Appendix 5.6 BIG-1

Energy Assessment

BIG ENERGY ASSESSMENT

BNSF RAILWAY

BARSTOW INTERNATIONAL GATEWAY

172845

REVISION 0

October 3, 2025

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Detailed Modeling Methodology

Electrified Fleet Inventory

Location	Electrified Equipment Type	Year 1 Expected Count In-Use at Peak	Long-Term Expected Count In-Use at Peak
IMF-E-3	Drayage Hostlers	81	124
IMF-E-3	Employee Vehicles	79	158
IMF-E-3	Fleet Light-Duty Trucks	50	50
IMF-E-3	Yard Hostlers	47	73
IMF-E-3	Miscellaneous Yard Equipment	6	9
IMF-E-2	Wide-Span Cranes	4	8
IMF-W	Wide-Span Cranes	6	6
Warehouses	Forklifts	540	540
Warehouses	Intra-LP Drayage Hostlers	72	72
Warehouses	Employee Vehicles	1,029	1,029

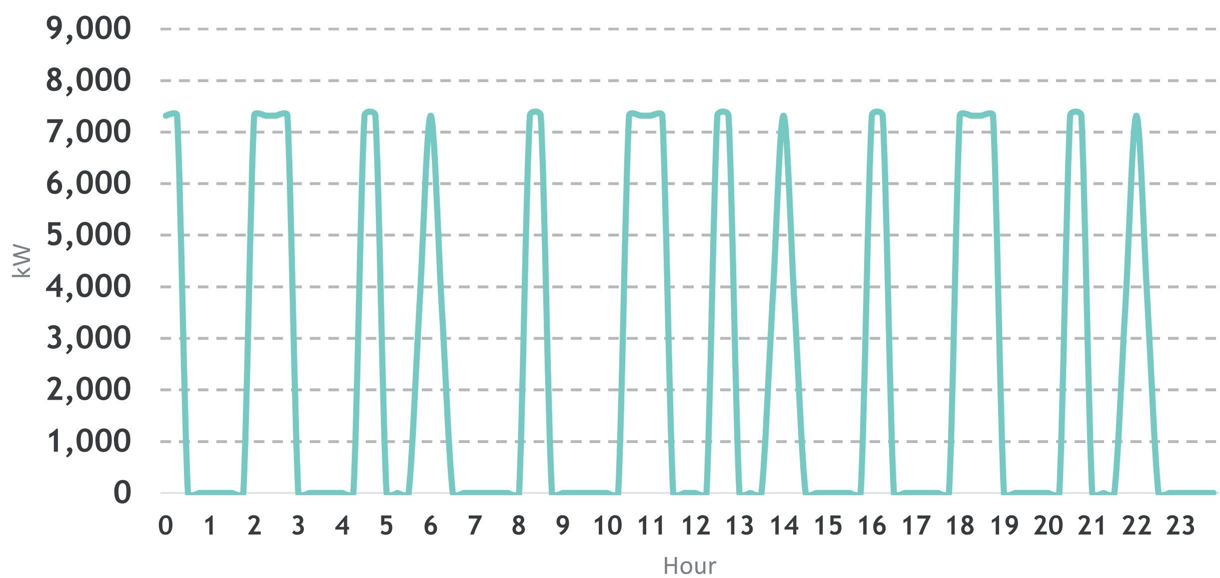
Electricity Usage Estimates

IMF-W	**16,144 MWh/Year**
Yard Loads	3,201
Lighting	6,666
Widespan Cranes	6,182
Miscellaneous Charging	95
IMF-E-2	**13,786 MWh/Year**
Railroad Buildings (inc. parking lighting)	4,429
Widespan Cranes	4,135
Yard Loads	5,162
Miscellaneous Charging	60
IMF-E-3	**16,088 MWh/Year**
Yard Hostlers	5,523
Fleet Vehicle Charging	195
Employee Vehicle Charging	1,370
Drayage Hostlers	8,330
Miscellaneous Charging	670
Transload Warehouses	**99,240 MWh/Year**
HVAC & Utilities	59,711
Exterior Lighting	7,712
Forklifts	12,908
Employee Vehicle Charging	17,848
Drayage Truck Charging	1,061
Total IMF	**46,018**
Total Transload Buildings	**99,240**
BIG Total	**145,258**

Yard Hostlers

Yard hostlers transport containers across the IMF, whether that be from the cranes to storage areas, between storage areas, or to a loading zone. The charging patterns for the Yard Hostlers take into account throughput requirements, operating schedules, and humanistic tendencies to plug-in and charge when an opportunity arises—known as "Opportunity Charging".

