2050 "VISION" PORTION OF THE AB1007 REPORT

Introduction

AB 1007 requires the Energy Commission and ARB to examine near and mid-term strategies to increase the use of alternative transportation fuels through 2022. There are important reasons, however, to look beyond this timeframe. Doing so will enable the agencies and the public to judge if the approaches examined in the AB 1007 plan are best suited to achieving the desired benefits of alternative transportation fuels well into the future. The reasons to look beyond a 15-year horizon include:

1. The need to define the long-term investments needed to create the necessary supplies and the distribution infrastructure for alternative fuels.

2. The desire to illustrate how alternative fuels can, in the long term:
   - Help the transportation sector achieve the state's greenhouse gas (GHG) overall emission goal of 80 percent reduction by 2050,
   - Provide diversity that enhances transportation fuel security,
   - Provide economic benefits through in-state fuel production.
   - Be used in tandem with more efficient vehicles to produce a sustainable transportation future.

To address these questions Energy Commission and ARB staff have extended the time horizon from the required 15 years in AB 1007 through the year 2050. This effort includes a "2050 Vision" that combines three broad strategies as follows:

- Maximize the energy efficiency of vehicle/fuels systems used by Californians.
- Reduce growth in travel demand through transportation efficiency, technology changes in the delivery of goods and services and through expanded transit and more efficient land use patterns.
- Deploy an increasing mix of low greenhouse gas (GHG) emission alternative and conventional fuels to satisfy the remaining transportation energy demand.

The AB 1007 analysis includes forecasts for five specific "milestone" years: 2012, 2017, 2022, 2030 and 2050. The first three forecast years are required by the legislation, and our forecasts for these years are based upon substantial quantitative analysis. The "2050 Vision" is necessarily much more general and at a lower level of analysis and detail. The 2030 analysis helps bridge the gap between 2022 and the longer-term vision for 2050. It has an intermediate level of detail.

Analytical Approach

A "bottom up" analysis based on the contractor assessments, the Energy Commission and ARB's policy goals, and stakeholder input has formed the basis for the creation of the alternative fuel analyses for 2012, 2017 and 2022. The goals and policies recommended for these timeframes were also guided by:

- The explicit requirements of AB 1007
- The Governor's Executive Order S-01-07 which established goals and a timeline for a Low Carbon Fuel Standard (LCFS)
- The Energy Commisison's energy policy goals, as expressed in the 2005 Integrated Energy Policy Report (IEPR)
- The climate protection goals of AB 32
- The energy diversity goals established in the Governor's Executive Order S-06-06 on Bioenergy

The 2050 Vision has been developed as a "top down" assessment, based on established State goals. Principally these include the desire to:

- Reduce greenhouse gas emissions to a fraction of today's levels.
- Create sustainable long-term energy sources to meet our transportation needs.
- Protect the California economy from over-dependency on oil and petroleum products.
- Minimize the economic costs to the state.
- Maximize the economic benefits of producing alternative fuels in the state.

The 2050 Vision anticipates improvements in vehicle efficiency, reductions in energy demand due to improved travel habits and the widespread use of low GHG emitting fuels. As a result of these strategies, the Vision presents a transportation future that greatly reduces the energy needed for transportation, provides that energy through a diverse set of transportation fuels eliminates over-dependency on oil, and achieves an 80 percent reduction in GHG emissions. The 2050 Vision was developed to enable industry, the public, the Board and the Commission to understand and debate the types of changes that are possible and will likely become necessary to enable an environmentally sustainable transportation system in California.

Although many of the details and policies needed to achieve the 2050 vision will not be determined within the AB 1007 process or timeframe, the inclusion of a longer-term horizon in the AB 1007 report can serve to initiate a more in-depth discussion. Such a perspective is vital to determine how the strategies and policies included in the AB 1007 report can help achieve long-term energy goals and begin the effort to achieve the 80 percent GHG reduction goal for the transportation sector.

Results of the 2050 Vision Forecast

Staff has developed its top-down assessment on how the widespread use of alternative fuels, efficiency measures and changes in travel habits would impact transportation fuel demand and diversity, at least within the personal transportation sector. This assessment shows that there are challenging but plausible ways to meet 2050 goals. An 80 percent reduction in GHG emissions associated with personal transportation can be achieved even though population grows to 55 million, an increase of 50 percent.

