

Via Electronic Mail

MEMORANDUM

To: Jing Ng, The Prado Group

From: Michael Keinath
Shaena Ulissi
Ashley Wheeler

Subject: Greenhouse Gas Emissions by Phase for 3333 California St
AB900

In support of the AB900 Application for the mixed-use development project located at 3333 California Street in San Francisco, California (herein referred to as the "Proposed Project" or "Project"), Ramboll US Corporation (Ramboll) quantified both direct and indirect greenhouse gas (GHG) emissions associated with the Proposed Project's and Project Variant's operation. It showed that the Project and Project Variant meet the requirement for no net additional emission of greenhouse gases. That analysis, referred to hereafter as the "GHG Report", is available as Appendix E: Greenhouse Gas Emissions Analysis.¹

The California Air Resources Board ("ARB") requested additional documentation on implementation for the mitigation and offsets strategy presented in the GHG Report. This memorandum describes methodology and summarizes data needed to determine the timing of GHG reductions needed by phase for construction and operations.

CONSTRUCTION EMISSIONS BY PHASE

Construction emissions by year, phase, and sub-category are presented in the GHG Report, **Tables Con-1** through **Con-6**. The emissions values from the GHG Report tables are rearranged to summarize the emissions by phase in **Table 1**.

The emissions shown in **Table 1** can be used to determine the timing and quantity of GHG reduction credits required to meet the Project's obligations as described further in application Attachment H: 3333 California Street Project Greenhouse Gas Emissions Offset Commitment Approach.

OPERATIONAL EMISSIONS BY PHASE

Project and Project Variant operational emissions by year and emissions source category are presented in the GHG Report, **Tables Ops-6** and **Ops-7**. This section describes how the information used to develop those operational emissions inventories is used to derive emissions by phase.

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Ramboll
201 California Street
Suite 1200
San Francisco, CA 94111
USA

T +1 415 796 1950
F +1 415 398 5812
www.ramboll.com

¹ Ramboll, August 2018, AB900 Analysis. Available at: <http://opr.ca.gov/ceqa/california-jobs.html>. Accessed: September 24, 2018.

Area and Mobile Sources

Area and mobile source emissions are quantified by phase and year in the GHG Report, **Table Ops-17**. Emissions are summarized by phase and year in **Tables 2a** and **2b** for the Project and Project Variant, respectively, along with the emissions from other source categories.

Building Energy, Water, and Wastewater

Building electricity, natural gas, and water consumption are summarized by building type in the GHG Report, **Table Ops-8**. The proportions of each building type constructed in a given phase are shown in the GHG Report, **Table Ops-16**. To determine the consumption by phase, the amount used by building type is multiplied by the proportion of each building type constructed in a given phase.

Since the electricity intensity factor decreases over time with a cleaner electricity grid, the indirect electricity emissions for building energy and water transport depend on year and are calculated using the factors shown in GHG Report, **Table Ops-5**. The amount constructed per year is set to be consistent with the GHG Report year-by-year analyses.

Tables 3a and **3b** show the building energy emissions by year by phase for the Project and Project Variant, respectively. **Tables 4a** and **4b** show the water use emissions by year by phase for the Project and Project Variant, respectively.

Solid Waste

Solid waste emissions are summarized by building type and year in the GHG Report, **Table Ops-14**. To determine the emissions by phase, the emissions by building type and year are allocated to the building types and proportions in each phase from GHG Report, **Table Ops-16**. Emissions are summarized in **Tables 2a** and **2b** for the Project and Project Variant, respectively.

Stationary Source

Stationary source emissions from the on-site generator are assumed to operate beginning with Phase 2, consistent with the GHG analysis **Table Ops-6**. Emissions are summarized in **Tables 2a** and **2b** for the Project and Project Variant, respectively.

Solar and Vegetation Reductions

Solar energy reduces emissions through photovoltaics (PV) and solar hot water heating. Estimated solar output by building is shown in GHG Report, **Table Ops-9**. Electricity intensity factors from GHG Report, **Table Ops-5** are used to determine the emissions reductions by year and by phase, as shown in **Table 5**. Reductions from vegetation sequestration are assumed to begin with the final year of construction consistent with GHG Report **Table Ops-15**.

