

**HISTORIC COLUMBIA RIVER HIGHWAY: VIENTO  
PROJECT MATRIX**

**Current Status/Baseline & Problem to be Addressed**

Ten miles of the Historic Columbia River Highway remain to be reconstructed and connected to the rest of the 73 mile corridor. These miles are in the middle of the corridor. Five miles of the ten are already under construction. This project would reconstruct another 1.7 miles, and reconnect the corridor with another 0.5 mile segment.

In this mountainous area, many natural hazards exist including downed trees, rockfalls, culvert plugging, and wildfires. When I-84 is closed due to crashes or rockfalls, there is no alternative route available for emergency responders.

The alternative route for bicycles and pedestrians is I-84 - presenting a safety problem and discouraging tourism.

The abandonment of sections of the HCRH may have resulted in conditions that leave some environmental resources vulnerable (such as near culverts and where there is no guidance away from sensitive areas).

## STATE PARK TO PERHAM CREEK

### **Change to Baseline/Alternatives**

The project proposed to be funded by TIGER 8 would extend the trail another 1.7 miles to Perham Creek, leaving only 3.3 miles awaiting reconstruction as a trail to complete the 73 mile corridor for both recreation and transportation purposes. The 2010 Historic Columbia River Highway State Trail Plan evaluated a series of alternative alignments for 10.3 miles of State Trail and proposed an alignment that would have a minimum impact on natural, scenic, cultural and historic resources. This approach will be significantly less costly than constructing a completely new alignment. This project will bring a portion of the abandoned Historic Columbia River Highway to a state of good repair and repurpose the road as a multi-use trail.

This project provides pavement sections designed to accommodate service, emergency and construction vehicles, and includes or is proximate to a sufficient gated access point to Interstate 84 for fire fighting and other emergency purposes. This project will allow for improved circulation for fire or emergency response vehicles. Rockfall treatment ensures safety for trail users and improves existing rockfall protection along Interstate 84.

The project provides a paved multi-use trail between the developed day use sites at upper Viento State Park and Perham Creek. The existing parking area will be reconfigured for improved vehicular, bicycle, and pedestrian circulation.

Wherever possible, stormwater will be managed as "sheet flow" rather than concentrated in ditches. Vegetated filter strips will be used to clean and disperse run off wherever practical. Woody material will be chipped and spread on disturbed areas to reduce erosion and capture pollutants if any. Additionally, the trail enhancement will restrict use near sensitive resource areas through design.

<b>Type of Impacts</b>	<b>Population Affected by Impacts</b>
<p>Use values as goods and services provide tangible things that the present generation uses; and what economists call non-use values, usually defined as bequest values (what you leave to your children or future generations) and existence values (the value of knowing something exists, even if you don't use it). Somewhere in between use values and non-use values is option value or the value to a person of having the option for future use. In addition, the resource also has residual value beyond the twenty year span included in the analysis. Because additional users create additional miles of travel, the added social cost of carbon has been deducted as a disbenefit.</p>	<p>Beneficiaries of the HCRH State Trail include local and U.S. residents, and international visitors. Persons with disabilities and the aging population will be served by the State Trail as grades are kept below 5% whenever possible and the trail is paved with asphalt.</p>
<p>Reduced emergency service time, potential savings from reduction in injuries or reduced loss of life, potential reduction of delay related to rockfall on Interstate 84, and potential reduction in property damage due to wildfire.</p>	<p>HCRH State Trail user; emergency service providers; Interstate 84 users; and to the degree that area wildfires are suppressed earlier, residents, business and property owner owners in the area.</p>

<p>Value of an affordable and convenient active transportation option between desirable developed destinations along the HCRH State Trail. This will improve overall reliability of the multimodal transportation system by removing pedestrians and cyclists from the shoulder of I-84.</p>	<p>Beneficiaries of the HCRH State Trail and hiker/biker campground will include additional local and U.S. residents, and international visitors. Persons with disabilities and the aging population will be well served by the State Trail as grades are kept below 5% whenever possible and the trail is paved with asphalt.</p>
<p>Environmental benefits from stormwater, runoff, and erosion management improvements.</p>	<p>Those impacted by storm water, run off, erosion or other environmental impacts described.</p>

