SYSKA HENNESSY
GROUP

800 Corporate Pointe, Suite 200 ▪ Los Angeles, CA 90230 ▪ 310.312.0200

OceanKAMP

Oceanside, California

Climate Action Plan, rev1

Energy Report

EIR Amendment 05/03/2021

PREPARED FOR:

N4FL

BY:

Syska Hennessy Group, Inc.

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PREFACE TO THIS REVISION

The CAP Energy Report was originally delivered on August 28th, 2019 under the previous development team led by Zephyr. The Oceanside Action Sports Park project, now known as OceanKAMP, was acquired by N4FL in 2020, who is submitting the final development application to the City of Oceanside to receive approval to complete this project. This CAP Energy Narrative was updated to reflect the latest site design changes (particularly related to pool energy consumption) and provide pathways for compliance with the current City of Oceanside CAP Consistency Checklist – Renewable Energy Facilities (version dated 2020/12/23). This item in the Checklist requires either a) 50% of a project's estimated energy consumption be met with on-site renewable energy, or b) the project will purchase an energy portfolio comprised of at least 75% renewable, emissions-free electricity.

Disclaimer: The purpose of this narrative is to provide guidance for compliance with the Renewable Energy Facilities item of the CAP Consistency Checklist and no other Checklist items.

BACKGROUND INFORMATION

The city of Oceanside has adopted a Climate Action Plan to address energy consumption, burning of fossil fuels, deforestation, solid waste decomposition and water reduction usage reduction strategies in order to meet the 2030 and 2050 environmental mandates. In 2015 the Obama Administration enacted the Clean Power Plan (CPP) which requires states to meet specific standards for the reduction of carbon dioxide emissions. In addition, State legislation enacted by Governor Arnold Schwarzenegger (and furthered by Governor Brown) has established 2020 and 2030 statewide emission reduction targets and has mandated that electric utilities achieve a 33% minimum renewable power portfolio by 2020 and 50% by 2030.

The city of Oceanside has taken greenhouse emissions inventories from the year 2013. The baseline level of CO2 emissions per capita is 5.8 MT CO2. The target levels per capita is 4.4 MT CO2 by 2030. Furthermore, the city of Oceanside has adopted aggressive reduction goals per capita. The reduction goals for 2040 is to reduce emission levels to 3 MT CO2 by 2040 and down to 2 MT CO2 by 2050. The target levels set by Oceanside near term are more aggressive than the state per capita targets requiring more immediate action at the project level. There are no minimum greenhouse emission reduction targets at the building level. Instead, the Oceanside CAP has mandated measures at the project level to attain CO2 reduction targets.

In early 2019, City of Oceanside approved an amendment to implement a Climate Action Plan (CAP) to meet the state emission reduction target mandates. The Oceanside CAP program investigated measures that would reduce carbon emissions in the most economical and efficient manner. The measures that had the most value is now being implemented. The climate action plan's measures vary in their requirements from

Photovoltaic installation to Urban Forestry tree planning program. This report outlines the project requirements, path to conformance and additional energy efficient measures.

CLIMATE ACTION PLAN REQUIREMENT

The following measure is required to conform with the city of Oceanside's Climate Action Plan related to building energy consumption and onsite renewable energy production.

RENEWABLE ENERGY FACILITIES

The City of Oceanside's goal for the year 2030 is to generate 75% of local energy from renewable source. In order to achieve that, the CAP requires that all new development that include 50 or more off-street parking spaces to offset a minimum of 50% of the forecasted energy consumption. The alternative to this requirement is to purchase an energy portfolio comprised of at least 75% renewable, emission-free electricity.

The energy consumption of the buildings was estimated using an energy model built in IES-VE software. The energy consumption associated with the lap pool heating and wave pool generator were estimated using design and operating parameters provided by the development team; assumptions are provided in following sections. A summary of the estimated energy consumption for the project is summarized in the Table 1 below. The capacity and energy production required to satisfy the CAP Checklist is also shown in the table.

Table 1

Project Component	Estimated Energy (kWh)
Buildings	7,570,300
Lap Pool Heating	128,100
Wave Pool Generator	4,520,900
Total Electricity	12,219,300
PV System Size (kW)	**PV Energy Output (kWh)**
3,700	6,109,650

Based on the energy model and pool energy calculations, the amount of onsite solar PV generation required to satisfy the CAP Checklist is roughly **6.1 million kWh, capacity of 3,700 kW**. All PV installed on the OceanKAMP site will be canopy-mount above the surface parking. The area of surface parking based on the latest site plans is about 177,000 sf. Assuming the energy density of a high efficiency solar PV module, such as the SunPower A-series 450 W panel, the maximum total system size that can fit on-site is 3,800 kW. Therefore, the site is large enough for the 3,700 kW of PV necessary to satisfy the CAP Checklist requirement.