The following set of measures could be combined to produce this result:

- Lowering the energy needed for personal transportation by:
    - Tripling the energy efficiency of on-road vehicles in 2050 with:
        - Conventional gas, diesel and flex-fuel vehicles that averaging more than 40 miles per gallon (mpg),
        - Hybrid gas, diesel and flex-fuel vehicles averaging almost 60 mpg,
        - All electric and plug-in hybrids averaging well over 100 mpg (on a gasoline equivalent basis) on the electricity cycle, and
        - Fuel cell vehicles averaging over 80 mpg (on a gasoline equivalent basis),
    - Moderating growth in per capita driving, reducing today's average per capita driving miles by about five percent or back to 1990 levels
- Changing the energy sources for transportation fuels from the current 96 percent petroleum-based to approximately:
    - 30 percent from gasoline and diesel from traditional petroleum sources or lower GHG emission fossil fuels such as natural gas
    - 30 percent from transportation biofuels
    - 40 percent from a mix of electricity and hydrogen
- Producing transportation biofuels, electricity and hydrogen from renewable or very low carbon-emitting technologies that result in, on average, at least 80 percent lower life cycle GHG emissions than conventional fuels.
- Encouraging more efficient land uses and greater use of mass transit, public transportation and other means of moving goods and people.

The table below compares current 2005 situation, a "business as usual" (BAU) 2050 forecast, and the 2050 Vision. The BAU 2050 forecast assumes modest improvements in vehicle efficiency and some use of traditional corn-based ethanol. The 2050 Vision reflects the extensive use of energy efficiency measures, new vehicle technologies and low GHG emission alternative fuels.

Table XX - Alternative 2050 Forecast of Fuel Used for Personal Transportation

Parameter[1]	2005 Base	2050 BAU Forecast	2050 Vision	Units[2]
California Population	37	55	55	millions
Annual Vehicle Miles Travelled	320	570	450	billion miles
Per Capita Vehicle Miles Travelled	8,600	10,300	8,200	miles/year
Vehicle Mix				
Gas / Diesel	25	40	4	millions
FFVs	0.3	4	7	millions
FCVs & PHEVs	--	>1	28	millions
Real World Average MPG	20	26	70	miles/gallon
Energy Demand	16	23	6.4	billion GGEs
Greenhouse Gas Emissions	134	182	23	MMT CO2
Fuel Mix				
Gas + Diesel	15.3	21	~2	billion GGEs
Biofuels	0.7	1.2	~2	billion GGEs
Electricity & Hydrogen	--	--	~2.5	billion GGEs

[1] FFV = Flexible Fuel Vehicle, FCV = Fuel Cell Vehicle, PHEV = Plug-In Hybrid Vehicle.
[2] GGE = Gasoline Gallon Equivalent.

How Could Such a Dramatic Transition Occur?

Transitioning from current trends to the 2050 Vision would require substantial changes in technology, fuel options and availability, urban form, personal travel habits and government policies. However, it does not require implausible technological evolution or radical changes in lifestyles.

The major changes needed by 2030 include:

- Improving the design and efficiency of personal vehicles so that, by 2030, the average new conventional (i.e. non-hybrid) vehicle is twice as efficient as today's new cars and small trucks, achieving at least 40 mpg when operated on gasoline, diesel or biofuels. New hybrids are assumed to be 40 percent more efficient than the comparable non-hybrid vehicle.
- Fully commercializing plug-in hybrid-electric vehicles, hydrogen fuel cell and battery electric vehicles at a price and performance that can command high market shares and with effective fuel efficiencies of 80 mpg (equivalent) or better when operated on electricity or hydrogen,
- Creating the necessary fuel production technologies and infrastructure expansions so that the needed quantities of biofuels, electricity and hydrogen can be cost-effectively produced with very low lifecycle GHG emissions,
- Diversifying the fuel delivery infrastructure so that consumers have reliable and convenient access to price competitive biofuels, electricity and hydrogen, and
- Implementing "Smart Growth and Redevelopment" policies that lower the need for personal travel in new development, and enable residents of existing and new communities to lower auto use.