Figure 10: Yard Hostler Average Daily Charging Profile



Near-Term Assumptions:

- 47 hostlers operating on a typical day.
- Similar operational intensity to battery-electric hostlers at BNSF's Stockton site:
  - 19 kW average power consumption
- DCFC charging at 124 kW.
- 220 kWh battery capacity
- Opportunity charging characteristics:
  - Charging 1 hour, 3x per day on shift meal breaks
  - Charging of 30-45 minutes during shift changes and breaks
- 15% work energy recovery from regenerative breaking.

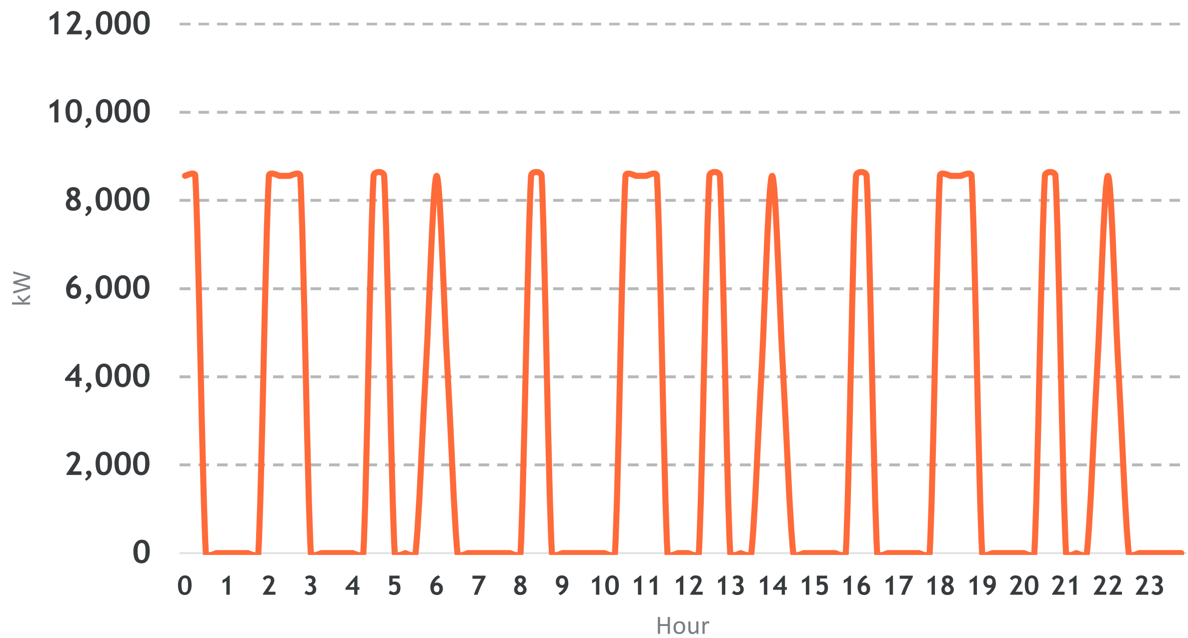
Long-Term Assumption Changes:

- 73 operating hostlers on typical day.

IMF Drayage Hostlers

Drayage hostlers transport containers between the IMF and Warehouses. The charging patterns for the Drayage Hostlers account for container throughput requirements and the IMF's operating schedule. Peak power demand requirements associated with drayage hostler charging are accounted for at both the IMF's Feeder #3 and the Warehouses' Feeder #4. At the IMF, DCFC are assumed to be installed on a 1:1 basis for each daily active drayage hostler. At the Warehouses, a communal charging depot consisting of 12 DCFC has also been included in the peak demand model, but it is assumed to only be used sporadically with the vast majority of IMF drayage hostler charging occurring at the IMF itself.