Alternative procurement methods such as Power Purchase Agreements (PPA) are effective in making large installations more financially feasible. In a PPA, the property owner engages a third-party developer who will install, own, and operate the PV system and sell the renewable energy along with the Renewable Energy Credit to the property, typically at a reduced rate compared to the Utility Company's rates.

Alternately, the project must purchase roughly **9,164,500 kWh/yr of renewable, emission-free electricity**. Green power can be purchased through SDG&E's EcoShare and EcoChoice programs, which link utility customers with renewable energy generating facilities, directly or indirectly, respectively.

ENERGY USAGE

Building Energy Usage

An energy model of the site was constructed to estimate the required peak electrical and natural gas demand and to compare different mechanical systems. The system that produced the least amount of carbon emissions was selected as the system of choice for the project. The energy model's assumptions were based on the 2019 Title 24 Energy Code performance requirements. The target energy usage intensity (EUI) targets were aligned to match the current Energy Star Building Benchmark portfolio. Table 2 shows the target EUI for similar building types. The buildings with the highest energy usage intensity will be the food and beverage and market building types, however the overall square footage for these buildings is relatively small compared to the overall building square footage.

Table 2

BUILDING ENERGY USAGE INTENSITY			
Building Type	**Square Footage**	**Baseline EUI**	**Target EUI**
Retail RT1 (Fitness)	35,000	60	48
Retail RT2	9,000	55	42
Retail RT3	9,000	55	42
Retail RT4	13,500	160	130
Retail RT5 (Office)	8,000	53	42
Retail RT6	6,000	55	42
Retail RT7	6,000	55	42
Retail RT8 (Office)	23,500	53	42
Hotel RH1	197,500	65	52
Hotel RH2 (Casitas)	8,500	55	40
Hotel RH3 (Villas)	35,000	55	40
Hotel RH3 (Villa Clubhouse)	750	55	44
Wellness RA1	14,000	52	42
Conference RA2	28,500	60	48
Cabana Clubhouse RA3	750	54	43
F&B / Surf Check in RA4	10,000	160	128

Aussie Surf Club RA5	3,000	56	45
Fieldhouse RA6	2,000	56	45

The energy model output report can be found in Appendix B. The energy model report highlights the building estimated energy usage and carbon emissions using a VRF system, gas cooking, electrical refrigeration and solar panel energy displacement as well as the estimated energy cost. Based on the energy model results, the total energy consumption of the buildings is estimated to be 7,570,300 kWh/yr.

Wave Pool Energy Usage

In addition to the buildings, OceanKAMP will also have a wave pool capable of producing up to 6 ½ foot waves. The wave pool will utilize 24 caissons in the design and will require 5,040 kilowatts of power. The estimated energy consumption is 2,016 kWh for a 30 second interval for 24 caissons. Table 3 below shows the power and energy requirements for various sizes and operating conditions for the wave pool design.

Table 3

# OF CAISSONS	12		16		20		24	
DESIRED WAVE HEIGHT	2.00 m	6.6 ft	2.00 m	6.6 ft	2.00 m	6.6 ft	2.00 m	6.6 ft
POWER & ENERGY	Low	High	Low	High	Low	High	Low	High
INSTALLED POWER	2,340 kW	2,520 kW	3,120 kW	3,360 kW	3,900 kW	4,200 kW	4,680 kW	5,040 kW
AVG ENERGY CONSUMPTION @ 15s (max frequency)	1,872 kWh	2,016 kWh	2,496 kWh	2,688 kWh	3,120 kWh	3,360 kWh	3,744 kWh	4,032 kWh
AVG ENERGY CONSUMPTION @ 30s	936 kWh	1,008 kWh	1,248 kWh	1,344 kWh	1,560 kWh	1,680 kWh	1,872 kWh	2,016 kWh

The wave pool is not intended to run continuous but will instead run at intermittent intervals, assumed to be two cycles per minute, with periods of time of non-operation captured by a diversity factor of 65%. Table 4 below lists the assumptions used to calculate the energy consumption of the wave pool, which is estimated to be 4,520,900 kWh/yr.