Economic Benefit	Summary of Results	Page Reference in BCA
<p>Monetized use value benefits estimated using the travel cost method including fuel costs, travel times, and user fees. Monetized residual value. Monetized Social Cost of Carbon disbenefit. Option, bequest, and existence values are likely strong given the national significance of the project area, but are not possible to quantify or monetize.</p>	<p>The present value of use value benefits estimated using the travel cost method including fuel costs, travel times, and day use fees is \$6.7 million over 20 years in 2016 \$s using a 3% discount rate. The present value of the Residual Value is \$4.7 million. The Social Cost of Carbon represents a disbenefit of -\$0.1 million. These compare to a Life Cycle cost of \$10.1 million (discounted at 3%).</p>	<p>Tab 6 Visitor Impacts; Tabs 4a Use Benefit (Fuel &amp; Time) and 4b Use Benefit (User Fees); disbenefit of the social cost of carbon is detailed in Tab 5 Cost of Carbon; elements are included as part of totals in Tab 2 Summary of Benefits &amp; Costs and Tab 3 Life Cycle Project Costs (Residual Values are included in this Tab also). Details of other calculations and reference tables are identified in Tab 7 Ref. &amp; Calculations</p>
<p>Unfortunately data was insufficient to monetize or quantify the economic benefits which could have included travel time savings, reduction in injuries and/or lives saved, and reductions in property damage.</p>	<p>None calculated.</p>	<p>N/A</p>

<p>Monetized use value benefit of hiker/biker campground based on hiker/biker user fees. Monetized residual value. Data was insufficient to estimate active transportation value and improved reliability of transportation system.</p>	<p>Additional user fees for hiker/biker campground are conservatively estimated at \$37,000 over 20 years in constant 2016 \$. Discounted benefits were not calculated separately for this item (only for the user fee total).</p>	<p>Tab 6 Visitor Impacts; Tab 4b Use Benefit (User Fees); included as part of totals in Tab 2 Summary of Benefits &amp; Costs.</p>
<p>Detail was insufficient to quantify or monetize specific benefits of environmental protections/improvements.</p>	<p>None calculated.</p>	<p>N/A</p>

**HISTORIC COLUMBIA RIVER HIGHWAY: VIENTO STATE PARK TO PERHAM CREEK  
SUMMARY OF BENEFIT COST ANALYSIS**

	<b>Discount Rate</b>	
	<b>3%</b>	<b>7%</b>
<b>Life-Cycle Costs (mil. 2016\$)</b>	10.08	9.00
<b>Benefits (mil. 2016\$)</b>	11.33	6.57
<b>Net Present Value (mil. 2016\$)</b>	<b>1.25</b>	<b>-2.43</b>
<b>Benefit: Cost Ratio</b>	<b>1.12</b>	<b>0.73</b>

	<b>Total Over 20 Years Discount Rate</b>	
	<b>3%</b>	<b>7%</b>
<b>ITEMIZED BENEFITS/DISBENEFITS (mil. 2016\$)</b>		
<b>Use Benefit (TCM)</b>	\$6.7	\$4.7
<b>Residual Value</b>	\$4.7	\$2.0
<b>SCC Disbenefit (3% in both cases)</b>	-\$0.1	-\$0.1
<b>TOTAL BENEFITS</b>	<b>\$11.3</b>	<b>\$6.6</b>

<b>Long Term Outcome</b>	<b>Types of Societal Benefits</b>
Quality of Life	Use value: facilities & services provided
	Bequest value - what you leave to your children
	Existence value - the value of knowing something is there
	Option value - the value to a person of being able to use something in the future
	Residual value - beyond the twenty year period
	Value of an affordable and convenient alternative to motor vehicle developed destinations along the Highway
	Time savings from improved overall road conditions by removing pedestrians and cyclists from the roadway
	Use value for active transportation users
Safety	Reduced maintenance and emergency response costs
	Savings from reduction in injuries or deaths
	Time savings due to reduction of delays
	Reduction in property damage due to accidents
Environmental Sustainability	Environmental benefits from stormwater management