Figure 11: IMF Drayage Hostler Average Daily Charging Profile



Near-Term Assumptions:

- 81 hostlers operating on a peak day.
- Operational intensity correlated to the distance traveled and speeds driven between the IMF and the Warehouses:
    - 20 kW average power consumption
- DCFC charging at 124 kW.
- 220 kWh battery capacity
- Opportunity charging characteristics:
    - Charging 1 hour, 3x per day on shift meal breaks
    - Charging of 30-45 minutes during shift changes and breaks
- 15% energy recovery from regenerative breaking.

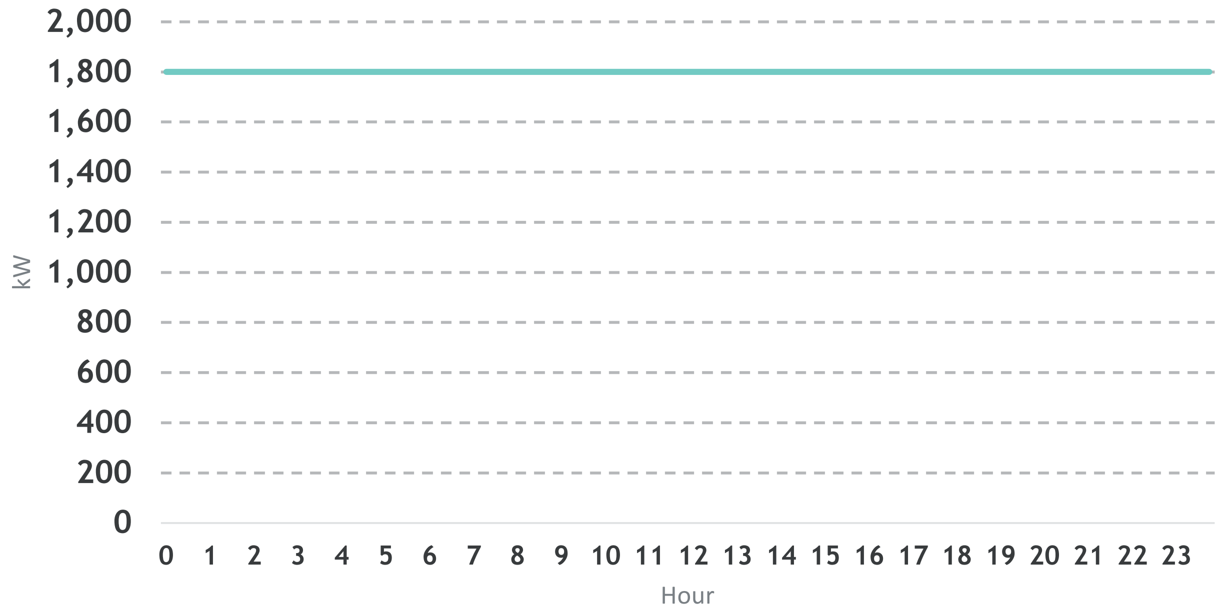
Long-Term Assumption Changes:

- 124 hostlers operating on a peak day.

Warehouse Drayage Hostlers

A second fleet of drayage hostlers are assumed to operate exclusively at the Warehouses, transporting containers to and from the warehouse staging areas within the transload warehouse center. The operational schedules of this fleet are assumed to be diversified due to the mixture of unique warehouse tenants.

