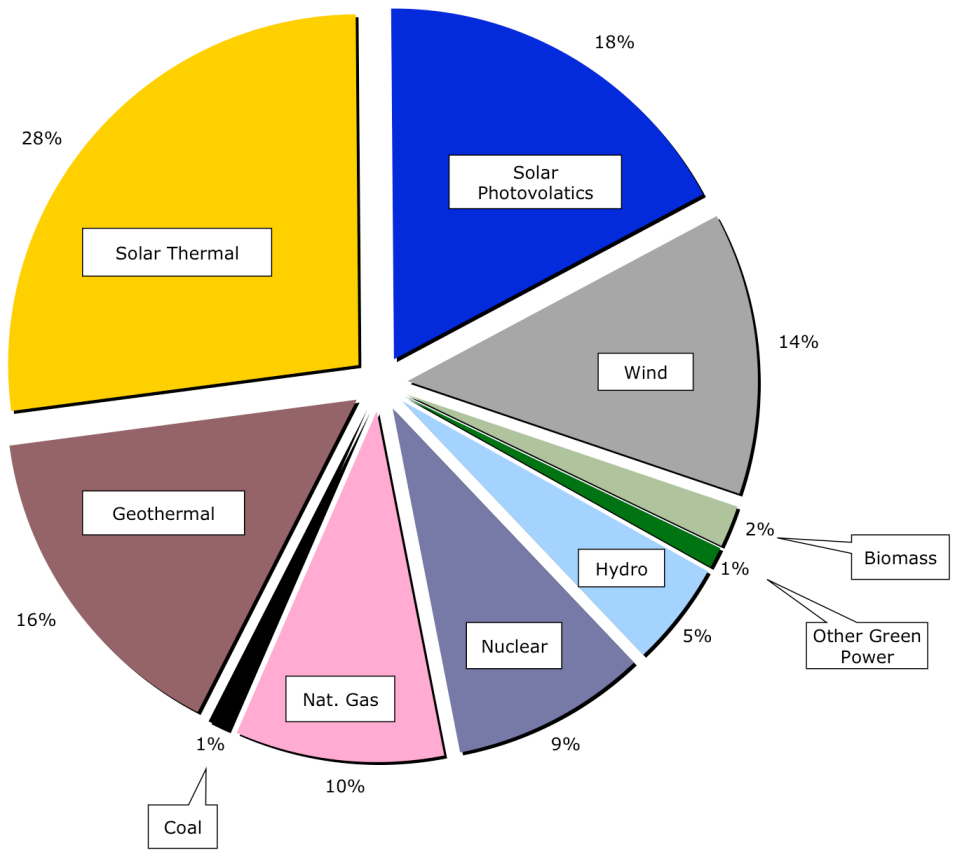
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
GV Incentive Oil Tax	0	1	2	4	7	12	17	24	29	34	40	46	51	57	62	68	
GV Incentive Proceeds	0	5	10	22	41	67	97	126	147	164	184	198	213	224	236	249	
Accumulative Proceeds	*Billion $*	5	15	37	77	144	241	367	514	679	863	1060	1273	1498	1734	1983	
Oil Price + Incentive Tax	84	89	94	97	98	96	93	89	88	88	87	89	91	97	102	108	
delta Effective Oil Price	0	-2	-4	-9	-16	-27	-41	-55	-68	-80	-94	-106	-120	-132	-145	-159	
	GV Group Economic Analysis																
Incentive Costs		22	30	50	60	68	73	76	75	71	64	58	52	47	42	38	
Savings Share Income		5	10	22	41	67	97	126	147	164	184	198	213	224	236	249	BT IRR
Net B4-Tax Cash Flow		-18	-20	-28	-19	-1	24	49	72	93	120	140	161	177	194	211	***37%***
Cumulative Cash Flow			*-38*	*-65*	*-84*	***-85***	*-61*	*-12*	*61*	*154*	*274*	*414*	*575*	*752*	*946*	***1157***	

Electricity Market

Electricity Market – Needs Transition to Reduced Carbon Sources

- Conventional coal-fired power plants need to be shut down to reduce GHG emissions
- Power Market in 2040 will have 80% Green Power
    - solar, wind, geothermal, biomass, and wave
    - natural gas will be important stopgap generator source of energy
- Shale gas = opportunity to transition to Green Power sources => Don't blow through reserves, quickly.
- Government tax breaks and subsidies are not working well to ramp Green Power.
- Best customer costs result from Public Green Power projects
- Need a Green Power Coalition to build Public Green Power projects and close down coal PPs
- Government should give Public Green Power projects subsidies similar to private sector.

Total Power Source Mix (2040)