Summary of Operational Emissions

Emissions by source, year, and phase are shown in **Tables 2a** and **2b** for the Project and Project Variant, respectively. **Table 6a** shows a summary of emissions from the above detailed tables for the Project scenario. **Table 6b** shows this for the Project Variant.

As shown in **Tables 6a** and **6b**, operational emissions exceed baseline emissions at buildout of Phase 3. For the Project, the emissions from Phase 3 plus any two other phases would exceed the baseline operational emissions. For the Project Variant, the emissions from Phase 3 plus one or two other phases would exceed the baseline operational emissions. Attachment H: 3333 California Street Project Greenhouse Gas Emissions Offset Commitment Approach describes how this information will be used to inform the GHG reduction and offsets strategy.

TABLES

**Table 1. Construction Emissions by Phase
3333 California St AB900
San Francisco, California**

Phase	Assumed Construction Duration		Total Phase Emissions (MT CO ₂ e)
	Start Year	End Year	
1	2020	2022	1,589
2	2021	2023	559
3	2022	2025	1,666
4	2025	2027	458

Notes:

¹ Construction information is summarized from GHG Report Tables Con-1 through Con-6.

Abbreviations:

CO₂e - carbon dioxide equivalent

MT - metric tons

Table 2a. Project Operational Year-by-Year-by-Phase Emissions
3333 California St AB900
San Francisco, California

Phase	Year	CO ₂ e (MT/yr) ¹										
		Area	Energy		Mobile	Waste	Water		Stationary Source	Solar Reductions	Vegetation Reduction	Total
			Electricity	Natural Gas			Treatment	Transportation				
1	2020	0	0	0	0	0	0	0	0	0	0	0
	2021	0	0	0	0	0	0	0	0	0	0	0
	2022	3.8	74	65	233	2.0	3.6	2.2	0	-45	0	340
	2023	10	196	178	618	5.4	9.7	5.8	0	-44	0	980
	2024	10	191	178	602	5.4	9.7	5.6	0	-43	0	959
	2025	10	186	178	585	5.4	9.7	5.4	0	-42	0	937
	2026	10	180	178	570	5.4	9.7	5.3	0	-42	0	917
	2027	10	175	178	556	5.4	9.7	5.1	0	-41	0	899
2028	10	169	178	544	5.4	9.7	5.0	0	-40	0	882	
2	2020	0	0	0	0	0	0	0	0	0	0	0
	2021	0	0	0	0	0	0	0	0	0	0	0
	2022	0	0	0	0	0	0	0	0	0	0	0
	2023	3.3	49	56	143	1.5	3.1	1.9	9.4	-12	0	256
	2024	10	143	169	417	4.4	9.4	5.4	28	-12	0	774
	2025	10	139	169	406	4.4	9.4	5.2	28	-12	0	759
	2026	10	135	169	395	4.4	9.4	5.1	28	-12	0	744
	2027	10	131	169	386	4.4	9.4	4.9	28	-12	0	731
2028	10	127	169	377	4.4	9.4	4.8	28	-11	0	719	
3	2020	0	0	0	0	0	0	0	0	0	0	0
	2021	0	0	0	0	0	0	0	0	0	0	0
	2022	0	0	0	0	0	0	0	0	0	0	0
	2023	0	0	0	0	0	0	0	0	0	0	0
	2024	0	0	0	0	0	0	0	0	0	0	0
	2025	0.8	42	21	295	3.1	0.9	0.5	0	-202	0	162
	2026	6.7	349	182	2,443	26	7.5	4.0	0	-198	0	2,820
	2027	6.7	339	182	2,384	26	7.5	3.9	0	-195	0	2,754
2028	6.7	328	182	2,331	26	7.5	3.7	0	-191	0	2,694	
4	2020	0	0	0	0	0	0	0	0	0	0	0
	2021	0	0	0	0	0	0	0	0	0	0	0
	2022	0	0	0	0	0	0	0	0	0	0	0
	2023	0	0	0	0	0	0	0	0	0	0	0
	2024	0	0	0	0	0	0	0	0	0	0	0
	2025	0	0	0	0	0	0	0	0	0	0	0
	2026	0	0	0	0	0	0	0	0	0	0	0
	2027	2.2	37	38	85	1.0	2.2	1.1	0	-42	-13	112
2028	2.3	37	39	86	1.0	2.2	1.1	0	-42	-13	115	