By 2050 an 80 percent reduction in GHG emissions could occur as follows:

- Further improving the design and efficiency of new personal vehicles so that, by 2050, the average in-use vehicle achieves 70 mpg, and gains half of its fuel energy from electricity or hydrogen sources.
- Designing most liquid fueled vehicles sold after 2030 so they can be operated on a flexible mix of biofuels and gasoline, or on lower carbon diesel blends.
- Designing most hybrid electric vehicles sold after 2030 to be capable of being plugged into the electricity grid, and producing efficient and low carbon electricity so that owners have strong economic incentives to plug in.
- Lowering the cost of plug-in hybrids, battery powered EV and/or hydrogen fuel cell vehicles so that they compete for a large share of the vehicle market.

- Ensuring the fuel delivery infrastructure is fully diversified and provides consumers with reliable and convenient access to cost competitive, very low GHG emission biofuels, electricity and hydrogen.
- Expanding the choice of travel mode for most trips and reducing the need to travel with both technology and more compact urban form (improved land use planning).
- Increasing use of mass transit and public transportation, as an alternative to personal motor vehicle use.

How Does the Forecast for 2022 in AB 1007 Link with the Vision?

Because the needed transition can occur over four decades, most of the changes outlined above can occur incrementally – provided the recommendations in the AB 1007 and other State policies effectively jump start the move to alternative fuels. Much of the basic technological progress is needed by 2030 because of the 15 years it takes to fully introduce new technologies into the vehicle fleet. To achieve the needed progress by 2030, much of the change must be well underway by 2020, and considerable progress is needed in the 2022 planning horizon required by the AB 1007 legislation.

Setting ambitious goals for the deployment of large amounts of alternative fuels as part of the AB 1007 recommendations, and initiating the LCFS are the beginning steps in this process. By 2022, the last milestone year required by AB 1007, the proposed plan calls for a five-fold increase in the current share of non-petroleum alternative transportation fuels. Via the LCFS, the plan calls for at least a 10 percent reduction in global warming emissions from transportation fuels. The exact route to these two goals is not clearly defined, but they can be reached only with substantial change in fuel production methods, fuel availability at competitive prices and vehicle capability. All of these efforts are logical initial steps to the 2050 Vision.

Energy Commission and ARB staff has modeled how these recommendations for 2022 might be met, and how California's transportation fuel supply and vehicle inventory could evolve from today to 2022, 2030, and 2050. This is shown below:

Table XX -- Potential Path to 2050 Vision

Parameter[3]	Today 2005	AB 1007 2022	Interim 2030	Vision In 2050	Units[4]
Per Capita Vehicle Miles Traveled	8,600	8,900	8,600	8,200	miles/year
Vehicle Mix					
Gas & Diesel	25	20	10	5	millions
FFVs	0.3	5	11	7	millions
FCVs & PHEVs	--	2	11	28	millions
Transportation Fuel	16	15	13	7	billion GGEs/year
Greenhouse Gas Emissions	134	120	74	23	MMT CO2
Fuel Carbon Intensity	0.99	0.89	0.73	0.38	
Approximate Fuel Mix – By Amount of Energy					
Gas + Diesel	96%	80%	50%	30%	
Biofuels	4%	16%	38%	30%	
Electricity & Hydrogen	0	4%	12%	40%	

[3] FFV = Flexible Fuel Vehicle, FCV = Fuel Cell Vehicle, PHEV = Plug-In Hybrid Vehicle.
[4] GGE – Gasoline Gallon Equivalent

Full 2050 Forecast — Version 7, April 15 Draft, For Vision 2050 analysis in AB 1007 Report