Figure 12: Warehouse Drayage Hostler Average Daily Charging Profile



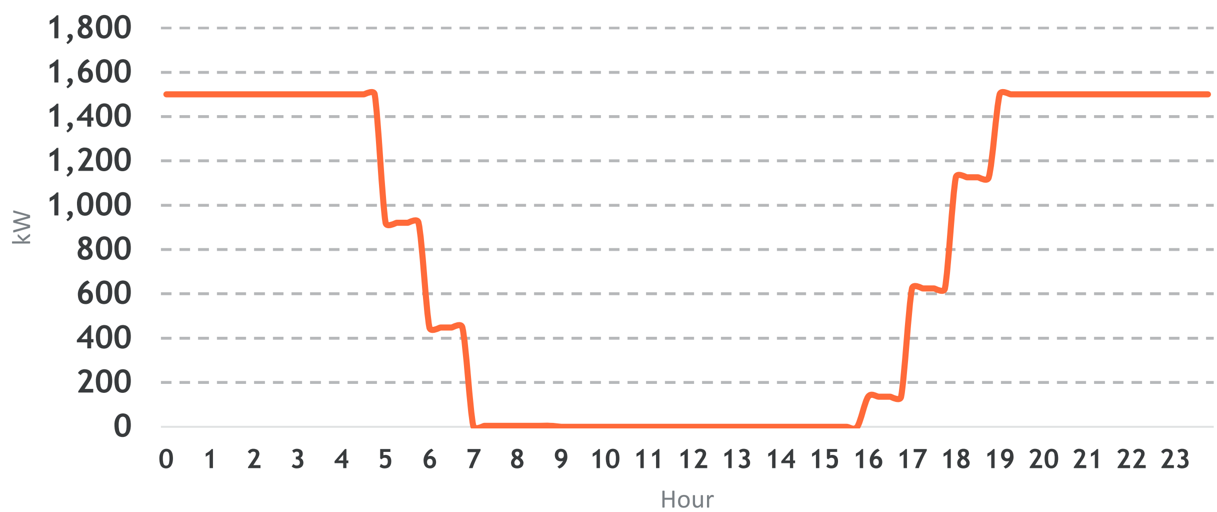
Near-Term Assumptions:

- Total fleet size of 72 drayage hostlers, calculated based upon South Coast Air Quality Monitoring District's 2014 *High Cube Warehouse Truck Trip Study White Paper*'s survey result of 8 hostlers per million SF of warehouse.
- Similar operational intensity to the IMF Drayage Hostlers:
    - 20 kW average power consumption
    - For energy modeling, 10% duty cycle is assumed, meaning that 10% of fleet is actively used at all times
- California Building Code generally requires 400 kVA of electrical capacity be allocated for future DCFC of medium/heavy duty equipment at new warehousing facilities
    - It is assumed that all 400 kVA of allocated power capacity is utilized by future DCFC, a much higher charging rate than the 100 kW assumed for the IMF hostlers
    - To estimate peak power demand, a demand factor of 75% was assumed for the cumulative Warehouse Drayage Hostler charging power capacity

Lighting

Lighting at the IMF will be comprised of high mast lighting to illuminate the facility. The magnitude of this load was established based on the IMF's high-mast and low-mast lighting designs. 1.5 MW of lighting power demand was modeled as occurring for all hours from an hour before dusk to the hour after dawn each day.

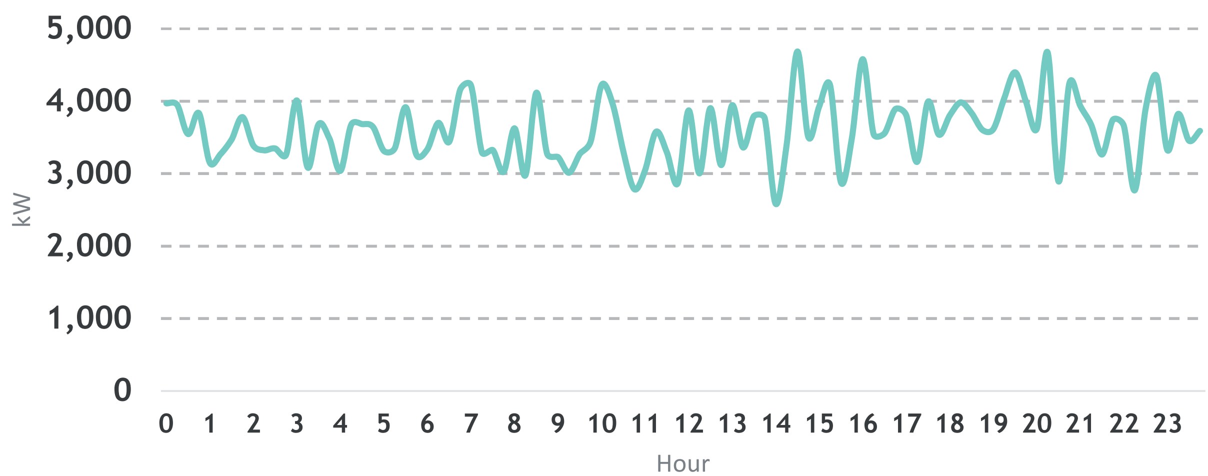
Figure 13: IMF Lighting Average Daily Profile



Widespan Cranes

Widespan cranes are rail mounted cranes that move containers on and off trains at the IMF. Energy and demand for widespan crane operations used data from academic literature and other BNSF locations as a reference and were adjusted to accommodate for the IMF's planned throughput. Due to the highly dynamic nature of cranes' power requirements, this model was developed on a second-by-second basis to estimate the realistic peak coincident demand of the crane fleet.