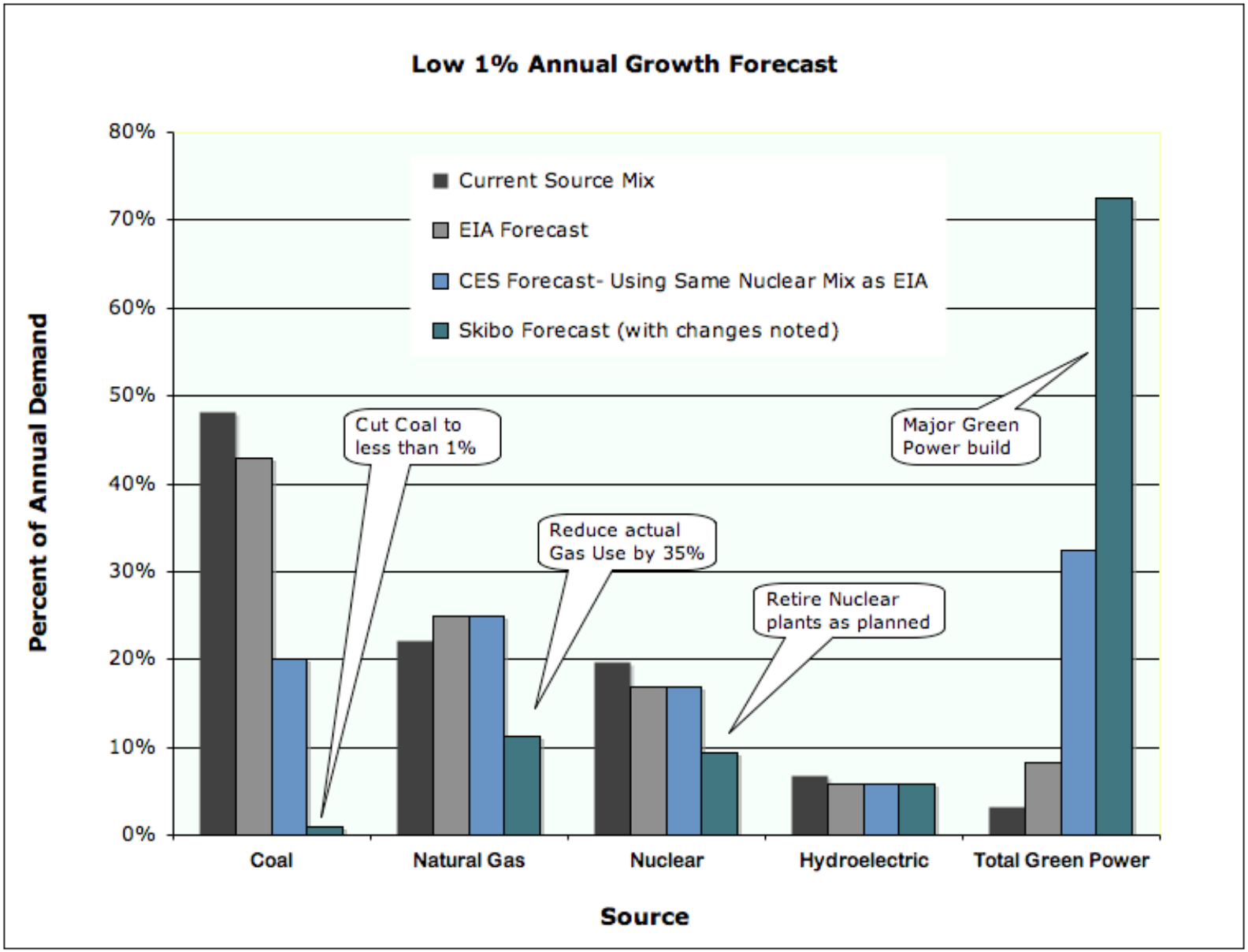


Total: 5,770,000 GWh

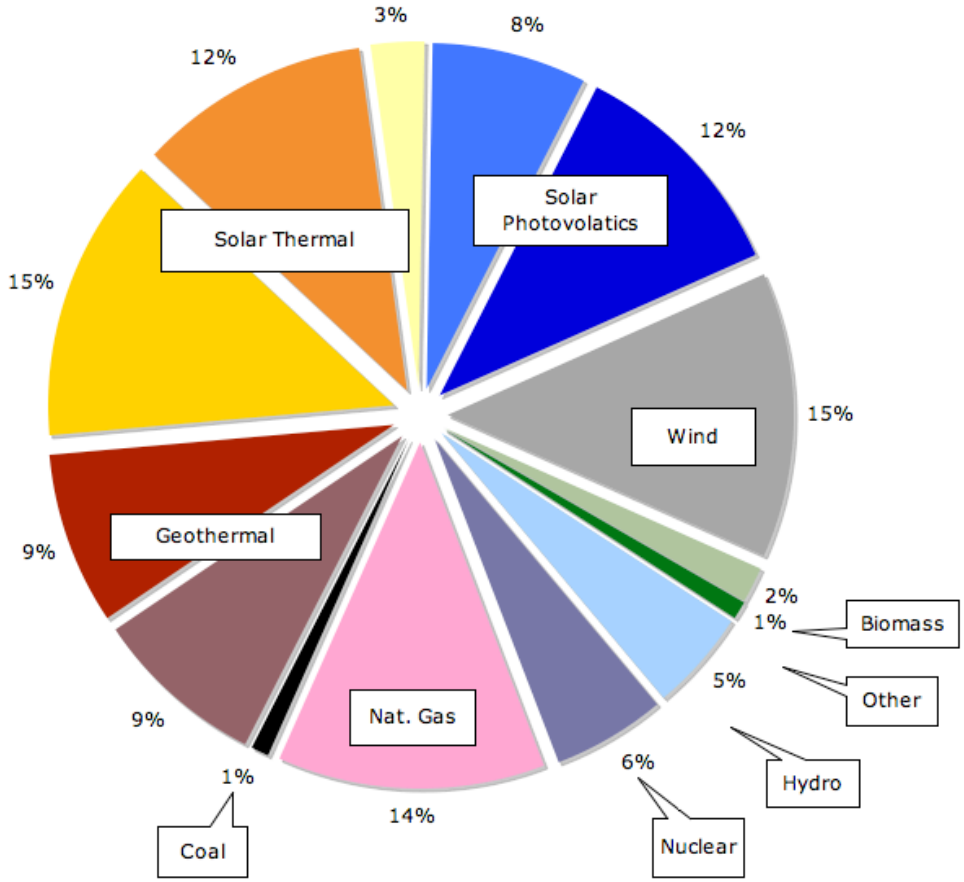
104% of Market

Green + Hydro + Nuke: 5,160,000 GWh

89% of Market


Low 1% Annual Growth Forecast
Percent of Annual Demand
80%
70%
60%
50%
40%
30%
20%
10%
0%
Current Source Mix
EIA Forecast
CES Forecast- Using Same Nuclear Mix as EIA
Skibo Forecast (with changes noted)
Cut Coal to less than 1%
Reduce actual Gas Use by 35%
Retire Nuclear plants as planned
Major Green Power build
Coal
Natural Gas
Nuclear
Hydroelectric
Total Green Power
Source