Table 4

Wave Pool Assumptions	
Wave height	6.6 ft
# of caissons	24
Cycles per minute	2
Hours per day operation	10
Days per year operation	346
Diversity	65%

Pool Heating Energy Usage

OceanKAMP will have a heated lap loop served by a heat pump with a COP of 4. The surface area, water temperature setpoint, and heating demand for the lap pool can be found in Table 5, as well as other assumptions used to calculate the lap pool heating energy consumption, which is estimated to be 128,100 kWh/yr. On average for every 1 degree that pool heating setpoints are raised results an increase of 7% yearly energy consumption.

Table 5

Lap Pool Assumptions	
Water Temp	72 degrees
Surface Area	3750 sf
Demand	900 MBH
Solar Thermal	25% of demand
Heat Pump Efficiency	4 COP
Hours per day operation	10
Days per year operation	346

Incentives to offset pool heating costs are available through the California Solar Initiative Thermal Program. The incentive per annual therm displaced is $6.00 with a maximum rebate of $500,000 and not to exceed 50% of the solar thermal system installation cost. The project will only qualify for the incentive if natural gas is not the fuel source of choice for heating pools. Commercial pools do not qualify for federal tax incentives. See Appendix A for incentive options.

Additional energy efficiency measure recommendations are listed below:

1. High COP (Coefficient of Performance) Heat Pump
2. Provide an opaque thermal pool cover when the pool is not in use.
3. Increase solar thermal to meet 60% of demand for pool heating.
4. Recover heat rejection from Casitas HVAC systems for lazy river.

MECHANICAL, ELECTRICAL, PLUMBING

Mechanical

The OceanKAMP project requires a system that is low maintenance, flexible and one that follows Oceanside's Climate Action Plan. Oceanside's Climate Action Plan encourages the use of fuel from renewable sources and discourages the use of combustible energy sources. As such, natural gas consumption is limited to the food and beverage buildings, fitness center and overhead gas fired heaters.

Space cooling and heating will be provided through air source Variable Refrigerant Flow systems (VRF). The VRF system was compared against a traditional central plant with chillers and boilers. While the central plant was more efficient for space cooling, the amount of carbon emissions from space heating was 474 MT of CO_2 compared to 1.9 MT CO_2. The reason for the reduction in greenhouse emissions is primarily due to the reduction of combustible fuel for reheat energy. A 4-pipe fan coil system with heat recovery chillers was also investigated but had a much higher first cost associated with exterior piping and valve pits. The decision of an air cooled VRF system eliminated the need for pipe trenching and valve pits while still maintaining heat recovery at the condensing unit.

Each building will have one VRF condensing unit system with heat recovery. The number of indoor units will depend on the number of zones within the building. Each interior zone will be capable of providing energy consumption for 3rd party billing. Buildings that require makeup for exhaust or dehumidification are provided a single zone heat pump for ventilation and additional cooling. Where no heat pump is provided, outside air will be ducted to each of the indoor units through an exterior wall.

For the Casitas and Villas, single zone split heat pumps will be utilized, and outside air will be ducted to the indoor units.

Table 6 provides the estimated cooling load for each of the buildings that will be conditioned.

Table 6

Mechanical HVAC			
Building Type	**Square Footage**	**SF/Ton**	**Cooling Load (Tons)**
Retail RT1 (Fitness)	35,000	600	60
Retail RT2	9,000	500	20
Retail RT3	9,000	350	30
Retail RT4	13,500	400	30
Retail RT5 (Office)	8,000	400	20
Retail RT6	6,000	350	20
Retail RT7	6,000	350	20
Retail RT8 (Office)	23,500	400	60
Hotel RH1	197,500	600	330
Hotel RH2 (Casitas)	8,500	700	15
Hotel RH3 (Villas)	35,000	700	50
Hotel RH3 (Villa Clubhouse)	750	700	1
Wellness RA1	14,000	400	35
Conference RA2	28,500	400	70
Cabana Clubhouse RA3	750	700	1
F&B / Surf Check in RA4	10,000	350	30
Aussie Surf Club RA5	3,000	600	5
Fieldhouse RA6	2,000	600	3

Electrical

Electrical system will be designed to provide adequate power for the project and site, comply with applicable codes and standards, be flexible, energy efficient and allow for future growth.