Figure 14: Widespan Cranes Average Daily Profile



Near-Term Assumptions:

- Similar operational pattern to BNSF's LPKC site.
  - Individual crane lifts are stagged atop each with randomized wait times between lifts to represent second-by-second operations of the collective fleet on a typical day.
  - 879,034 annual crane lifts assumed for purposes of determining crane energy usage hourly operational intensity (~8 lifts per hour per crane).
- Maximum instantaneous peak power draw of 1.049 MW per crane
- 10 cranes in total, split across IMF-E-2 (4) and IMF-W (6).
- At all times (24/7), at least two cranes are assumed to be in operation. Otherwise, crane activity is modeled as decreasing during all meal break periods on account of hostler operators being on break, resulting in approximately 21 hours of daily activity for the rest of the crane fleet.

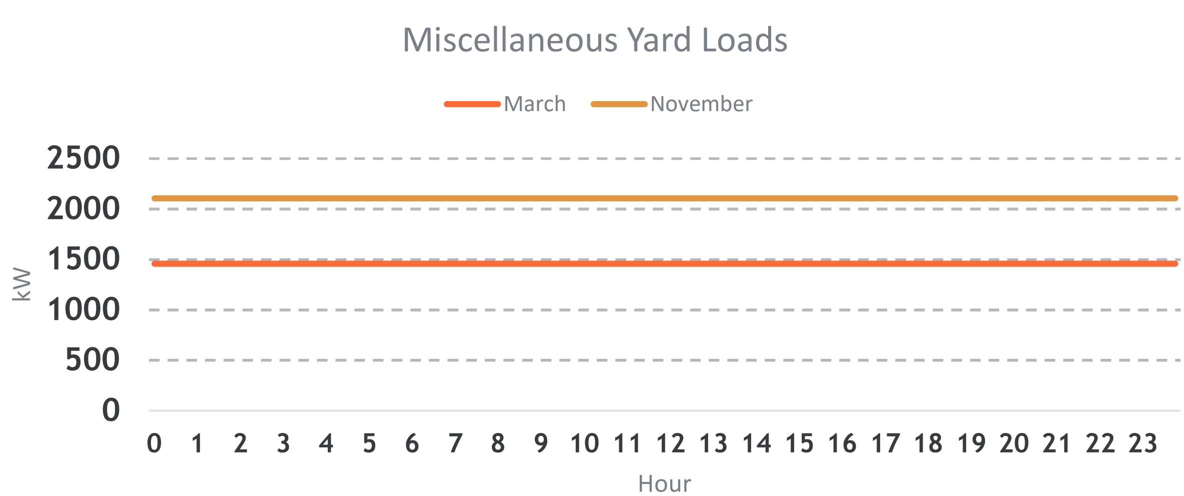
Long-Term Assumption Changes:

- 14 cranes in total, split across IMF-E-2 (8) and IMF-W (6).
- 1,020,531 annual crane lifts assumed for purposes of determining crane energy usage hourly operational intensity (~7 lifts per hour per crane).
- At all times (24/7), at least two cranes are assumed to be in operation.

Miscellaneous Yard Loads

The "Miscellaneous Yard Load" load element conglomerates the loads from smaller pieces of equipment spread throughout the IMF (e.g., air compressors, motors, switches). Load profiles for this equipment was referenced from LPKC and scaled to match IMF needs based on the square footage comparison between LPKC's footprint and BIG's footprint. These loads are split across IMF-W and IMF-E-2 according to a 35/65 ratio derived from BIG Anticipated Facility Electrical Loads' enumeration of loads per feeder.