Notes:

¹ Area and mobile source emissions are quantified by phase and year in the GHG Report, Table Ops-17. Building energy, water, and wastewater emissions quantified by phase and year in Tables 3a, 3b, 4a, and 4b. Solid waste emissions are summarized by building type and year in the GHG Report, Table Ops-14 and proportioned by phase using Table Ops-16 of the GHG Report. Stationary source emissions are from the GHG Report, Table 2. Solar reductions by phase by year are calculated in Table 5 and vegetation reductions are taken from the GHG Report, Table Ops-15 and amortized over 20 years, starting in 2027.

Abbreviations:

AB - Assembly Bill
CO₂e - carbon dioxide equivalent
MT - metric ton

Table 2b. Project Variant Operational Year-by-Year-by-Phase Emissions
3333 California St AB900
San Francisco, California

Phase	Year	CO ₂ e (MT/yr) ¹										
		Area	Energy		Mobile	Waste	Water		Stationary Source	Solar Reductions	Vegetation Reduction	Total
			Electricity	Natural Gas			Treatment	Transportation				
1	2020	0	0	0	0	0	0	0	0	0	0	0
	2021	0	0	0	0	0	0	0	0	0	0	0
	2022	3.8	68	58	238	1.8	3.5	2.1	0	-45	0	331
	2023	10	181	159	630	4.9	9.4	5.6	0	-44	0	956
	2024	10	176	159	613	4.9	9.4	5.4	0	-43	0	935
	2025	10	171	159	596	4.9	9.4	5.3	0	-42	0	913
	2026	10	166	159	580	4.9	9.4	5.1	0	-42	0	894
	2027	10	161	159	567	4.9	9.4	5.0	0	-41	0	875
2028	10	156	159	554	4.9	9.4	4.8	0	-40	0	858	
2	2020	0	0	0	0	0	0	0	0	0	0	0
	2021	0	0	0	0	0	0	0	0	0	0	0
	2022	0	0	0	0	0	0	0	0	0	0	0
	2023	3.3	44	50	144	1.2	3.0	1.8	9.4	-12	0	245
	2024	10	128	150	421	3.5	9.1	5.2	28	-12	0	743
	2025	10	125	150	409	3.5	9.1	5.1	28	-12	0	728
	2026	10	121	150	398	3.5	9.1	4.9	28	-12	0	714
	2027	10	118	150	389	3.5	9.1	4.8	28	-12	0	701
2028	10	114	150	380	3.5	9.1	4.6	28	-11	0	689	
3	2020	0	0	0	0	0	0	0	0	0	0	0
	2021	0	0	0	0	0	0	0	0	0	0	0
	2022	0	0	0	0	0	0	0	0	0	0	0
	2023	0	0	0	0	0	0	0	0	0	0	0
	2024	0	0	0	0	0	0	0	0	0	0	0
	2025	1.9	50	35	301	2.7	1.8	1.0	0	-202	0	191
	2026	16.5	415	294	2,488	23	15.1	8.2	0	-198	0	3,061
	2027	16.5	403	294	2,428	23	15.1	8.0	0	-195	0	2,993
2028	16.5	391	294	2,374	23	15.1	7.7	0	-191	0	2,930	
4	2020	0	0	0	0	0	0	0	0	0	0	0
	2021	0	0	0	0	0	0	0	0	0	0	0
	2022	0	0	0	0	0	0	0	0	0	0	0
	2023	0	0	0	0	0	0	0	0	0	0	0
	2024	0	0	0	0	0	0	0	0	0	0	0
	2025	0	0	0	0	0	0	0	0	0	0	0
	2026	0	0	0	0	0	0	0	0	0	0	0
	2027	2.2	34	34	86	0.8	2.1	1.1	0	-42	-13	105
2028	2.3	34	35	87	0.8	2.2	1.1	0	-42	-13	108	