Total Power Source Mix (2040)

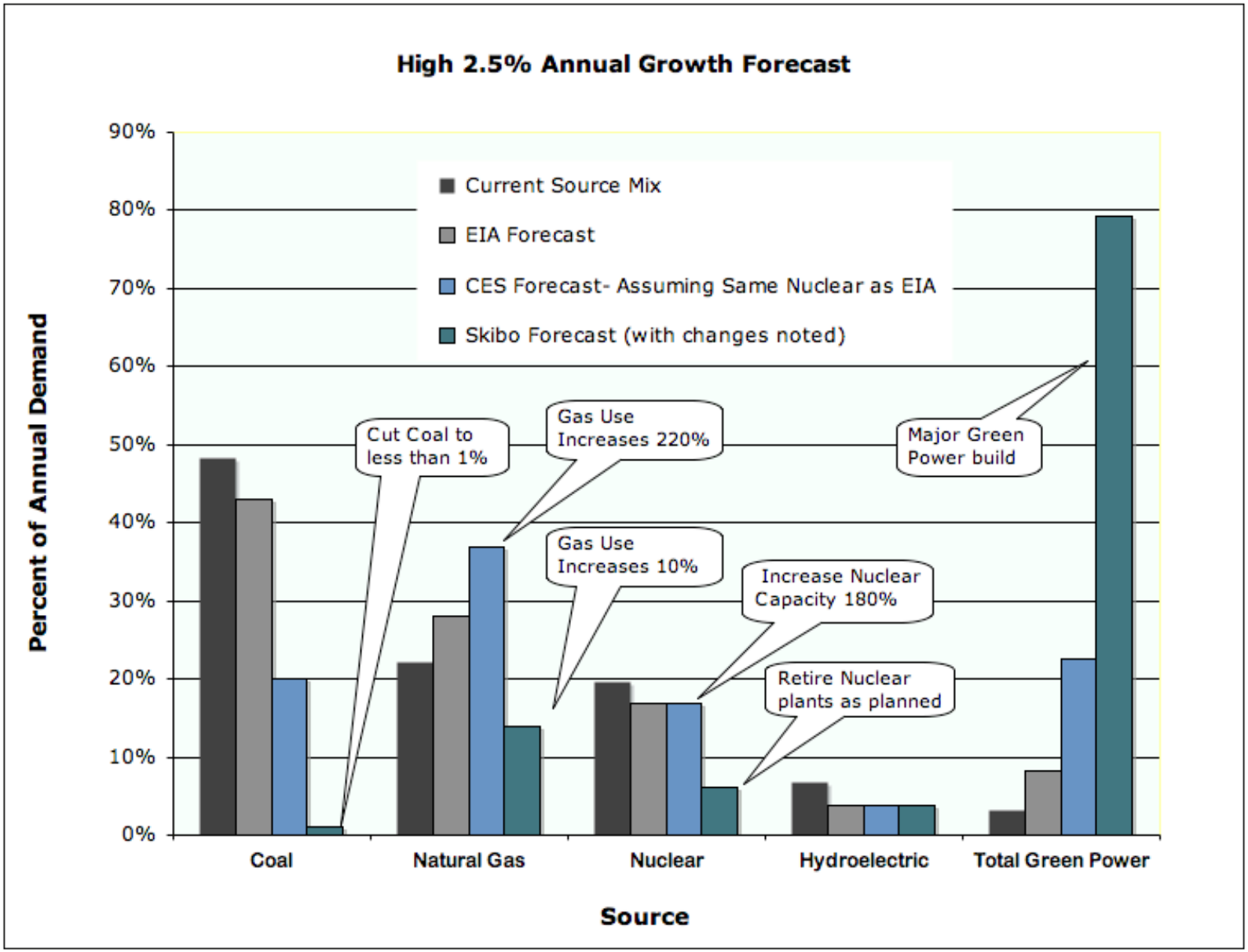


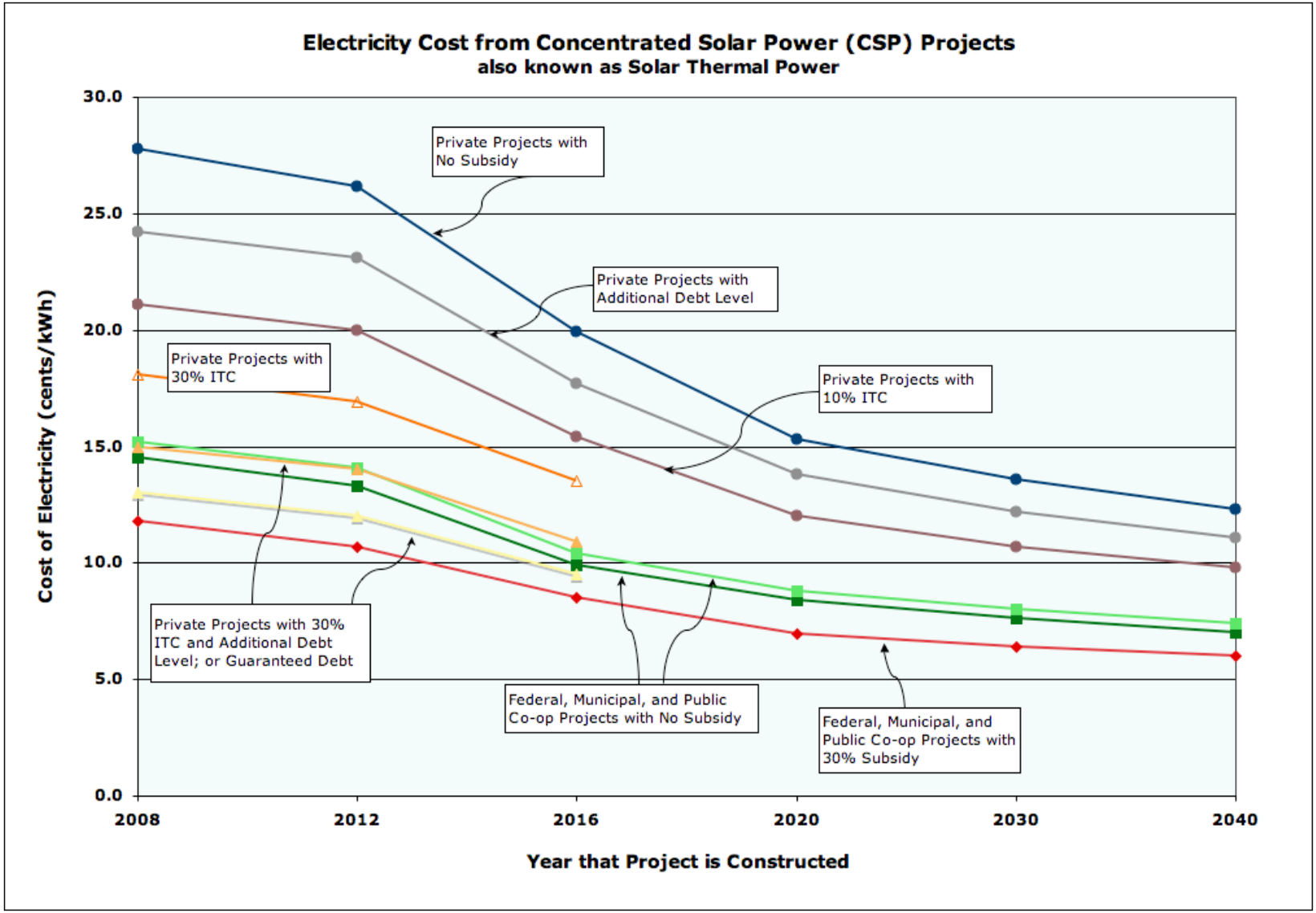
Total: 9,680,000 GWh

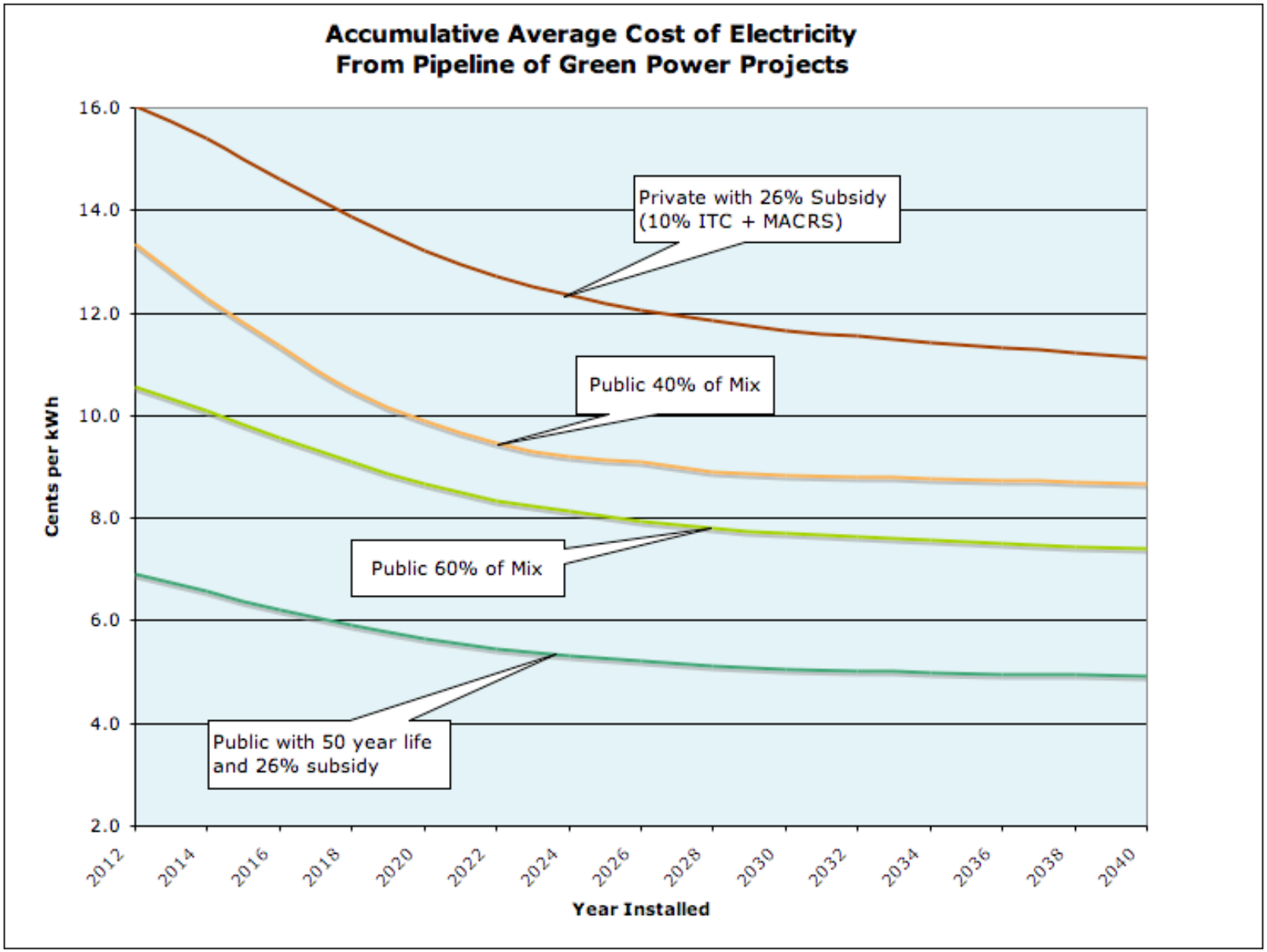
112% of Market

Green + Hydro + Nuke: 8,380,000 GWh

97% of Market


High 2.5% Annual Growth Forecast
Percent of Annual Demand
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Current Source Mix
EIA Forecast
CES Forecast- Assuming Same Nuclear as EIA
Skibo Forecast (with changes noted)
Cut Coal to less than 1%
Gas Use Increases 220%
Gas Use Increases 10%
Increase Nuclear Capacity 180%
Retire Nuclear plants as planned
Major Green Power build
Coal
Natural Gas
Nuclear
Hydroelectric
Total Green Power
Source


Electricity Cost from Concentrated Solar Power (CSP) Projects
also known as Solar Thermal Power
Cost of Electricity (cents/kWh)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
2008
2012
2016
2020
2030
2040
Year that Project is Constructed
Private Projects with No Subsidy
Private Projects with Additional Debt Level
Private Projects with 30% ITC
Private Projects with 10% ITC
Private Projects with 30% ITC and Additional Debt Level; or Guaranteed Debt
Federal, Municipal, and Public Co-op Projects with No Subsidy
Federal, Municipal, and Public Co-op Projects with 30% Subsidy


Accumulative Average Cost of Electricity
From Pipeline of Green Power Projects
Cents per kWh
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
Year Installed
Private with 26% Subsidy
(10% ITC + MACRS)
Public 40% of Mix
Public 60% of Mix
Public with 50 year life
and 26% subsidy

Forming a Green Power Coalition

- Green Power Coalition
  - Group of primarily publicly or cooperatively owned power providers that uses public financing to build a pipeline of green power projects.
  - Receives 25-30% capital cost subsidies (similar to private power project subsidies).
  - Private sector companies build and operate many of the green power projects.
  - Private companies could be minority owners.