Figure 15: Yard Loads Average Daily Profile



Near-Term Assumptions:

- Similar loads, equipment, and operation to BNSF's LPKC sites: ~1 kW/acre.
- Power demand and energy requirements are proportional to site size; the IMF is understood to be ~4x larger than LPKC, so a yard load assumption of ~4 kW/acre has been assumed.
  - Equivalent to average yard electrical power demand of 955 kW (used in energy model).
  - Equivalent to peak yard electrical power demand of 2.1 MW (used in peak demand model).
  - Seasonal variation was added to November and December

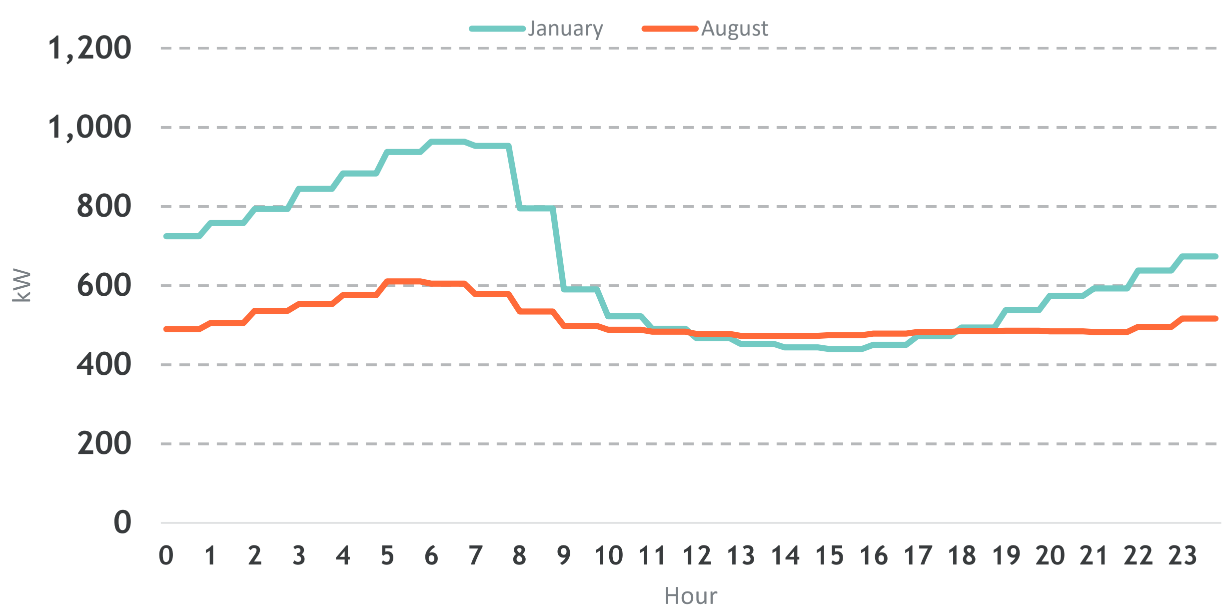
Long-Term Assumption Changes:

- No changes.

Railroad Buildings

The Railroad Buildings are a conglomeration of buildings spread throughout the IMF yard. These include the Administration Building, Electric Hostler Employee and Maintenance Building, Drivers Assist Building, and the Crane Maintenance Employee and Storage Building. All buildings are modeled to be fully air-conditioned and heated. Installed equipment was estimated and profiles were developed to match operational expectations. Figure 16 provides the aggregated average monthly power demand profile used to represent the Railroad Buildings in the energy model, highlighting the winter-peaking nature of the electricity demand that is expected.

Figure 16: Railroad Buildings Average Daily Profile



Near-Term Assumptions:

- Use of similar equipment to other maintenance depots such as welders, lifts, compressors, and hoists.
- Level 2 charging of repaired hostlers at 19.2 kW.

- 100% of planned area is air conditioned to 76˚F.
- 100% of planned area heated to 64˚F via air-source heat pump.
- 24/7 operation.
- Calibrated the Railroad building peak demand to 1.45MW to match CalTrans peak load expectations.