Activity, Fuels use and GHG Emissions from Gasoline Powered Vehicles

Scenario =====>	Historic Data [DOF, BOE & CEC IEPR]		Projections ~2003 IPER "Old Forecast" $1.75gas & pre AB1493			Revised Forecast 2005 IEPR $3.00gas & AB1493			AB 1007 assuming 10% LCFS in 2020 using 20% Alt Fuel			AB 1007 "Vision" High Fuel Efficiency & 80% GHG Red. Case			
Factor	1990	2005	2020	2030	2050	2020	2030	2050	2020	2030	2050	2020	2030	2050	Units
CA Population	30	37	43	47	55	43	47	55	43	47	55	43	47	55	millions
VMT/Person	7.9	8.2	8.7	9.4	10.3	8.4	9.1	10.0	8.4	9.1	10.0	8.4	8.6	8.2	1000 mi/person/yr
VMT red. Factor (expressed as fraction of projected level						0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.08	0.20	Frac. of Base Forecas
Calc. Annual VMT =	237	303	374	442	567	363	429	550	363	429	550	363	406	453	Billion Mi/yr
Assumed Avg. MPG	18.8	20.0	20.0	20.0	20.0	23.4	26.0	26.0	23.9	31.7	39.4	23.9	36.5	70.5	Fleet avg mpg [in gge
Calc. Trans. Energy =	12.6	15.2	18.7	22.1	28.3	15.5	16.5	21.1	15.2	13.5	14.0	15.2	11.1	6.4	Bn gas-gal.eq./yr
Fuel or Vehicle Type assumed in analysis															
Petroleum based	100	96	100	100	100	96	96	96	80	61	40	80	61	31	Percent of Trans-
Biofuels	0	4	0	0	0	4	4	4	19	28	29	19	28	30	portation Energy
Electricity via PHEVs	0	0	0	0	0	0	0	0	1	9	21	1	9	29	by Each Type
H2 FCVs									0	2	10	0	2	10	
Carbon Intensity relative to current gasoline, on average															
Petro-based	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	GHG Emissions
Biofuels		0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.49	0.33	0.25	0.49	0.33	0.15	Relative to Gasoline
Elec.and/or H2						0.50	0.50	0.50	0.33	0.25	0.15	0.33	0.25	0.10	on Lifecycle basis
CA GHG Emis.	106	128	157	186	238	129	138	176	114	83	61	114	68	21	MMT-CO2eq -
% Chg fr 1990		20%	48%	75%	124%	22%	30%	66%	7%	-22%	-43%	7%	-36%	-80%	[LD transportation]
% Chg fr 2005			23%	45%	86%	1%	8%	38%	-11%	-35%	-52%	-11%	-46%	-84%	
Summary of Fuel Quantities															
Petro-based	12.6	14.6	18.7	22.1	28.3	14.9	15.8	20.3	12.1	8.3	5.6	12.1	6.8	2.0	Bn gas-gal.eq.
Biofuels		0.9	0.0	0.0	0.0	0.9	0.9	1.2	4.2	5.3	5.7	4.2	4.4	2.7	Bn EtOH
Electricity via PHEVs		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.2	2.9	0.2	1.0	1.9	Bn gas-gal.eq.
H2 FCVs		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	1.4	0.0	0.2	0.6	Bn gas-gal.eq.
Summary of Vehicle Stock															
Petro-based			29.9	35.3	45.3	29.5	34.8	44.6	21.6	14.3	8.8	21.6	13.9	4.3	
Biofuel FFVs			0.0	0.0	0.0	0.0	0.0	0.0	6.6	8.6	8.8	6.6	8.3	7.1	
PHEVs			0.0	0.0	0.0	0.0	0.0	0.0	1.2	10.7	21.0	1.2	10.4	23.6	
H2 FCVs			0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.9	0.0	1.1	4.7	
C Intensity LCFS		0.994							0.895	0.728	0.505	0.895	0.728	0.380	
% of 2005 Carbon intensity									90.0%	73.2%	50.8%	90.0%	73.2%	38.3%	
LifeCycle GHGs =	133	160	196	232	297	162	172	221	143	104	76	143	86	26	125% of Direct Emis.