- Provides incentives for state and local governments and existing publicly owned electric power providers to build green power projects.
  - Many states and local governments want to increase green power supply to reduce fossil fuel use.
  - Doesn't require that all states or local governments participate.
- Spreads the costs and benefits of developing of green power projects.
  - Costs of green power should drop by 40-60% (or more) over a 20-30 year ramp.
  - Continuous deployment is key to reducing costs and optimizing benefit to customers.
- Coalition members control investment allocation and project selection
  - Local control of project builds ensures projects address local/regional issues
  - Creates a huge market for green power project/technology developers

Alternative Financial Structures: Green Power Coalition Projects

- Public Entity Ownership Using 100% Financing
  - Option 1: Government Owned Operating Company
  - Option 2: Government Owned – Company Operated (GOCO) Organization structure
  - Receives 25-30% capital cost subsidies (similar to private power project subsidies).
- Joint Public / Private Ownership
  - Use primarily public financing, plus some private investment.
  - Use 100% public financing, with private company covering a portion of the annual debt payments in return for an ownership share
- Alternate Ownership/ Financing Option: Green Power Coalition owns projects and uses Federal government loans to fund project
  - Green power coalition receives pass-through government financing
  - Coalition agrees to build a pipeline build of green power projects
  - Government agencies provide regulatory oversight of the Green Power Coalition
  - Mix of public, cooperative, and private investors comprise the Green Power Coalition

Green Power Coalition Project Investments

- Green Power Coalition Capital Investments
  - Ramps to $80-100B annually within ten years (approximately 40-60% of all green power investments).