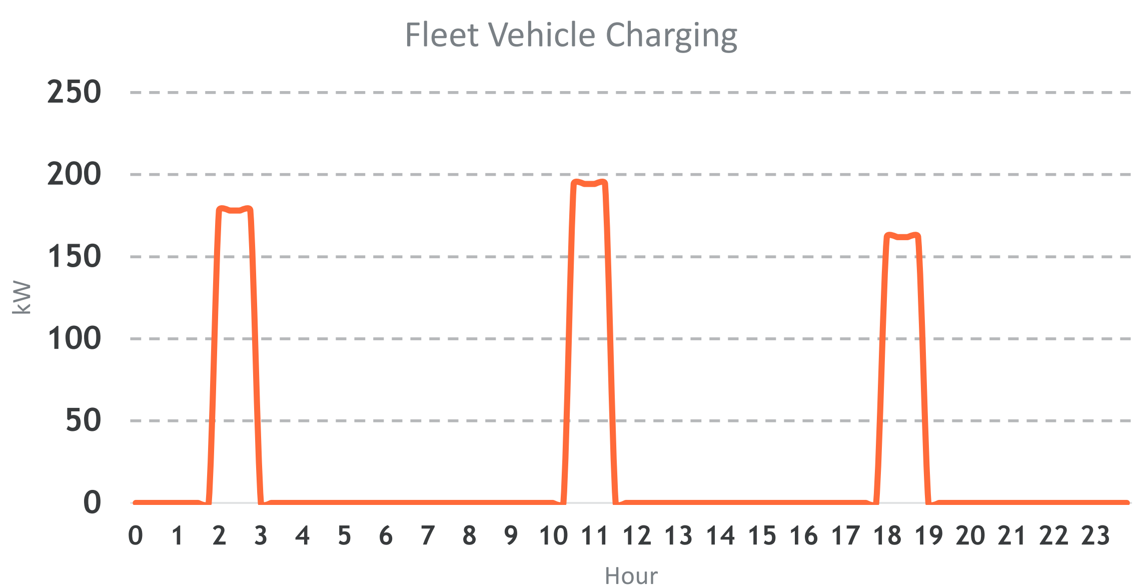
Long-Term Assumption Changes:

- No changes.

Fleet Vehicle Charging

Fleet Vehicle Charging includes BNSF-owned electric pickup trucks and similar light-duty automobile charging. Current electric vehicle specifications were combined with charging during meal break periods to develop the load profile.

Figure 17: Fleet Vehicle Average Daily Charging Profile



Near-Term Assumptions:

- Fleet size of 50 vehicles provided by BNSF.
- 98 kWh battery capacity with a usable capacity of 88.2 kWh
- Average energy usage rate of 2.6 kWh per hour during on-shift hours.
- 1:1 vehicle-charger ratio; Level 2 charging power assumed at 16.6 kW.
- Charging pattern: portion of fleet needing charge charges 3x each day for 1 hour
- BNSF provided usage assumption of 1.5 hours of drivetime per 24 hours at 15 mph.

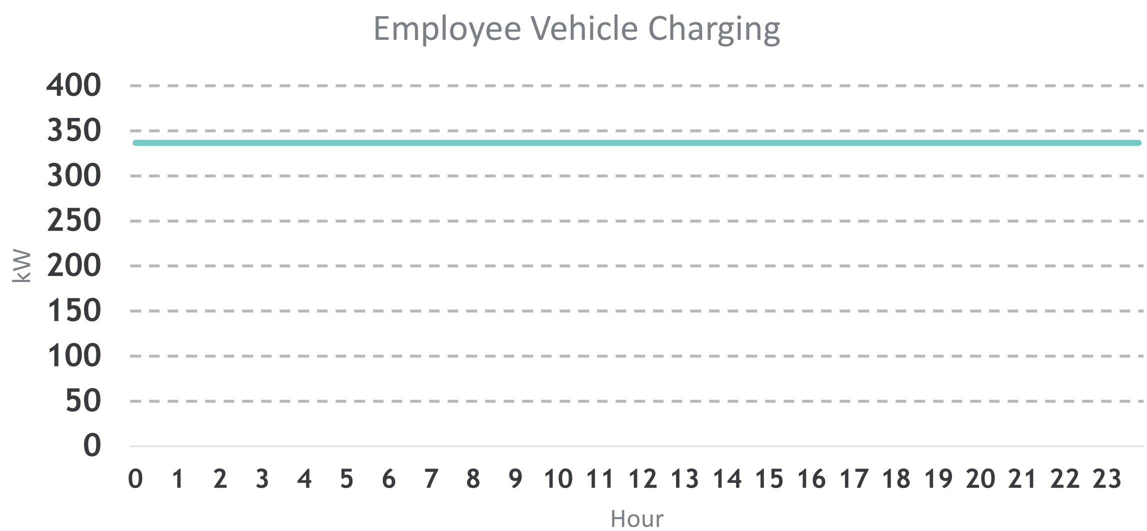
Long-Term Assumption Changes:

- No changes.