	<b>In BCA</b>
Provide tangible things the present generation uses	Yes
For our children or future generations	No
Providing something exists, even if you don't use it	No
Benefit of having the option for future use	No
Time span included in the analysis	Yes
Present active transportation option to and between desirable CRH State Trail	No
Improving reliability of the multi modal transportation system by removing the shoulder on Interstate 84	No
Allowing users staying at hiker/biker campground	Yes
Reducing emergency service time	No
Reducing reduced loss of life	No
Reducing delay related to rockfall on Interstate 84	No
Contributing to wildfire mitigation	No
Improving water, runoff, and erosion management improvements	No

## LIFE-CYCLE COSTS

Year	DIRECT PROJECT COSTS			Constant 2016 Dollars
	INITIAL COSTS		SUBSEQUENT COSTS	
	Project Support	Construction	Maintenance/ Operations	
<b>Construction Begins</b>				
2016	0			
	1	\$400,000		\$388,350
	2	\$1,714,000		\$1,615,609
	3		\$9,426,000	\$8,626,125
<b>Project Opens</b>				
2020	4		\$21,330	\$21,330
	5		\$21,330	\$21,330
	6		\$21,330	\$21,330
	7		\$21,330	\$21,330
	8		\$21,330	\$21,330
	9		\$21,330	\$21,330
	10		\$21,330	\$21,330
	11		\$21,330	\$21,330
	12		\$21,330	\$21,330
	13		\$21,330	\$21,330
	14		\$21,330	\$21,330
	15		\$21,330	\$21,330
	16		\$21,330	\$21,330
	17		\$21,330	\$21,330
	18		\$21,330	\$21,330
	19		\$21,330	\$21,330
	20		\$21,330	\$21,330
	21		\$21,330	\$21,330
	22		\$21,330	\$21,330
	23		\$21,330	\$21,330
	<b>Total</b>	\$2,114,000	\$9,426,000	\$426,600
				<b>Total Present Value Costs</b>
				<b>Residual Value</b>

<b>TOTAL COSTS</b>	
<b>Present Value</b>	
<b>3%</b>	<b>7%</b>
\$377,038	\$362,943
\$1,522,867	\$1,411,136
\$7,894,127	\$7,041,488
\$18,951	\$16,273
\$18,399	\$15,208
\$17,864	\$14,213
\$17,343	\$13,283
\$16,838	\$12,414
\$16,348	\$11,602
\$15,872	\$10,843
\$15,409	\$10,134
\$14,960	\$9,471
\$14,525	\$8,851
\$14,102	\$8,272
\$13,691	\$7,731
\$13,292	\$7,225
\$12,905	\$6,753
\$12,529	\$6,311
\$12,164	\$5,898
\$11,810	\$5,512
\$11,466	\$5,151
\$11,132	\$4,814
\$10,808	\$4,499
\$10,084,440	\$9,000,026
<b>\$10,084,440</b>	<b>\$9,000,026</b>
<b>\$4,738,159</b>	<b>\$1,972,599</b>

**USE BENEF**

<b>YEAR</b>	<b>MILES OF TRAVEL</b> (miles/yr)	<b>FUEL EFFICIENCY</b> (mpg)	<b>FUEL GALLONS</b> (gallons/yr)	<b>FUEL PRICE</b> (constant 2016 \$)
1	680,500	25.0	27,220	\$2.33
20	450,100	36.6	12,298	\$3.20
2	2,061,600	25.7	80,218	\$2.37
3	450,100	26.4	17,049	\$2.41
4	450,100	27.1	16,609	\$2.45
5	450,100	27.8	16,191	\$2.49
6	450,100	28.5	15,793	\$2.53
7	450,100	29.3	15,362	\$2.58
8	450,100	30.0	15,003	\$2.62
9	450,100	30.8	14,614	\$2.66
10	450,100	31.5	14,289	\$2.71
11	450,100	32.3	13,935	\$2.75
12	450,100	32.9	13,681	\$2.80
13	450,100	33.4	13,468	\$2.85
14	450,100	34.0	13,238	\$2.89
15	450,100	34.5	13,046	\$2.94
16	450,100	35.1	12,823	\$2.99
17	450,100	35.5	12,679	\$3.04
18	450,100	35.9	12,538	\$3.09
19	450,100	36.2	12,434	\$3.15
<b>Total</b>	10,843,900		362,487	