  - Hits $120-160B annually in 20 years, and could peak at at $200B in 30 years
  - Receives 25-30% capital cost subsidies (similar to private power project subsidies).
- Investment ramp depends on availability of debt financing and “need for speed”
  - If AGW impacts worsen, then accelerate ramp
  - Green Power Coalition assesses and promotes green power technology development
  - Continuous deployment is key to reducing costs and optimizing benefit to customers.
- Energy efficiency and load shift projects can be part of GPC pipeline of projects
  - Investing in negawatts should generate high returns and reduce costs to customers
  - Green Power Coalition would be looking for best projects to reduce carbon emissions, so energy efficiency/conservation projects would easily compete for funding
- National transmission (grid) projects can be part of GPC pipeline
  - Used to reduce dumped power from green power sources
  - Supply peak green power across the country

Results of Green Power Ramp

- Green Power seizes over 80% of electricity market within thirty years
  - Coal fired power plants can be priced out of the market, or shut down due to regulatory issues
  - Natural gas plays key role as stopgap electric generation energy source, but doesn't simply replace coal
  - Green power ramp covers retirement of nuclear plants
- Electricity costs to customers fall to about 1.5% of household expenses (versus 2.6% currently), with lower consumption per unit of customer quality of life (QoL)
  - Costs would fall more, but forecast uses high growth to increase customer QoL
  - Significant build-out of the national grid occurs, but costs decline anyway
- Electricity costs as fraction of GDP falls to about 2% (versus 2.8% currently)
  - GDP grows faster than electricity expenditures
  - Electricity costs fall to about 1% of GDP by 2060

Natural Gas Market Overview

Natural Gas Market – Market is Busted!