Main service arrangement and equipment location to be coordinated with the local electrical service provider. Medium voltage distribution (4160V) to be utilized to serve the three unit-substations located throughout the site that are utilized to step down the medium voltage to the utilization voltage of 480Y/277volt. A 5,000KVA substation serves the beach club parcel and wave pool, a 5,000KVA substation serves the hotel parcel and a 1,700KVA substation serves the retail parcel and parking lots.

Photovoltaic panels are carport mounted in parking lots and roof mounted in Fitness Center, Conference Center and Office building. PV system size is approximately 257,000 sq. ft. of panels and can generate up to 5,000 KVA. There will be three PV substations and battery storage banks throughout the site. While battery storage is not a requirement for to conform with the CAP, it is proposed that a battery storage system is integrated into the project to further reduce demand and store unused solar energy for use when solar energy is not available. Three battery storage banks are recommended for a total of 3 megawatt-hours. A breakdown of building electrical demand can be found in table 7.

Parking lot lighting comprise of surface mounted LED fixtures to be mounted under carport structures and LED poles lights throughout the parking lots. 6% of total parking stalls to be prewired for electric vehicle charging stations. Mechanical equipment to be 480/277V. Low voltage transformers and panelboard to be located inside the buildings.

Table 7

OCEANSIDE PAVILION- SERVICE LOAD CALCULATION					
BUILDING DESIGNATION	PARCELL AREA (SQ.FT.)	LIGHTING (VA/SQ.FT.)	POWER (VA/SQ.FT.)	MECHANICAL (VA/SQ.FT.)	TOTAL CONNECTED LOAD (KVA)
RETAIL					
Retail RT1 (Fitness)	35,000	0.90	1	5	224
Retail RT2	9,000	0.90	2	5	67
Retail RT3	9,000	0.90	2	5	67
Retail RT4	13,500	0.90	2	5	100
Retail RT5 (Office)	8,000	1	2	4	54
Retail RT6	6,000	0.90	2	5	44
Retail RT7	6,000	0.90	2	5	44
Retail RT8 (Office)	23,500	0.80	1	4	136
TOTAL RETAIL KVA					**737**
RESORT HOTEL					
Hotel RH1	197,500	0.91	1	5	1167
Hotel RH2 (Casitas)	8,500	1.23	1	5	57
Hotel RH3 (Villas)	35,000	1.23	1	5	236
Hotel RH3 (Villa Clubhouse)	750	0.91	1	5	5
TOTAL RESORT HOTEL KVA					**1465**
RESORT AMENITY					
Wellness RA1	14,000	0.90	1	5	83
Conference RA2	28,500	1.20	1	5	191
Cabana Clubhouse RA3	750	1.25	1	5	5
F&B / Surf Check in RA4	10,000	0.90	1	5	64
Aussie Surf Club RA5	3,000	1	1	5	19
Fieldhouse RA6	2,000	0.90	1	5	13
BEACH CLUB POOL HEATING POWER					**2200**
WAVE POOL POWER					**5,040**
TOTAL RESORT AMENITY KVA					**7615**
PARKING PARCEL					
PARKING A	138,700	0.25	-	-	35
PARKING B	120,000	0.25	-	-	30
PARKING C	63,500	0.25	-	-	16
PARKING D	9,350	0.25	-	-	2
ELECTRIC CHARGING STATIONS	-	-	-	-	381
TOTAL PARKING PARCEL KVA					**464**
TOTAL RESORT KVA					**10,280**
TOTAL AMPS @ 4160V					**1,428**

Plumbing

Oceanside Climate Action Plan requires that each building is provided a connection for recycled water integration. The City of Oceanside is upgrading current wastewater treatment facilities and is planning to integrate buildings to optimize the amount of wastewater that may be recycled to replace potable water locations. Reclaimable water may come from the HVAC system, showers, dishwashers, sinks and rainwater.

Natural Gas service is limited to food and beverage locations, fitness center and hotel. The minimum pressure required at each of the buildings is 4.5 psig.

Domestic hot water will be provided through instantaneous electric water heaters.

Pool heating to be provided through electric heat pumps with a minimum Coefficient of Performance (COP) of 4. The project is considering the addition of solar thermal to reduce the demand load for water heating and pool heating. A solar thermal system will be investigated during further development of design documents.

