

# Appendix D

## **Inland Star Greenhouse Gas Emissions Calculations**



# Construction Emissions

**Inland Star  
Construction Energy Analysis**

**Annual Fuel Summary**

<b>Off-Road Heavy-Duty Construction Equipment</b>	
37,123	Diesel Consumption (gal)
37,123	Annual Diesel Consumption (gal/year)
<b>On-Road Construction Equipment</b>	
<b>Haul Trucks</b>	
71	Diesel Consumption (gal)
71	Annual Diesel Consumption (gal/year)
<b>Vendor Trucks</b>	
7,235	Diesel Consumption (gal)
7,235	Annual Diesel Consumption (gal/year)
<b>Workers</b>	
7,803	Gas Consumption (gal)
7,803	Annual Gas Consumption (gal/year)
<b>Total On-Road</b>	
7,305	Total Diesel Consumption (gal)
7,305	Annual Diesel Consumption (gal/year)
7,803	Project Gas Consumption (gal)
7,803	Annual Gas Consumption (gal/year)
<b>44,428</b>	<b>Total Gallons Diesel</b>
<b>7,803</b>	<b>Total Gallons Gasoline</b>
<b>52,231</b>	<b>Total Gallons Fuel (Gas and Diesel)</b>

1.0 Estimated Project Construction Duration (years)

44,428 Annual Average Gallons Diesel  
7,803 Annual Average Gallons Gasoline

Los Angeles County Fuel Consumption (2015) <sup>1</sup>			Percent of Annual Project Compared to County
Source	Fuel Type	Gallons	
Off-Road/Vendor/Haul Trucks	Diesel	630,769,231	0.007%
Workers	Gasoline	3,465,000,000	0.0002%

**Notes:**

1 California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2015  
[https://www.energy.ca.gov/almanac/transportation\\_data/gasoline/2010-2017\\_A15\\_Results.xlsx](https://www.energy.ca.gov/almanac/transportation_data/gasoline/2010-2017_A15_Results.xlsx). Accessed December 2018.  
Diesel is adjusted to account for retail (52%) and non-retail (48%) diesel sales.

**Inland Star  
Construction Energy Analysis**

**Off-Road Equipment**

**Equipment ≤ 50 hp**

pounds fuel/hp-hr (OFFROAD2011 model, ≤ 50 hp): 0.408 lb/hp-hr  
 diesel pounds/gallon (CARB density assumption): 7.07 lb/gal  
 diesel gallons/hp-hr: 0.0577 gal/hp-hr  
 Total <50 43,222 hp-hr  
 Total diesel gallons: 2,494 gal

**Equipment > 50 hp**

pounds fuel/hp-hr (OFFROAD2011 model, > 50 hp): 0.367 lb/hp-hr  
 diesel pounds/gallon (CARB density assumption): 7.07 lb/gal  
 diesel gallons/hp-hr: 0.0519 gal/hp-hr  
 Total >50 667,091 hp-hr  
 Total diesel gallons: 34,628 gal

**Total diesel gallons (off-road equipment): 37,123 gal**

Construction Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Water Pipeline	Concrete/Industrial Saws	2	8	81	0.73	64	60,549
Water Pipeline	Excavators	2	8	158	0.38	64	61,481
Water Pipeline	Skid Steer Loaders	2	8	65	0.37	64	24,627
Facility Renovations	Aerial Lifts	3	8	63	0.31	261	122,336
Facility Renovations	Concrete/Industrial Saws	1	8	81	0.73	261	123,463
Facility Renovations	Excavators	1	8	158	0.38	261	125,364
Facility Renovations	Forklifts	2	8	89	0.2	261	74,333
Facility Renovations	Tractors/Loaders/Backhoes	1	8	97	0.37	261	74,938
Facility Renovations	Welders	1	8	46	0.45	261	43,222
						<b>Total &gt;50</b>	667,091
						<b>Total &lt;50</b>	43,222

**Inland Star  
Construction Energy Analysis**

**On-Road Haul Trucks**

EMFAC2014 Diesel Fuel Consumption Factor: <sup>1</sup>	0.1645 gallons/mile	miles/gallon
Total Haul Truck VMT:	420 miles	6.08
<b>Total VMT diesel gallons (on-road haul trucks):</b>	<b>69</b>	
EMFAC2014 Diesel Fuel Consumption Factor: <sup>2</sup>	0.8225 gallons/hour	
Total Haul Truck Idle-Hours per Year:	2 hours	
<b>Total Idling diesel gallons (on-road haul trucks):</b>	<b>1</b>	
<b>Total diesel gallons (on-road haul trucks):</b>	<b>71 gal</b>	

1. California Air Resources Board, EMFAC2014 (South Coast Air Basin; T7 Single Construction; Annual; CY 2019; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (South Coast Air Basin; T7 Single Construction; Annual; CY 2019; Aggregate MY; 5 miles per hour converted to hourly rate)