- Natural gas prices falling to $2.50, down from $5-$10 over the last eight years.
- Shale gas is important stopgap supplement to Green Power sources => Don't blow through reserves, quickly; Too valuable to produce and sell at such low prices.
- Need new regulatory controls on Shale Gas development to slow down and curtail supply
    - Hold shale gas acreage back from development for now.
    - Compensate leaseholders for slow shale gas development.
- Levy a shale gas severance tax to address other economic and environmental concerns
- Select critical markets where natural gas provides a critical energy source
- Substitute other energy sources or technology in non-critical markets
    - Provide green energy subsidies for new facilities using green energy sources to reduce or replace natural gas demand

Natural Gas: Critical End-Markets vs. Non-Critical Markets

Key Strategy: Use Natural Gas only for Critical End-Markets where alternative energy sources don't make sense. Discourage Natural Gas use for Non-critical markets.

Critical End-Markets:

- Stopgap Electric power generation
- Industrial Fuel for high temperature heat source
- Petrochemical feedstock
- Back-up/Supplement for heat pump space heating
- Oven/cooktop fuel

Non-critical End-Markets:

- Baseload and Peak Electric power generation
- Primary residential or commercial space heating or water heating
- CHP (combined heat and power) systems

Other Markets:

- Motor vehicle fuel (CNG) – perhaps use to help rapidly reduce oil demand, then transition to other biofuels

Natural Gas: Controlling Power Plant Use

Key Strategy: Use Natural Gas only for stopgap power generation in dual source thermal energy power plants.

Use state/regional energy standards to control natural gas power generation:

- Use regional considerations to develop plan to shut down coal fired PPs and transition to green power
- Use natural gas as a transitional fuel, but reduce use of natural gas over the longer term

Transition to Green Power Generation:

- Phase out construction of natural gas turbine combined cycle power plants
- Support development of hybrid solar thermal/natural gas power plants using thermal energy storage systems

Place limitations on Combined Heat and Power (CHP) installations:

- Consumes fossil fuel for non-critical application
- Preferred approach: Use a solar thermal/geothermal CHP, with natural gas back-up

Combining Green Vehicle Group and Green Power Coalition

- Re-direct a portion of crude oil cost savings tax to fund green power projects
  - Tax recovering about 50% of crude oil price decline below the reference trend price would fund both increased green vehicle incentives and public green power project subsidies
  - Tax proceeds spit 60/40 would cover GVG incentives and GP Coalition projects
- Allowing the GVG members to participate in the GPC, and vice versa, builds a much stronger set of companies and organizations to implement GV incentives and build GP projects
- Include shale gas operators in the combination?
- Threat of actions to tax retained capital from previous fossil fuel industry tax subsidies can be balanced by redirecting investments into the combined Green Energy Group

Customer Savings Due to Lower Oil Demand and Lower Oil Prices

Overall Cash Balance for Oil and Vehicle Markets, Green Vehicle Group, and Green Power Coalition

15-year Program Cumulative Cashflow	15-yr Total
	$ Billion
Direct Cost Savings (due to lower oil purchases)	**3500**
Indirect Cost Savings (due to lower oil prices)	6600
Total Potential Cost Savings	10100
Tax Credits (paid by US Govt.)	1030
Extra Incentives (GVs) - Paid by crude oil tax	825

Indirect Cost Savings (due to lower oil prices)	6600
Extra Incentives (GVs)	825
GVG Investor Cashflow (pay back investment w interest)	1157
Net Indirect Cost Savings Received by Oil Products customers	4618
Cost of tax credits for GVs, if paid by crude oil tax	1030
Green Power subsidies paid by crude oil tax	821
Reduced Net Indirect Cost Savings	**2767**
Total Cost Savings to Customers	**6267**

Can oil companies benefit from “Customers First” energy policies?

- Uncontrolled drop in oil price isn’t in anyone’s best interest.
  - Green vehicle incentives could collapse oil prices
  - Oil companies could welcome efforts to control oil prices in the $40-50 per barrel range, if the alternative is a collapse below that level.
- Controlling natural gas prices back into the range of $4-5 per million BTU versus current prices of $2.50 benefits both customers and gas producers.
  - Control natural gas price by limiting shale gas development.
- Removing tax subsidies on fossil fuel investments coupled with lower prices and shale gas restrictions will slow down oil and gas development, and ease constraints on capital (focus on most profitable opportunities).
- Threat of actions to tax retained capital from previous tax subsidies can be balanced by redirecting investments to green energy projects using low cost public financing.

Total Energy Value (VOC) Expanded Customer Needs Tree for Energy Products and Services	Total Cost of Energy (Vehicle Fuels)				Total Cost of Energy (Electricity)				Total Cost of Energy (Natural Gas)			
Suggested Energy Policy Strategies:	Reduce Energy Price	Increase Energy Efficiency	Optimize Energy Quantity to meet needs	Optimize energy use to increase QoL	Reduce Energy Price	Increase Energy Efficiency	Optimize Energy Quantity to meet needs	Optimize energy use to increase QoL	Reduce Energy Price	Increase Energy Efficiency	Optimize Energy Quantity to meet needs	Optimize energy use to increase QoL
"Deny and Delay" - BAU and defer serious GHG mitigation efforts												
Use 'Free Market' GHG Mitigation plans - e.g. carbon fee or cap-and-trade	increases costs				increases costs							
'Customers First' policies and actions												