CONCLUSION

OceanKAMP is a multi-use building resort that includes Hotels, Exercise Facilities, Retail, Supermarket, Museum and Food and Beverage building types. Additional site energy usage includes a wave pool and lap pool heating through the use of heat pumps. The project is required to comply with California's 2019 Title 24 Energy Code and must conform with the City of Oceanside's Climate Action Plan. The CAP encourages reduction of combustible energy sources through mandate. The CAP Consistency Checklist includes a requirement for 50% on-site renewable energy production or 75% green power purchase, annually. Based on the energy calculations and assumptions described in this report, the necessary on-site PV system size is estimated to be **3,700 kW** capable of producing roughly **6.1 million kWh**. There is sufficient space to mount a system of this size on canopies above surface parking around the site. Alternatively, the project must purchase **9.2 million kWh of green power** (renewable, emission-free) from SDG&E through either their EcoShare or EcoChoice programs.

Buildings will reclaim water where possible and a service connection will be provided for future connection to Oceanside's recycled water network. Further energy reduction may be achieved through the inclusion of using heat rejection for pool heating, natural ventilation, and high efficiency systems where possible.

APPENDIX A - INCENTIVES

There are various programs available that will help offset the additional cost associated with the implementation of the measures required. The following are available incentive programs that the project would qualify for.

Savings by Design

This program offsets up to $150,000 from each building project. The project is required to have a compliance model run of 10% better than the current Title 24 baseline model. As of 2019, San Diego only accepts Energy Pro models for compliance.

https://www.savingsbydesign.com/

California Solar Initiative Thermal Program

CSI – Thermal Program is an initiative that encourages the use of solar thermal as opposed to natural gas to heat up domestic hot water.

https://sites.energycenter.org/csi-thermal

Investment Tax Credit

This credit allows a tax deduction of 30% of the cost of installing a solar energy system from the federal taxes. There is currently no cap value; however, as of 2020, the deduction reduces to 26% and down to 22% by 2021.

Self-Generation Incentive Program

This program provides incentive rates for battery storage. It is unknown how long the fund will remain available for Non-Residential buildings. The current rate is $0.22 per watt hour. Battery storage also qualifies for the Investment Tax Credit (ITC).

APPENDIX B – ENERGY MODEL

This section summarizes the energy model that was created and shows the comparison between a central utility plant and stand-alone system. The design criteria were to select a system that was easy to maintain, low first cost and reliable while minimizing greenhouse emissions. Limiting of greenhouse gasses has the highest weight in selection of a system. Other criteria that had a lot of weight in deciding a system was that each system would have to be metered for energy usage.

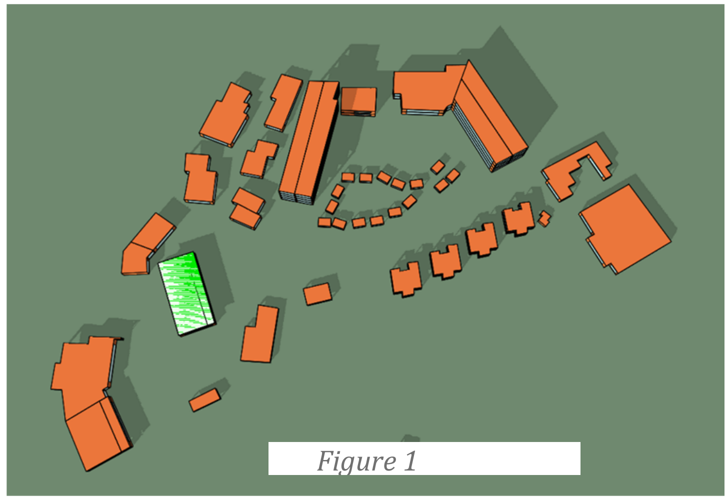

Figure 1

The footprint and heights of the proposed buildings were modeled and were applied Title 24 minimum required efficiencies for the upcoming 2019 Energy Code.

Central Plant

The first system that was investigated was a central plant where water cooled chillers, boilers, cooling towers other utilities would be housed in one central location and chilled and hot water would be distributed throughout the site to each building where there would be a dedicated air handling unit.

At the zone level, there would be Variable Air Volume Boxes attached with Reheat Coils. 55-degree supply air would be sent to each zone from the primary air handling unit and the reheat coils would raise the temperature of the air to meet the required demand from the zone.

Variable Refrigerant Flow – Heat Recovery

The second system that was analyzed was a VRF Heat Recovery system. This system allows for heat to be shuffled between indoor units depending on the demand load. Figure 2 shows a schematic of a VRF system simultaneously heating and cooling spaces in the building.

Wasted reheat is eliminated since the indoor unit will either heat or cool the space in order to meet the space setpoint. This system also eliminates combustible fuel as a source for space heating. Space heating will be provided through the refrigerant using electricity as the fuel source.