**ITS (FUEL COST & TRAVEL TIME)**

FUEL COST (constant 2016 \$)	PERSON HOURS OF TRAVEL (person-hours/yr)	TIME COST (constant 2016 \$)	ESTIMATED VISITATION E	
			Constant Dollars	Present 3%
\$63,400	28,150	\$507,300	\$570,700	\$522,300
\$39,300	18,590	\$335,000	\$374,300	\$195,300
\$190,100	85,310	\$1,537,400	\$1,727,500	\$1,534,900
\$41,100	18,590	\$335,000	\$376,100	\$324,400
\$40,700	18,590	\$335,000	\$375,700	\$314,600
\$40,300	18,590	\$335,000	\$375,300	\$305,200
\$40,000	18,590	\$335,000	\$375,000	\$296,000
\$39,600	18,590	\$335,000	\$374,600	\$287,100
\$39,300	18,590	\$335,000	\$374,300	\$278,500
\$38,900	18,590	\$335,000	\$373,900	\$270,100
\$38,700	18,590	\$335,000	\$373,700	\$262,100
\$38,400	18,590	\$335,000	\$373,400	\$254,300
\$38,300	18,590	\$335,000	\$373,300	\$246,800
\$38,300	18,590	\$335,000	\$373,300	\$239,600
\$38,300	18,590	\$335,000	\$373,300	\$232,600
\$38,400	18,590	\$335,000	\$373,400	\$225,900
\$38,400	18,590	\$335,000	\$373,400	\$219,300
\$38,600	18,590	\$335,000	\$373,600	\$213,100
\$38,800	18,590	\$335,000	\$373,800	\$207,000
\$39,100	18,590	\$335,000	\$374,100	\$201,100
<b>\$958,000</b>	<b>448,080</b>	<b>\$8,074,700</b>	<b>\$9,032,700</b>	<b>\$6,630,200</b>

<b>BENEFIT</b>
<b>t Value</b>
7%
\$465,900
\$84,500
\$1,317,900
\$268,200
\$250,300
\$233,700
\$218,300
\$203,800
\$190,300
\$177,600
\$165,900
\$154,900
\$144,800
\$135,300
\$126,400
\$118,200
\$110,500
\$103,300
\$96,600
\$90,400
<b>\$4,656,800</b>

## USE BENEFITS (USER FEES)

YEAR	DAY USE CARS (cars/yr)	DAY USE FEES (constant 2016 \$)	HIKER/BIKER CAMPERS (person days/yr)	HIKER/BIKER FEES (constant 2016 \$)	ESTIMATE Constant Dollars
1	1,115	5,577	370	1,850	\$7,427
20	740	3,700	370	1,850	\$5,550
2	3,360	16,800	370	1,850	\$18,650
3	740	3,700	370	1,850	\$5,550
4	740	3,700	370	1,850	\$5,550
5	740	3,700	370	1,850	\$5,550
6	740	3,700	370	1,850	\$5,550
7	740	3,700	370	1,850	\$5,550
8	740	3,700	370	1,850	\$5,550
9	740	3,700	370	1,850	\$5,550
10	740	3,700	370	1,850	\$5,550
11	740	3,700	370	1,850	\$5,550
12	740	3,700	370	1,850	\$5,550
13	740	3,700	370	1,850	\$5,550
14	740	3,700	370	1,850	\$5,550
15	740	3,700	370	1,850	\$5,550
16	740	3,700	370	1,850	\$5,550
17	740	3,700	370	1,850	\$5,550
18	740	3,700	370	1,850	\$5,550
19	740	3,700	370	1,850	\$5,550
<b>Total</b>	17,795	\$88,977	7,400	\$37,000	\$125,977