Economy and National Security (VOC) Expanded Customer Needs Tree Addressing Economic Impact and National Security Risks	Increase Positive Economic Impact				Reduce National Security Risks			
Suggested Energy Policy Strategies:	Increase Jobs	Improve Standard of Living	Ensure Stable Economy (no boom/bust)	Reduce Crop Failures	Reduce Crude Oil/Products Imports	Reduce Global Instability	Avoid Major Catastrophic Events	Increase Global Standards of Living
"Deny and Delay" - BAU and defer serious GHG mitigation efforts	fewer	lower	unstable	more		more	more	lower
Use 'Free Market' GHG Mitigation plans - e.g. carbon fee or cap-and-trade	fewer				increases costs			
'Customers First' policies and actions								

Choice and Environment (VOC) Expanded Customer Needs Tree Addressing Customer Choice, Environmental, and QoL	Increase Choice and Freedom				Environment and Quality of Life				
Suggested Energy Policy Strategies:	More available choices	Not "chained" to one choice	Free from worry about future	Not forced to "pay polluters'	Reduce Pollution	Prevent Land Degradation	Reduce Climate Impacts	Reduce Weather Pattern Changes	Avoid loss of comfort & liveability
"Deny and Delay" - BAU and defer serious GHG mitigation efforts	fewer	fossil fuels	more	must pay		more	more	more	more
Use 'Free Market' GHG Mitigation plans - e.g. carbon fee or cap-and-trade	fewer			must pay					
'Customers First' policies and actions									

Triggering Events which should Accelerate Action

- Continuing and persistent disruptive weather system events comprise the first important triggering event, increasing public and private efforts toward addressing AGW.
- Droughts, heat waves, severe precipitation events, even unusual cold spells, are being linked to Arctic amplification, in turn caused by AGW.
- The problem is serious enough to warrant immediate government action.
- Triggering events will increase the desire of Americans for finding and funding a solution…

  … and we have the solution.
- Establishing the GV Group and the GP Coalition sets up a strong force advocating action on climate change.
- The GV Group and the GP Coalition should recommend setting up an emergency task force (ETF) to address this issue.

Breaking the Weather System for US48 States

- Shifting jet stream patterns are causing new weather patterns in US48 states.
  - Stalled jet stream Rossby waves are changing US48 temperature patterns since major NH snow cover loss and Arctic ice loss.
  - Seasonal changes in the jet stream resulted in big winter cooling events in the East.
  - Slower jet stream winds seems more prone to “locking up” into a blocking pattern.
  - Blocking patterns are responsible for huge heat waves and drought over 2010-2012.
- Blocking patterns tend to re-occur at same NH longitude location in the same seasons.
- Within several years, the change in seasonal weather patterns should become apparent to most Americans.
  - Meteorologists eventually should tie the shift in weather patterns to jet stream changes caused by Arctic warming and NH snow cover changes.
  - Increased number of extreme heat waves / cold spells show up in the averaged temperature data for the US48 over the last 22 years.
- Reasonable expectation: emerging scientific and anecdotal evidence will tie unusual prolonged weather events to loss of the Arctic ice pack and NH snow cover losses.
- Linking the pattern in extreme weather events to Arctic amplification, and experience with the severity of the events, will increase public demand for action.
- Disruptive events comprise the first important triggering event, increasing public and private efforts toward addressing AGW.

Extreme 2011 Weather Events (possibly caused by jet stream changes):

	Event	Date	Cost	Deaths
Likely caused or amplified by jet stream changes	October Northeast Snow Storm	October 29, 2011	$3+ billion	27
	Texas Drought & Wildfires	Spring-Summer 2011	$5.2 billion	2
	Groundhog Day Blizzard	January 29-February 3, 2011	$3.9 billion	36
	Missouri and Souris River Flooding	Spring-Summer 2011	$2 billion	5
	Mississippi River Flooding	Spring-Summer 2011	$5 billion	1
Possibly caused or amplified by jet stream changes	Midwest, Southeast, Plains Severe Storms	June 16-22, 2011	$1.25 billion	0
	Midwest/Southeast Tornado Outbreak	April 14-16, 2011	$2.5 billion	38
	Midwest, Southeast, Plains Severe Storms	April 19-21, 2011	$1 billion	0
	Midwest/Southeast Tornado Outbreak	May 21-27, 2011	$8 billion	177
	2011 Super Outbreak	April 25-30, 2011	$9 billion	321
	Southeast/Midwest Severe Storms	April 8-11, 2011	$2.25 billion	0
	Midwest/Southeast Severe Storms	April 3-5, 2011	$2.5 billion	9
	Hurricane Irene	August 26-28, 2011	$7.2 billion	46
	Tropical Storm Lee	September 8, 2011	$1+ billion	13

Use a Panel Review to Evaluate Risk and Recommend Action to Set Up an Emergency Task Force (ETF)

- Assemble a panel of experts on meteorology and climate; agriculture and forestry; insurance; and national defense.
  - Ask meteorologists and climate scientists to privately present and discuss possibilities and probabilities of NH weather system changes and disruptions.
  - Collect input from the group of experts and assemble a probability curve of annual disruptions caused by NH jet stream changes.
- Estimate the impact of the annual weather system disruptive events
  - Costs of crop failures, floods, storms, freezes, and droughts.
  - Deaths, and reduced QoL caused by disrupted weather system patterns.
- Calculate "expected valuations" for disruptive events, using the probability adjusted impacts on America (and other NH countries).
  - Use "Strategic Decision Analysis" process to determine "expected valuations".
  - Major population centers in Europe and Asia should also experience weather system disruptions.
- Ask the group to evaluate a set of actions, starting with setting up a Weather Systems Disruption ETF (Emergency Task Force) to develop a plan to respond to the weather system disruptions.
- Use this preliminary decision analysis as the framework for the ETF analysis.