Values Shaded in are inputs made by ARB staff

AB 1007 Future Scenarios — Version 7, April 15 Draft, For Vision 2050 analysis in AB 1007 Report

Activity, Fuels use and GHG Emissions from Light Duty Vehicles

Scenario =====>	Historic Data [DOF, BOE & CEC IEPR]		Projections ~2003 IPER "Old Forecast" $1.75gas & pre AB1493			Revised Forecast 2005 IEPR $3.00gas & AB1493			AB 1007 assuming 10% LCFS in 2020 using 20% Alt Fuel			AB 1007 "Vision" High Fuel Efficiency & 80% GHG Red. Case			
Factor	1990	2005	2020	2030	2050	2020	2030	2050	2020	2030	2050	2020	2030	2050	Units
CA Population	30	37	43	47	55	43	47	55	43	47	55	43	47	55	millions
VMT/Person	7.9	8.2	8.7	9.4	10.3	8.4	9.1	10.0	8.4	9.1	10.0	8.4	8.6	8.2	1000 mi/person/yr
VMT red. Factor (expressed as decrease from projected level						0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.08	0.2	Frac. of Base Forecast
Calc. Annual VMT =	237	303	374	442	567	363	429	550	363	429	550	363	406	453	Billion Mi/yr
Estimated Avg. MPG	18.8	20.5	20.0	20.0	20.0	23.4	26.0	26.0	23.9	31.7	39.4	23.9	36.5	70.5	Fleet avg mpg [in ggeq.]
Calc. Trans. Energy =	12.6	14.8	18.7	22.1	28.3	15.5	16.5	21.1	15.2	13.5	14.0	15.2	11.1	6.4	Bn gas-gal.eq./yr
								LCFS Performance =	0.90	0.73	0.51	0.90	0.73	0.38	
Percent of Energy Fuel or Vehicle Type assumed in analysis															
Gas & Diesel	100	100	100	100	100	100	100	100	75	50	30	75	50	18	Percent of Trans-
E-85 in FFVs	0	0	0	0	0	0	0	0	23	30	30	23	30	30	portation Energy
PHEV on E-10, E-85 & Elec.	0	0	0	0	0	0	0	0	2	18	30	2	18	42	by Each Type
Fcell Vehicle	0	0	0	0	0	0	0	0	0	2	10	0	2	10	
Total Check=			100	100	100	100	100	100	100	100	100	100	100	100	
						GHG Red. Performance from 2005 =			-0.11	-0.35	-0.52	# -0.11	-0.46	-0.84	
						GHG Red. Performance from 1990 =			0.07	-0.22	-0.43	0.07	-0.36	-0.80	
Assumed Relative Fuel Economy -- Fleet-wide MPG gas-gal-eq.															
Gas or Diesel (G/D)	18.8	20.0	20.0	20.0	20.0	23.4	26.0	26.0	23.4	26.0	26.0	23.4	30.0	42.0	Assumed Avg. Value
Biofuel as E-85 [in GGEq]	18.8	20.0	20.0	20.0	20.0	23.4	26.0	26.0	23.4	26.0	26.0	23.4	30.0	42.0	equal to gas/diesel
PHEV on Gas									32.8	36.4	36.4	32.8	42.0	58.8	40% better tha G/D
PHEV on Elec.									65.5	72.8	72.8	65.5	84.0	117.6	100 % > PHEV on gas
Fcell Vehicle									46.8	52.0	52.0	46.8	60.0	84.0	100% > G/D
Calculation of Fleet Fuel Economy					*MPG fraction contributed to the fleet by each vehicle/fuel combination*										
Gas & Diesel [on E-10]					20.0	23.4	26.0	26.0	17.6	13.0	7.8	17.6	15.0	7.6	
E-85					0.0	0.0	0.0	0.0	5.4	7.8	7.8	5.4	9.0	12.6	
PHEV on E-10 & E-85					0.0 #	0.0	0.0	0.0	0.3	3.3	3.3	0.3	3.8	7.4	
PHEV on Elec.					0.0 #	0.0	0.0	0.0	0.7	6.6	15.3	0.7	7.6	34.6	
Fcell Vehicle					0.0	0.0	0.0	0.0	0.0	1.0	5.2	0.0	1.2	8.4	
Fleet MPG =					**20.0**	**23.4**	**26.0**	**26.0**	**23.9**	**31.7**	**39.4**	**23.9**	**36.5**	**70.5**	
Use of E-85 by FFVs and E-10, E-85 and Elec by PHEVs															