Figure 3 is a graphical display of the green house emission of the two system. It can be seen that the central plant option produces almost twice as much carbon emissions when compared to the VRF system.

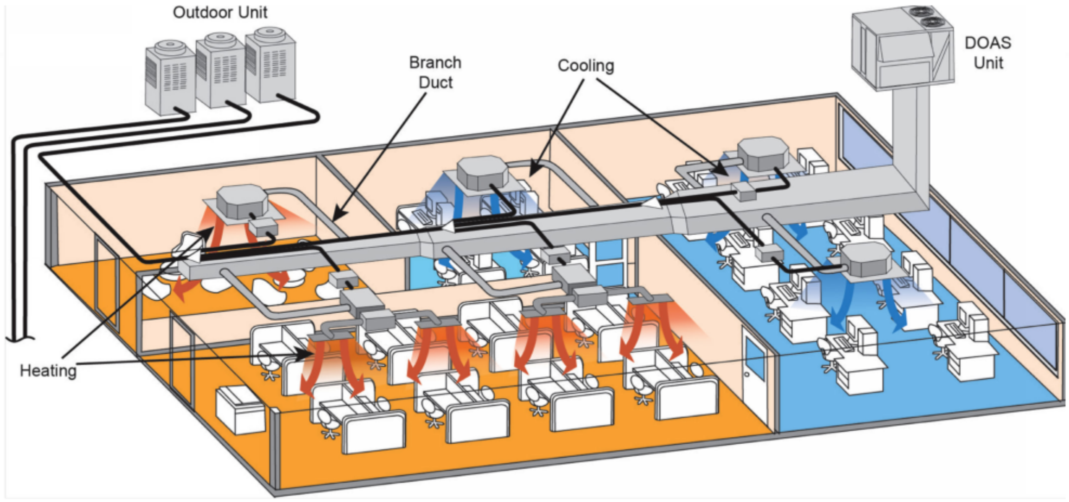

Figure 2 VRF Schematic

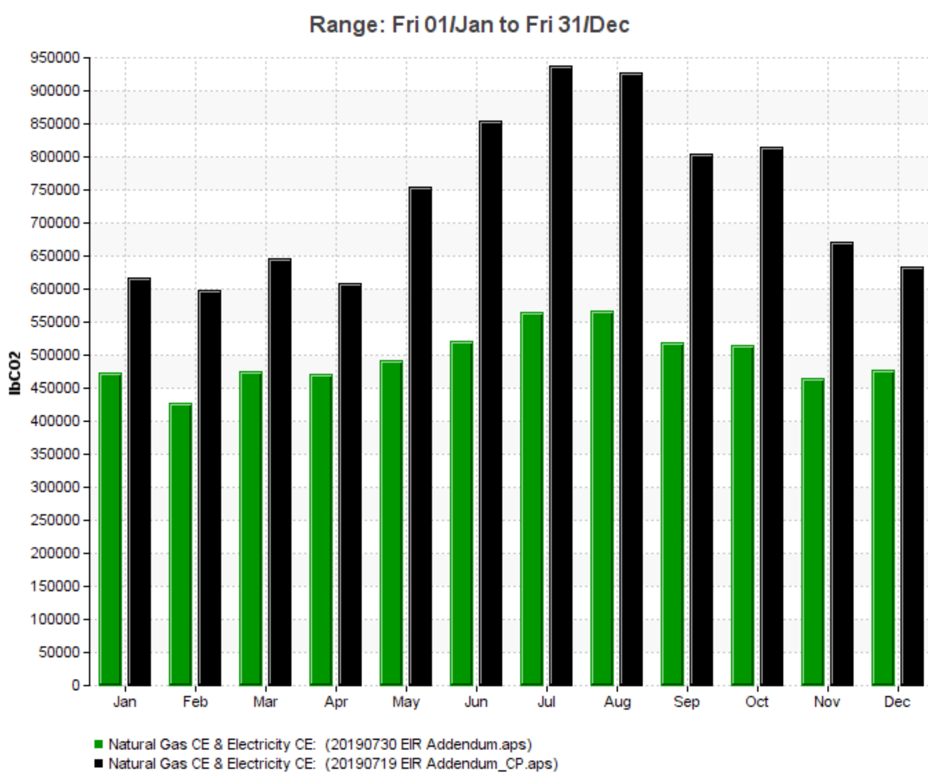

Figure 3 Carbon Emissions by system.