<b>TED VISITATION BENEFIT</b>	
<b>Present Value</b>	
<b>3%</b>	<b>7%</b>
\$6,800	\$6,100
\$2,900	\$1,300
\$16,600	\$14,200
\$4,800	\$4,000
\$4,600	\$3,700
\$4,500	\$3,500
\$4,400	\$3,200
\$4,300	\$3,000
\$4,100	\$2,800
\$4,000	\$2,600
\$3,900	\$2,500
\$3,800	\$2,300
\$3,700	\$2,200
\$3,600	\$2,000
\$3,500	\$1,900
\$3,400	\$1,800
\$3,300	\$1,600
\$3,200	\$1,500
\$3,100	\$1,400
\$3,000	\$1,300
<b>\$91,500</b>	<b>\$62,900</b>

## SOCIAL COST OF CARBO

YEAR	MILES OF TRAVEL (miles/yr)	FUEL EFFICIENCY (mpg)	FUEL GALLONS (gallons/yr)	METRIC TONS CARBON DIOXIDE (metric tons/year)
1	680,500	25.0	27,220	243
20	450,100	36.6	12,298	110
2	2,061,600	25.7	80,218	716
3	450,100	26.4	17,049	152
4	450,100	27.1	16,609	148
5	450,100	27.8	16,191	144
6	450,100	28.5	15,793	141
7	450,100	29.3	15,362	137
8	450,100	30.0	15,003	134
9	450,100	30.8	14,614	130
10	450,100	31.5	14,289	127
11	450,100	32.3	13,935	124
12	450,100	32.9	13,681	122
13	450,100	33.4	13,468	120
14	450,100	34.0	13,238	118
15	450,100	34.5	13,046	116
16	450,100	35.1	12,823	114
17	450,100	35.5	12,679	113
18	450,100	35.9	12,538	112
19	450,100	36.2	12,434	111
<b>Total</b>	10,843,900		362,487	3,233

## N DISBENEFITS

SOCIAL COST OF CARBON	
per metric ton 2016 \$	present value
\$49	\$10,890
\$68	\$3,780
\$49	\$30,243
\$49	\$6,239
\$49	\$5,903
\$50	\$5,700
\$51	\$5,503
\$52	\$5,305
\$53	\$5,122
\$54	\$4,938
\$56	\$4,862
\$57	\$4,687
\$57	\$4,467
\$58	\$4,343
\$59	\$4,217
\$60	\$4,100
\$61	\$3,981
\$62	\$3,881
\$64	\$3,849
\$65	\$3,763
<b>\$125,774</b>	

## Trail Connection Day Use Attendance Impacts

Year	Car Counts			3 Year Averages
	Starvation Creek Entrance	Viento DU Entrance	Combined	
2005	44,903	15,338	60,241	
2006	45,082	14,962	60,044	
2007	45,971	16,165	62,136	60,810
2008	42,237	15,804	58,041	
2009	47,015	17,727	64,742	
2010	53,558	19,155	72,713	
2011	45,037	18,106	63,143	
2012	46,736	18,076	64,812	
2013	47,066	15,290	62,356	63,440
<input type="text"/>	Year connecting trail constructed/completed			

### Combined Growth Measures

- 6.5% 1st Year After Completion
- 12.3% 2nd Year After Completion (add'l or compound growth)
- 4.3% Diff. of averages before (three years preceeding) and most recent 3 years after