The Government Should Act Now!

If panel recommends immediate action:

President Obama should order a **weather systems disruption emergency task force (ETF)** to address NH weather system disruptions that cause extreme weather.

- Mobilize the necessary branches of government to identify the extent of the disruption to our weather system.
- Get emergency funds to NASA, NOAA, private and university researchers to collect and analyze data on jet stream changes.
- Order the Air Force and Navy to collect and disseminate data on NH/Arctic heat flows, jet stream patterns, ocean currents, and satellite imagery, and coordinate additional data collection efforts with other agencies.
- Order the Agriculture Department to develop plans to help alleviate crop failures and respond to repetitive severe droughts, floods, frosts, and pestilence.
- Order the Agriculture and Interior Departments to develop plans to alleviate damage to forests, grasslands, fisheries, and deal with water issues.
- Order Homeland Security and the Army Corp of Engineers to develop plans to respond to repetitive flooding events.
- Order Homeland Security to set up the task force and to coordinate efforts and identify corrective actions needed to respond to this emergency.

Triggering Events should help drive action on energy policies!

- Begin public discussion on the problem.
  - Establishing an emergency task force to address NH weather system disruption jumpstarts discussion on the crisis.
  - People will want to hear a solution. (*Listen to what our customers want; a way out!)*
  - Our solutions address all four critical needs (cost, environmental risks, economic impact, and national security) better… and provides more choices.
  - The solutions use a pragmatic blend of private/public sector actions, and benefit huge sectors of the economy and most of the population – the solutions are saleable!
- Fear of impending deterioration in QoL, will motivate people to favor energy policies that actually address the issue (vs. doing nothing), and cost less than existing energy systems.
- "Customers First" policies set the template for global policy makers.
  - Major economies in Europe and Asia will likely implement similar energy policies.
  - Rapid deployment in America reduces risks for global actions.
  - Leading-edge deployment puts America into a globally competitive position.
- We can offer customers the "win-win" proposition that they want.

Triggering events keeps the "heat" on leaders to get new energy systems deployed!

Opportunities

- Trading opportunities
  - Oil and oil futures should adjust to lower valuations
  - Oil producers should drop to a significantly lower valuation
  - Oil refiners and coal company valuations should collapse
- Investment opportunities
  - Vehicle manufacturers and suppliers, biofuel companies, transportation infrastructure (high speed rail).
  - Green power companies, other green energy companies.
  - GHG mitigation companies.
- Acquisition and leveraged buyout opportunities
  - Substitute vehicle manufacturers and suppliers receive higher valuations
  - Green power companies and suppliers receive higher valuations
- Green Vehicle Group operating company formation
  - Implement green vehicle and biofuel incentive programs.
  - Allocate investments into most effective actions to reduce crude oil demand.
- Green Power Coalition operating company formation
  - Develop and support a construction pipeline of green power projects.
  - Set deployment plans for critical sectors like advanced geothermal, solar thermal, and thermal energy storage.

Timing Issues

- US election cycle issues:
  - Try to reveal policy recommendations before November 2012 elections.
  - Tie policy recommendations to “Weather System Disruptions ETF (Emergency Task Force)” proposal.
  - Follow-up into next election cycle.
- Climate impacts and weather system disruption should escalate timing
  - Increasing incidents of heat waves, droughts, and floods increase Americans demands to do something to begin correcting the problem
  - Impacts could become severe enough to reach all out emergency response… reduce carbon emissions by 50% within ten years.
- Critical element of this set of policies involves green vehicle and biofuel ramps; early meetings with key industry players needed
  - Identify key limiting conditions and identify countermeasures to remove blocks preventing quick ramps
  - Begin raising capital to build industry infrastructure and systems ASAP
- File provisional patent application
  - Cover a business method for intervening in a commodity market to pay for substitution, with incentives paid for by a share in the commodity price drop (caused by the substitution).

Results and Conclusions

- "Customers First" Energy Policies meet all critical customer needs better than "Existing 'Deny and Delay' Policies", or "GHG Mitigation Policies".
  - They address each of all four overall critical needs (cost, environmental risks, economic impact, and national security) better than existing policies.
  - They use a pragmatic blend of private/public sector actions and regulations to improve customer satisfaction.
- "Customers First" policies result in more rapid deployment of improved energy systems.
  - Rapid deployment reduces risks.
  - Leading-edge deployment puts America into a globally competitive position.
- "Customers First" policies set the template for global policy makers.
  - Major economies in Europe and Asia will likely implement similar energy policies.
- Eventually climate impacts and customer complaints would force implementation of the same end-solutions as "Customers First" policies;
  - but with higher costs,
  - and after putting customers into a higher risk environment.

Result of New Policies on Customer Costs

2040 Household Total Expenses approximately $58,000 annually (inflation adjusted and using 0.5% annual real income growth) include:

Housing energy expenses = $1600 annually (2.8%)

- Household electricity cost = $1400 annually (2.5%)
- Household natural gas or heating oil = $200 annually (0.3%)

Transportation fuel costs

- Gasoline and diesel expenses = $450 annually (0.7%)
- Stable with oil price swings prevented due to substitute competition
- Biofuel expenses = $200 annually (0.3%)
- EV electricity use included in housing electricity cost

Household energy expenses are 4.1% of total expenses

Comparison with Target:

In 2040, energy should comprise only 4% (four points) of total expenses. **Plan = 4.1%**

- Fossil fuel based energy at less than 1 point of this target. **Plan = 1.0%**
- Green energy sources should comprise 3 points of this target. **Plan = 3.0%**
- Vehicle fuels/energy should add 1 point to this target…

  Plan = 1.0% + electricity charge (included above)If GDP grows