Notes:

¹ Area and mobile source emissions are quantified by phase and year in the GHG Report, Table Ops-17. Building energy, water, and wastewater emissions quantified by phase and year in Tables 3a, 3b, 4a, and 4b. Solid waste emissions are summarized by building type and year in the GHG Report, Table Ops-14 and proportioned by phase using Table Ops-16 of the GHG Report. Stationary source emissions are from the GHG Report, Table 2. Solar reductions by phase by year are calculated in Table 5 and vegetation reductions are taken from the GHG Report, Table Ops-15 and amortized over 20 years, starting in 2027.

Abbreviations:

AB - Assembly Bill
CO₂e - carbon dioxide equivalent
MT - metric ton

Table 3a. Project Energy Emissions Year-by-Year-by-Phase
3333 California St AB900
San Francisco, California

Year	CO ₂ e Intensity Factor ¹		Phase ^{2,3}															
	Electricity	Natural Gas	1				2				3				4			
			Electricity Use	Natural Gas Use	Electricity Emissions	Natural Gas Emissions	Electricity Use	Natural Gas Use	Electricity Emissions	Natural Gas Emissions	Electricity Use	Natural Gas Use	Electricity Emissions	Natural Gas Emissions	Electricity Use	Natural Gas Use	Electricity Emissions	Natural Gas Emissions
			lb CO ₂ e/MWh	lb CO ₂ e/kBTU	MWh	kBTU	MT CO ₂ e/year	MWh	kBTU	MT CO ₂ e/year	MWh	kBTU	MT CO ₂ e/year	MWh	kBTU	MT CO ₂ e/year	MWh	kBTU
2020	363	0.118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	354	0.118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022	345	0.118	473	1,224,705	74	65	0	0	0	0	0	0	0	0	0	0	0	0
2023	335	0.118	1,290	3,335,951	196	178	323	1,057,230	49	56	0	0	0	0	0	0	0	0
2024	326	0.118	1,290	3,335,951	191	178	966	3,163,023	143	169	0	0	0	0	0	0	0	0
2025	317	0.118	1,290	3,335,951	186	178	966	3,163,023	139	169	294	401,334	42	21	0	0	0	0
2026	308	0.118	1,290	3,335,951	180	178	966	3,163,023	135	169	2,498	3,406,674	349	182	0	0	0	0
2027	299	0.118	1,290	3,335,951	175	178	966	3,163,023	131	169	2,498	3,406,674	339	182	273	708,408	37	38
2028	290	0.118	1,290	3,335,951	169	178	966	3,163,023	127	169	2,498	3,406,674	328	182	283	732,490	37	39

Notes:

¹ Uses a linear interpretation between the electricity intensity factors derived in the GHG Report, Table Ops-5.

² Does not include the benefits of solar photovoltaics or solar water heating. These are shown in Table 5.

³ Building electricity, natural gas, and water consumption are summarized by building type in the GHG Report, Table Ops-8. While construction is underway, energy use is based on the percent of operational land uses by Phase as shown in the GHG Report, Table Ops-16.