### Projections for New Trail Impacts

Year	Viento DU Entrance	Diff from baseline	Mitchell Point/ Seneca Fouts	Combined
Baseline*	17,160		19,000	36,160
2020	18,275	1,115	20,235	38,510
2021	20,523	3,360	22,724	43,247
2022	17,898	740	19,817	37,715
2023	17,898	740	19,817	37,715
2024	17,898	740	19,817	37,715
2025	17,898	740	19,817	37,715
2026	17,898	740	19,817	37,715
2027	17,898	740	19,817	37,715
2028	17,898	740	19,817	37,715
2029	17,898	740	19,817	37,715
2030	17,898	740	19,817	37,715
2031	17,898	740	19,817	37,715
2032	17,898	740	19,817	37,715
2033	17,898	740	19,817	37,715
2034	17,898	740	19,817	37,715
2035	17,898	740	19,817	37,715
2036	17,898	740	19,817	37,715
2037	17,898	740	19,817	37,715
2038	17,898	740	19,817	37,715
2039	17,898	740	19,817	37,715

## Hiker/Biker Camping Facility Addition Impacts

74 Camp sites currently available at Viento  
27,010 Camping site days available  
4,595 Viento camp site rentals in 2013  
17.0% Annual occupancy rate at Viento camp sites

A number of Oregon Parks campgrounds (but none in Gorge) allow hiker and biker campers to squeeze in somewhat. Statewide the hiker/biker person days are 1% to 8% above the number of camp site rentals, with a state average of 3.2% per campground and there will be a bike hub (including a repair station and cell phone charging area nearby) demand

150 Hiker/Biker camping site person days  
3.2% Annual occupancy rate

370 Hiker/Biker camping site person days

7.8% Annual occupancy rate

810 Hiker/Biker camping site person days  
17.0% Annual occupancy rate

13 Hiker/Biker camp sites being added at Viento  
4745 Hiker/Biker camping site person days available



here at a rate of \$5 per person per day. These are not official sites, nor are they camping areas set up for average of 3.3%. Because the facility that is part of this project is the first trailside exclusive hiker/biker for this facility is estimated conservatively at 8% above current camp site rentals at Viento.

report.

10 (they represent  
to Census 2010).

**Miles of Travel and Person Hours of Travel Calculations**

Year 1		Average		Total Miles of Travel		Person Hours of Travel	
Vehicle Zones	Zone Distribution	Distance (mi/hr)	Person-Hrs	Speed	Person	Person	Person
Portland Metro	0%	1850	109	51.3	121,899	2,218	6,617
NE Wood/George	10%	418	12	52.4	12,145	184	1,031
Willamette Valley	6%	145	218	58.4	14,510	195	1,360
Other Oregon	6%	84	411	59.4	18,249	184	1,430
Other Washington	6%	112	264	56.2	16,432	161	1,660
Other States (Canada)	6%	129	1547	58.4	38,613	198	1,148
Total	100%	2528	3000	47.9	186,813	3,629	24,152
New Motor Demand (Total Cost)		2,528					

  

Year 2		Average		Total Miles of Travel		Person Hours of Travel	
Vehicle Zones	Zone Distribution	Distance (mi/hr)	Person-Hrs	Speed	Person	Person	Person
Portland Metro	0%	4220	109	51.3	431,980	9,748	19,940
NE Wood/George	10%	1261	12	52.4	16,811	211	1,060
Willamette Valley	6%	431	218	58.4	131,768	1,007	4,120
Other Oregon	6%	252	411	59.4	121,248	184	1,220
Other Washington	6%	401	266	56.2	131,238	1,007	1,520
Other States (Canada)	6%	390	1547	58.4	161,313	161	16,220
Total	100%	3086	3000	47.9	2,061,611	16,239	85,118
New Motor Demand (Total Cost)		3,086					

  

Years 3-30		Average		Total Miles of Travel		Person Hours of Travel	
Vehicle Zones	Zone Distribution	Distance (mi/hr)	Person-Hrs	Speed	Person	Person	Person
Portland Metro	0%	926	109	51.3	191,884	2,138	4,380
NE Wood/George	10%	277	12	52.4	14,881	187	871
Willamette Valley	6%	96	218	58.4	22,888	122	900
Other Oregon	6%	51	411	59.4	13,161	117	1,020
Other Washington	6%	189	266	56.2	13,888	111	1,100
Other States (Canada)	6%	86	1547	58.8	219,192	189	8,230
Total	100%	1551	3000	47.9	450,876	3,562	15,530
New Motor Demand (Total Cost)		1,551					