Percent FFV Energy fr. E-85						0	0	0	72	80	90	72	80	90	
Percent PHEV Energy fr. E-10						0	0	0	30	20	10	30	20	10	
Percent PHEV Energy fr. E-85						0	0	0	20	30	20	20	30	20	
Percent PHEV Energy fr. Elec.						0	0	0	50	50	70	50	50	70	
Summary of Fuel Quantities															
Gas & Diesel			**17.4**	**20.5**	**26.3**	**14.4**	**15.3**	**19.7**	**12.1**	**8.3**	**5.6**	**12.1**	**6.8**	**2.0**	
Gasoline on E-10	% =	100	17.4	20.5	26.3	14.4	15.3	19.7	10.6	6.3	3.9	10.6	5.2	1.1	
E-85 FFV on E-10						0.0	0.0	0.0	0.9	0.8	0.4	0.9	0.6	0.2	
E-85 FFV on E-85						0.0	0.0	0.0	0.5	0.6	0.8	0.5	0.5	0.3	
PHEV on E10						0.0	0.0	0.0	0.1	0.5	0.4	0.1	0.4	0.3	
PHEV on E85						0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.1	0.1	
Biofuel as EtOH in E-85 or E10			**1.3**	**1.5**	**2.0**	**1.1**	**1.2**	**1.5**	**2.9**	**3.7**	**4.0**	**2.9**	**3.1**	**1.9**	
Gas & Diesel on E-10	% =	100	1.3	1.5	2.0	1.1	1.2	1.5	0.8	0.5	0.3	0.8	0.4	0.1	
E-85 FFV on E-10						0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	
E-85 FFV on E-85						0.0	0.0	0.0	2.0	2.6	3.0	2.0	2.1	1.4	
PHEV on E10						0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHEV on E85						0.0	0.0	0.0	0.0	0.6	0.7	0.0	0.5	0.4	
Electricity															
PHEVs on Elec	% =	100				0.0	0.0	0.0	0.2	1.2	2.9	0.2	1.0	1.9	
Fcell Vehicle	% =	100				0.0	0.0	0.0	0.0	0.3	1.4	0.0	0.2	0.6	
Total Vehicle Energy in Gas-gal-eq			**18.7**	**22.1**	**28.3**	**15.5**	**16.5**	**21.1**	**15.2**	**13.5**	**13.9**	**15.2**	**11.1**	**6.4**	
VMT by Vehicle Type & Fuel															
Gas & Diesel on E-10			374	442	567	363	429	550	266	176	109	266	167	49	
E-85 on E-10			0	0	0	0	0	0	23	21	11	23	20	8	
E-85 on E-85			0	0	0	0	0	0	59	84	98	59	80	73	
PHEV on E10			0	0	0	0	0	0	3	16	14	3	16	15	
PHEV on E85			0	0	0	0	0	0	2	27	30	2	25	32	
PHEVs on Elec			0	0	0	0	0	0	10	89	213	10	84	222	
Fcell Vehicle			0	0	0	0	0	0	0	14	73	0	13	54	
VMT by Vehicle Type only															
Gas & Diesel on E-10			374	442	567	363	429	550	266	176	109	266	167	49	Calculated as follows:
E-85 on E-10 or E-85			0	0	0	0	0	0	82	106	109	82	100	81	[Fuel in GGEq] X MPG
PHEV on E10, E85 or Elec			0	0	0	0	0	0	15	132	258	15	125	269	[for specific fuel type]
Fcell Vehicle			0	0	0	0	0	0	0	14	73	0	13	54	
			374	442	567	363	429	550	363	427	548	363	405	452	
Vehicle Population by Type															
Gas & Diesel on E-10	VMT/yr	12.5	29.9	35.3	45.3	29.5	34.8	44.6	21.6	14.3	8.8	21.6	13.9	4.3	Assumes measures
E-85 on E-10 or E-85	per	12.5	0.0	0.0	0.0	0.0	0.0	0.0	6.6	8.6	8.8	6.6	8.3	7.1	that reduce VMT also
PHEV on E10, E85 or Elec	Veh.	12.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	10.7	21.0	1.2	10.4	23.6	reduce vehicle owner-
Fcell Vehicle	[1000s]	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	5.9	0.0	1.1	4.7	ship by 1/2 the VMT
			29.9	**35.3**	**45.3**	**29.5**	**34.8**	**44.6**	**29.4**	**34.7**	**44.5**	**29.4**	**33.7**	**39.8**	reduction

Values Shaded in **are inputs assumed by ARB staff**