Abbreviations:

CO₂e - carbon dioxide equivalents

EF - emission factor

lb - pound

kBTU - thousand British Thermal Units

MT - metric ton

MWh - megawatt-hour

Table 3b. Project Variant Energy Emissions Year-by-Year-by-Phase
3333 California St AB900
San Francisco, California

Year	CO ₂ e Intensity Factor ¹		Phase ^{2,3}															
	Electricity	Natural Gas	1				2				3				4			
			Electricity Use	Natural Gas Use	Electricity Emissions	Natural Gas Emissions	Electricity Use	Natural Gas Use	Electricity Emissions	Natural Gas Emissions	Electricity Use	Natural Gas Use	Electricity Emissions	Natural Gas Emissions	Electricity Use	Natural Gas Use	Electricity Emissions	Natural Gas Emissions
	lb CO ₂ e/MWh	lb CO ₂ e/kBTU	MWh	kBTU	MT CO ₂ e/year		MWh	kBTU	MT CO ₂ e/year		MWh	kBTU	MT CO ₂ e/year		MWh	kBTU	MT CO ₂ e/year	
2020	363	0.118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	354	0.118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2022	345	0.118	436	1,092,913	68	58	0	0	0	0	0	0	0	0	0	0	0	0
2023	335	0.118	1,188	2,976,965	181	159	290	940,913	44	50	0	0	0	0	0	0	0	0
2024	326	0.118	1,188	2,976,965	176	159	867	2,815,026	128	150	0	0	0	0	0	0	0	0
2025	317	0.118	1,188	2,976,965	171	159	867	2,815,026	125	150	350	648,327	50	35	0	0	0	0
2026	308	0.118	1,188	2,976,965	166	159	867	2,815,026	121	150	2,972	5,503,237	415	294	0	0	0	0
2027	299	0.118	1,188	2,976,965	161	159	867	2,815,026	118	150	2,972	5,503,237	403	294	251	630,468	34	34
2028	290	0.118	1,188	2,976,965	156	159	867	2,815,026	114	150	2,972	5,503,237	391	294	260	651,901	34	35

Notes:

¹ Uses a linear interpretation between the electricity intensity factors derived in the GHG Report, Table Ops-5.

² Does not include the benefits of solar photovoltaics or solar water heating. These are shown in Table 5.

³ Building electricity, natural gas, and water consumption are summarized by building type in the GHG Report, Table Ops-8. While construction is underway, energy use is based on the percent of operational land uses by Phase as shown in the GHG Report, Table Ops-16.

Abbreviations:

CO₂e - carbon dioxide equivalents

EF - emission factor

lb - pound

kBTU - thousand British Thermal Units

MT - metric ton

MWh - megawatt-hour

Table 4a. Project Water Emissions Year-by-Year-by-Phase
3333 California St AB900
San Francisco, California

Year	CO ₂ e Intensity Factor	Phase ¹											
		1			2			3			4		
		Electricity Consumption	Distribution Emissions	Treatment Emissions	Electricity Consumption	Distribution Emissions	Treatment Emissions	Electricity Consumption	Distribution Emissions	Treatment Emissions	Electricity Consumption	Distribution Emissions	Treatment Emissions
		lb CO ₂ e/MWh	MWh	MT CO ₂ e/year	MWh	MT CO ₂ e/year	MT CO ₂ e/year	MWh	MT CO ₂ e/year	MT CO ₂ e/year	MWh	MT CO ₂ e/year	MT CO ₂ e/year
2020	363	0	0	0	0	0	0	0	0	0	0	0	
2021	354	0	0	0	0	0	0	0	0	0	0	0	
2022	345	14	2.2	3.6	0	0	0	0	0	0	0	0	
2023	335	38	5.8	9.7	12	1.9	3.1	0	0	0	0	0	
2024	326	38	5.6	9.7	36	5.4	9.4	0	0	0	0	0	
2025	317	38	5.4	9.7	36	5.2	9.4	3.4	0.5	0.9	0	0	
2026	308	38	5.3	9.7	36	5.1	9.4	29	4.0	7.5	0	0	
2027	299	38	5.1	9.7	36	4.9	9.4	29	3.9	7.5	8.3	1.1	
2028	290	38	5.0	9.7	36	4.8	9.4	29	3.7	7.5	8.6	1.1	

Notes:

¹ Building water consumption and treatment emissions are summarized by building type in the GHG Report, Table Ops-8 and Table Ops-12. While construction is underway, water use is based on the percent of operational land uses by Phase as shown in the GHG Report, Table Ops-16.