Average number of people per motor vehicle  
 Source: Bureau of Economic Analysis of Household Travel Data, Oregon Parks and Recreation Department, 2012

**Travel Time Value in 2013 US\$ per person-hour**  
 Inflation: Personal Services Index  
 Inflation to 2013 dollars

Year	2011	2012	2013	April 01 2014
Inflation Adjustments	224,629	229,264	232,967	239,174
Quality of time, per gallon	91.47	91.47	92.177	91.8

Source: March 2014 GAO forecast  
 2014 estimate from WADWAA Oregon/Fishers survey  
 Real growth rate of 1.18% from 2011-14 Q1

**Fuel Efficiency for All Cars and Light Trucks "On the Road" Combined**

Year	MPG	Fuel Efficiency
2010	21.0	21.0
2011	18.4	20.0
2012	18.4	20.0
2013	18.4	20.0
2014	18.4	20.0
2015	18.4	20.0
2016	18.4	20.0
2017	18.4	20.0
2018	18.4	20.0
2019	18.4	20.0
2020	18.4	20.0
2021	18.4	20.0
2022	18.4	20.0
2023	18.4	20.0
2024	18.4	20.0
2025	18.4	20.0
2026	18.4	20.0
2027	18.4	20.0
2028	18.4	20.0
2029	18.4	20.0
2030	18.4	20.0

Source: Environmental Protection Agency, 2013 Reference Case  
 Source: Energy Information Administration, Annual Energy Outlook 2013, Reference Case

**Environmental Protection Agency, metric tons CO2/p gallon of gasoline**  
 0.125 metric tons/gallon + 71.25 kg CO2/metric ton + metric tons/1,000 kg = 0.00802  
 0.125 x 0.00802 metric tons CO2/gallon of gasoline

**Depreciated Social Cost of Carbon**

Year	MPG	2015	2045	All Years CBA All Urban Consumers U.S. City Average
2010	21	42	42	
2011	21	42	42	
2012	21	42	42	
2013	21	42	42	207,382
2014	21	42	42	224,974
2015	21	42	42	
2016	21	42	42	
2017	21	42	42	
2018	21	42	42	
2019	21	42	42	
2020	21	42	42	
2021	21	42	42	
2022	21	42	42	
2023	21	42	42	
2024	21	42	42	
2025	21	42	42	
2026	21	42	42	
2027	21	42	42	
2028	21	42	42	
2029	21	42	42	
2030	21	42	42	

Source: National Oceanic and Atmospheric Administration, Renewable Fuels

**Residual Value Estimate**

Category	Year	MPG	2015	2045
2010	21	42	42	
2011	21	42	42	
2012	21	42	42	
2013	21	42	42	207,382
2014	21	42	42	224,974
2015	21	42	42	
2016	21	42	42	
2017	21	42	42	
2018	21	42	42	
2019	21	42	42	
2020	21	42	42	
2021	21	42	42	
2022	21	42	42	
2023	21	42	42	
2024	21	42	42	
2025	21	42	42	
2026	21	42	42	
2027	21	42	42	
2028	21	42	42	
2029	21	42	42	
2030	21	42	42	

**Maintenance & Operating Costs**

Category	2015	2045
Wages & Benefits	\$ 142,010	\$ 12,100
Utilities	\$ 171	\$ 1,700
Supplies	\$ 114	\$ 700
Fleet	\$ 462	\$ 1,240
Insurance/Fuel	\$ 1	\$ 100
Capital Expenditures	\$ 848	\$ 848
Office/IT/Security	\$ 416	\$ 440
Travel & Training	\$ 74	\$ 80
Other Costs	\$ 185	\$ 240
Total Annually Operating	\$ 292,000	\$ 3,240