Phase	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Water Pipeline	11	20	220	1
Facility Renovations	10	20	200	1
	Total Haul Truck VMT:		420	
	Total Idle-Hours:		2	

**Inland Star  
Construction Energy Analysis**

**On-Road Vendor Trucks**

EMFAC2014 Diesel Fuel Consumption Factor:<sup>1</sup> 0.1521 gallons/mile miles/gallon  
 Total Vendor Truck VMT: 44,850 miles 6.6  
**Total VMT diesel gallons (on-road vendor trucks): 6,821**

EMFAC2014 Diesel Fuel Consumption Factor:<sup>2</sup> 0.7645 gallons/hour  
 Total Haul Truck Idle-Hours per Year: 542 hours  
**Total Idling diesel gallons (on-road haul trucks): 414**

**Total diesel gallons (on-road haul trucks): 7,235 gal**

1. California Air Resources Board, EMFAC2014 (South Coast Air Basin; HHDT and MHDT; Annual; CY 2019; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (South Coast Air Basin; HHDT and MHDT; Annual; CY 2019; Aggregate MY; 5 miles per hour converted to hourly rate)

Phase	Days	Trips/Day	Miles/Trip	VMT	Idle Hours
Water Pipeline	64	20	6.9	8,832	107
Facility Renovations	261	20	6.9	36,018	435

Total Vendor Truck VMT: 44,850

Total Idle-Hours: 542

**Inland Star  
Construction Energy Analysis**

**On-Road Workers (LDA, LDT1, LDT2)**

EMFAC2014 Gasoline Fuel Consumption Factor: <sup>1</sup>	0.0408	gallons/mile	miles/gallon
Total Worker VMT:	191,100	miles	24.5
<b>Total VMT gasoline gallons (workers):</b>	<b>7,803</b>		

1. California Air Resources Board, EMFAC2014 (South Coast Air Basin; LDA, LDT1, LDT2; CY 2019; Aggregate MY; Aggregate Speed)

<b>Phase</b>	<b>Days</b>	<b>One-Way Trips/Day</b>	<b>Miles/Trip</b>	<b>VMT</b>
Water Pipeline	64	40	14.7	37,632
Facility Renovations	261	40	14.7	153,468
			<b>Total Worker VMT:</b>	<b>191,100</b>

# Operational Emissions

**Operational Energy Analysis**

Electricity	kWh/yr	GWh/yr
Refrigerated Warehouse-No Rail	553,116	0.553
<b>Total</b>	<b>553,116</b>	<b>0.553</b>
<b>Total (including water, see below)</b>	<b>556,759</b>	<b>0.557</b>

**Project Energy Consumption                    556,759                    0.56**

Source: Oregon Department of Energy, Indoor Cannabis Cultivator Energy Use Estimator, 2018

Water	Mgal/yr
Refrigerated Warehouse-No Rail	0.280
<b>Total</b>	<b>0.280</b>

  

Electricity Intensity Factors	kWh/Mgal
Electricity Factor - Supply	9,727
Electricity Factor - Treat	111
Electricity Factor - Distribute	1,272
Electricity Factor - Wastewater Treatment	1,911

  

Electricity from Water Demand	kWh/yr	GWh/yr
<b>Total</b>	<b>3,643</b>	<b>0.004</b>

Source: California Air Resources Board, CalEEMod, Version 2016.3.2.

Base water demand is based on rates provided in City of Los Angeles Department of Public Works, Sewage Facilities Charge, Sewage Generation Factor for Residential and Commercial Categories, 2012.

Electricity	GWh/yr
SCE 2015 Electricity Sales	87,544
Project Annual	0.557
Existing Annual	-
Net Project Annual	0.56
Percent Net Project of LADWP	0.0006%

Source: Southern California Edison

[2015 Financial and Statistical Report, p.2](#)

Natural Gas	kBtu/yr	cubic foot (cf)	Per day Usage	Natural Gas	million cubic foot (cf)
Refrigerated Warehouse-No Rail	196,123	189,491		SoCalGas 2015	934,035
<b>Project Total</b>	<b>196,123</b>	<b>189,491</b>	519.15	Project Annual	0.189
<b>Project Net Total</b>	<b>196,123</b>	<b>189,491</b>	<b>519</b>	Existing Annual	-
				Net Project Annual	0.189491
				Percent Net Project of SoCalGas	0.00002%

Source: California Gas and Electric Utilities, 2018 California Gas Report, p. 101, 2018.

Source: California Air Resources Board, CalEEMod, Version 2016.3.2.

Conversion factor of 1,035 Btu per cubic foot based on United States Energy Information Administration data (see: USEIA, Natural Gas, Heat Content of Natural Gas Consumed, February 28, 2018, [https://www.eia.gov/dnav/ng/ng\\_cons\\_heat\\_a\\_EPGO\\_VGTH\\_btucf\\_a.htm](https://www.eia.gov/dnav/ng/ng_cons_heat_a_EPGO_VGTH_btucf_a.htm). Accessed September 2018.)