Abbreviations:

CO₂e - carbon dioxide equivalents
 lb - pounds

MT - metric tons
 MWh - megawatt-hour

Table 4b. Project Variant Water Emissions Year-by-Year-by-Phase
3333 California St AB900
San Francisco, California

Year	CO ₂ e Intensity Factor	Phase ¹											
		1			2			3			4		
		Electricity Consumption	Distribution Emissions	Treatment Emissions	Electricity Consumption	Distribution Emissions	Treatment Emissions	Electricity Consumption	Distribution Emissions	Treatment Emissions	Electricity Consumption	Distribution Emissions	Treatment Emissions
		lb CO ₂ e/MWh	MWh	MT CO ₂ e/year	MWh	MT CO ₂ e/year	MT CO ₂ e/year	MWh	MT CO ₂ e/year	MT CO ₂ e/year	MWh	MT CO ₂ e/year	MT CO ₂ e/year
2020	363	0	0	0	0	0	0	0	0	0	0	0	
2021	354	0	0	0	0	0	0	0	0	0	0	0	
2022	345	13	2.1	3.5	0	0	0	0	0	0	0	0	
2023	335	37	5.6	9.4	12	1.8	3.0	0	0	0	0	0	
2024	326	37	5.4	9.4	35	5.2	9.1	0	0	0	0	0	
2025	317	37	5.3	9.4	35	5.1	9.1	6.9	1.0	1.8	0	0	
2026	308	37	5.1	9.4	35	4.9	9.1	59	8.2	15	0	0	
2027	299	37	5.0	9.4	35	4.8	9.1	59	8.0	15	8.0	1.1	
2028	290	37	4.8	9.4	35	4.6	9.1	59	7.7	15	8.3	1.1	

Notes:

¹ Building water consumption and treatment emissions are summarized by building type in the GHG Report, Table Ops-8 and Table Ops-12. While construction is underway, water use is based on the percent of operational land uses by Phase as shown in the GHG Report, Table Ops-16.

Abbreviations:

CO₂e - carbon dioxide equivalents

MT - metric tons

lb - pounds

MWh - megawatt-hour

Table 5. GHG Emissions Reductions from Solar Energy
3333 California St AB900
San Francisco, California

Energy Assessment Solar Data by Building and Phase¹

Building	Proposed Total Solar Equipment Area (sqft)	Estimated PV Energy Output (kBTU/year)	Estimated Solar Hot Water Energy Output (kBTU/year)	Construction Phase
Center Building A	0	0	0	2
Center Building B	2,597	180,864	82,000	2
Plaza A Building	12,190	795,497	380,000	3
Plaza B Building	11,812	828,163	384,000	3
Walnut Building	19,771	1,397,159	635,000	3
Masonic Building	0	0	0	1
Euclid Building	9,036	638,342	289,000	1
Laurel Duplexes	6,384	394,514	207,000	4
Mayfair Building	3,550	251,107	107,000	4
Total	65,340	4,485,646	2,084,000	

Year-By-Year Reductions due to Solar

Phase	Year	CO ₂ e Intensity Factor (lb CO ₂ e/MWh) ²	Solar PV Reductions (MT)	CO ₂ e Intensity Factor NG (lb CO ₂ e/kBTU) ³	Solar Heating Reductions (MT)
1	2020	363	0	0.118	0
	2021	354	0	0.118	0
	2022	345	-29	0.118	-15
	2023	335	-28	0.118	-15
	2024	326	-28	0.118	-15
	2025	317	-27	0.118	-15
	2026	308	-26	0.118	-15
	2027	299	-25	0.118	-15
2	2028	290	-25	0.118	-15
	2020	363	0	0.118	0
	2021	354	0	0.118	0
	2022	345	0	0.118	0
	2023	335	-8.1	0.118	-4
	2024	326	-7.8	0.118	-4
	2025	317	-7.6	0.118	-4
	2026	308	-7.4	0.118	-4
2027	299	-7.2	0.118	-4	
2028	290	-7.0	0.118	-4	