**Inland Star  
Operational Energy Analysis**

**Fuel Usage from VMT**

Annual VMT (All): 176,800 miles/year  
(With trip and VMT reductions from land use characteristics and proximity to public transit.)

Fuel Type: <sup>1</sup>	GAS	DSL	ELEC
Percent:	97.94%	0.70%	1.36%
Miles per Gallon Fuel:	27.77	43.53	-
Annual VMT by Fuel Type (miles):	173,153	1,243	2,404
<b>Annual Fuel Usage (gallons):</b>	<b>6,236</b>	<b>29</b>	-
Annual Fuel Usage with Emer.Gen. (gallons):		1,606	
<b>Project Fuel Consumption</b>	<b>6,236</b>	<b>1,606</b>	
Annual Fuel Savings from Electric Vehicles: <sup>2</sup>	-	-	87

	Los Angeles County Fuel Consumption <sup>3</sup>	
	Gasoline	Diesel
Los Angeles County:	3,465,000,000	630,769,231
Project Annual:	6,236	1,606
Percent Net Project of Los Angeles County:	0.0002%	0.0003%

Notes:

- California Air Resources Board, EMFAC2017 (Los Angeles County; Annual; 2021, LDA,LDT1,LDT2).
- Assumes electric vehicles would replace traditional gasoline-fueled vehicles.
- California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2015  
[https://www.energy.ca.gov/almanac/transportation\\_data/gasoline/2010-2017\\_A15\\_Results.xlsx](https://www.energy.ca.gov/almanac/transportation_data/gasoline/2010-2017_A15_Results.xlsx). Accessed December 2018.  
Diesel is adjusted to account for retail (52%) and non-retail (48%) diesel sales.

**Inland Star  
Operational Energy Analysis**

**Fuel Usage from VMT**

Annual VMT (All): 1,861,600 miles/year  
(With trip and VMT reductions from land use characteristics and proximity to public transit.)

<b>Fuel Type:<sup>1</sup></b>	<b>GAS</b>	<b>DSL</b>
Percent:	40.09%	59.91%
Miles per Gallon Fuel:	5.58	15.35
Annual VMT by Fuel Type (miles):	746,310	1,115,290
<b>Annual Fuel Usage (gallons):</b>	<b>133,751</b>	<b>72,668</b>
Annual Fuel Usage with Emer.Gen. (gallons):		74,245
<b>Project Fuel Consumption</b>	<b>133,751</b>	<b>74,245</b>
Annual Fuel Savings from Electric Vehicles: <sup>2</sup>	-	-

	<b>Los Angeles County Fuel Consumption<sup>3</sup></b>	
	<b>Gasoline</b>	<b>Diesel</b>
Los Angeles County:	3,465,000,000	630,769,231
Project Annual:	133,751	74,245
Percent Net Project of Los Angeles County:	0.0039%	0.0118%

Notes:

1. California Air Resources Board, EMFAC2017 (Los Angeles County; Annual; 2021, LDA,LDT1,LDT2).
2. Assumes electric vehicles would replace traditional gasoline-fueled vehicles.
3. California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2015  
[https://www.energy.ca.gov/almanac/transportation\\_data/gasoline/2010-2017\\_A15\\_Results.xlsx](https://www.energy.ca.gov/almanac/transportation_data/gasoline/2010-2017_A15_Results.xlsx). Accessed December 2018.  
Diesel is adjusted to account for retail (52%) and non-retail (48%) diesel sales.

**Mobile Fuel Consumption**

	<b>Los Angeles County Fuel Consumption<sup>1</sup></b>	
	<b>Gasoline</b>	<b>Diesel</b>
<b>Los Angeles County</b>	3465000000.00	630769230.77
Project Employees	6236	1606
Project Trucks	133751	74245
Emergency Generator	-	1578
<b>Project Total</b>	<b>139987</b>	<b>77430</b>
	0.004%	0.012%

1 California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2015

[https://www.energy.ca.gov/almanac/transportation\\_data/gasoline/2010-2017\\_A15\\_Results.xlsx](https://www.energy.ca.gov/almanac/transportation_data/gasoline/2010-2017_A15_Results.xlsx). Accessed December 2018.

Diesel is adjusted to account for retail (52%) and non-retail (48%) diesel sales.

Fuel Consumption	Total CO <sub>2</sub> (MT/yr)	Fuel Type	Fuel Factor (kgCO <sub>2</sub> /gal)	Gallons
Emergency Generator	16.02	Diesel	10.15	1,578

**Assumptions**

10.15 diesel      KgCO<sub>2</sub>/gallon<sup>1</sup>  
1 MT = 1,000 kilograms

Notes:

1. [California Climate Action Registry, General Reporting Protocol v2.2, Tables C.3, C.5, and C.6, March 2007. Accessed September 2018.](#)