Phase	Year	CO ₂ e Intensity Factor (lb CO ₂ e/MWh) ²	Solar PV Reductions (MT)	CO ₂ e Intensity Factor NG (lb CO ₂ e/kBTU) ³	Solar Heating Reductions (MT)
3	2020	363	0	0.118	0
	2021	354	0	0.118	0
	2022	345	0	0.118	0
	2023	335	0	0.118	0
	2024	326	0	0.118	0
	2025	317	-127	0.118	-75
	2026	308	-124	0.118	-75
	2027	299	-120	0.118	-75
	2028	290	-116	0.118	-75
4	2020	363	0	0.118	0
	2021	354	0	0.118	0
	2022	345	0	0.118	0
	2023	335	0	0.118	0
	2024	326	0	0.118	0
	2025	317	0	0.118	0
	2026	308	0	0.118	0
	2027	299	-26	0.118	-17
	2028	290	-25	0.118	-17

Notes:

¹ From SWCA's Energy Assessment (July 2018), Table 10.

² Uses a linear interpretation between the electricity intensity factors derived in the GHG Report, Table Ops-3.

³ CO₂e intensity factor for natural gas is from CalEEMod Appendix D.

⁴ The solar for each building is assumed to become active when the relevant Phase is complete.

Abbreviations:

CalEEMod - California Emissions Estimator Model

CO₂e - carbon dioxide equivalents

kBTU - thousand British Thermal Units

lb - pound

MT - metric ton

MWh - megawatt-hour

sqft - square feet

Table 6a. Summary of Project Operational Emissions by Phase and Year
3333 California St AB900
San Francisco, California

Year	Operational Phase				Total ¹
	1	2	3	4	
MT CO ₂ e/yr					
2020	0	0	0	0	0
2021	0	0	0	0	0
2022	340	0	0	0	340
2023	980	256	0	0	1,235
2024	959	774	0	0	1,733
2025	937	759	162	0	1,858
2026	917	744	2,820	0	4,481
2027	899	731	2,754	112	4,496
2028	882	719	2,694	115	4,410
Maximum ²	980	774	2,820	115	--
Baseline	3,873				

Notes:

¹ When the total emissions by year exceed the baseline emissions, GHG reductions or offsets are required. If construction is delayed, the emissions for that phase could be shifted to later years. In case of delay, the emissions shown for a given year would be lower than shown here due to a cleaner fleet and electricity grid in later years.

² As shown, the maximum annual emissions from phase 1, 2, and 4 do not individually or cumulatively exceed the baseline emissions. The emissions from phase 3 do not exceed the baseline emissions individually but will exceed the baseline emissions when phase 3 plus two additional phases are constructed.

Abbreviations:

CO₂e - carbon dioxide equivalents

MT - metric ton

yr - year

**Table 6b. Summary of Project Variant Operational Emissions by Phase and Year
3333 California St AB900
San Francisco, California**

Year	Operational Phase				Total ¹
	1	2	3	4	
MT CO ₂ e/yr					
2020	0	0	0	0	0
2021	0	0	0	0	0
2022	331	0	0	0	331
2023	956	245	0	0	1,201
2024	935	743	0	0	1,678
2025	913	728	191	0	1,832
2026	894	714	3,061	0	4,669
2027	875	701	2,993	105	4,674
2028	858	689	2,930	108	4,585
Maximum ²	956	743	3,061	108	--
Baseline	3,873				

Notes:

¹ When the total emissions by year exceed the baseline emissions, GHG reductions or offsets are required. If construction is delayed, the emissions for that phase could be shifted to later years. In case of delay, the emissions shown for a given year would be lower than shown here due to a cleaner fleet and electricity grid in later years.

² As shown, the maximum annual emissions from phase 1, 2, and 4 do not individually or cumulatively exceed the baseline emissions. The emissions from phase 3 do not exceed the baseline emissions individually but will exceed the baseline emissions when phase 3 plus one or two additional phases are constructed.

Abbreviations:

CO₂e - carbon dioxide equivalents

MT - metric ton

yr - year