Employee Vehicle Charging

Employee vehicle charging accounts for electric vehicle charging of employee-owned vehicles used to commute to BIG. Level 2 chargers are expected to be installed across the facility in accordance with California's Title 24 Building Standards Code. Such chargers are anticipated to be used starting at shift changes when new employees arrive, plug in their vehicles, and leave their car charging during the duration of their shift or until the battery reaches full capacity.

Figure 18: Employee Vehicle Average Daily Charging Profile



Near-Term Assumptions:

- 79 parking stalls with EVSE available at the IMF
- 1,029 parking stalls with EVSE available at the Warehouses
- 70 kWh vehicle battery capacity
- 6.2 kW charger rated power assumed with typical active power consumption of 3.3 kW in compliance with 2022 Title 24.
- 60% charger utilization rate on each shift.
- On average, vehicles arrive at 50% state of charge

Long-Term Assumption Changes:

- 158 parking stalls with EVSE available at the IMF

Warehouse HVAC & Utilities

The HVAC and Utility usage of the Warehouses was modeled using E-Quest software, which took into account a multitude of variables ranging from site layout, location, orientation, building materials, et cetera. A one million square foot warehouse was modeled; the resulting load profile was then grown proportionally to fit the combined square footage across all warehouses. 9M SF of Warehouses are included in the project's development plan.

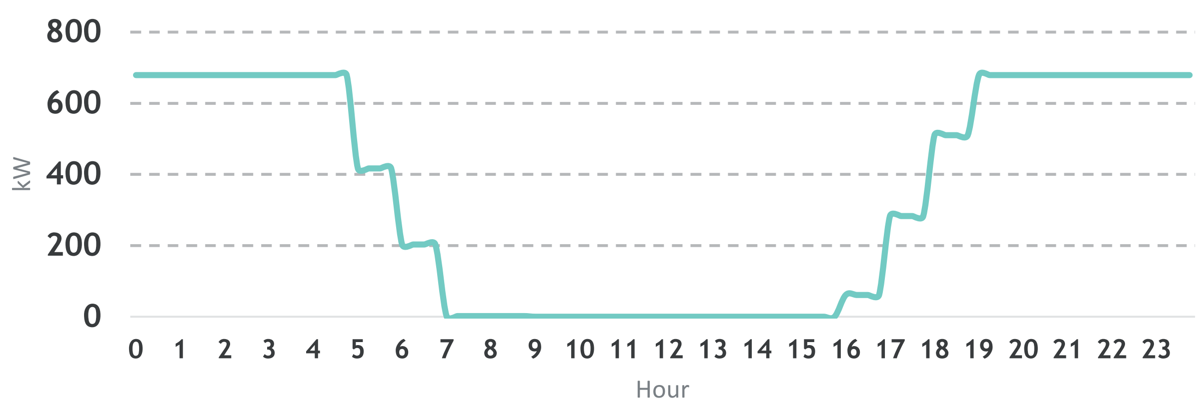
Assumptions:

- 9M SF of traditional warehouses in the near-term
- Assumed non-automated handling operations.
- Raised cooling from 76˚F to 82ºF.
- 100% of planned building area is heated via air-source heat pump;
  Temperature set to 55˚F in the warehouse and 70˚F in the office space.
- Building layout and sizes are assumed and subject to change once a warehouse developer is secured.
- HVAC units will meet expected EPA and California Building Code efficiency standards:
    - 14 SEER, 2.9 COP.

Exterior Warehouse Lighting

Exterior Warehouse Lighting assumes similar lighting type, luminosity, and power requirements of a standard commercial parking lot. The resulting profile was then expanded proportionally to the combined expected parking lot area for all warehouses.

Figure 20: Exterior Warehouse Lighting Average Daily Profile



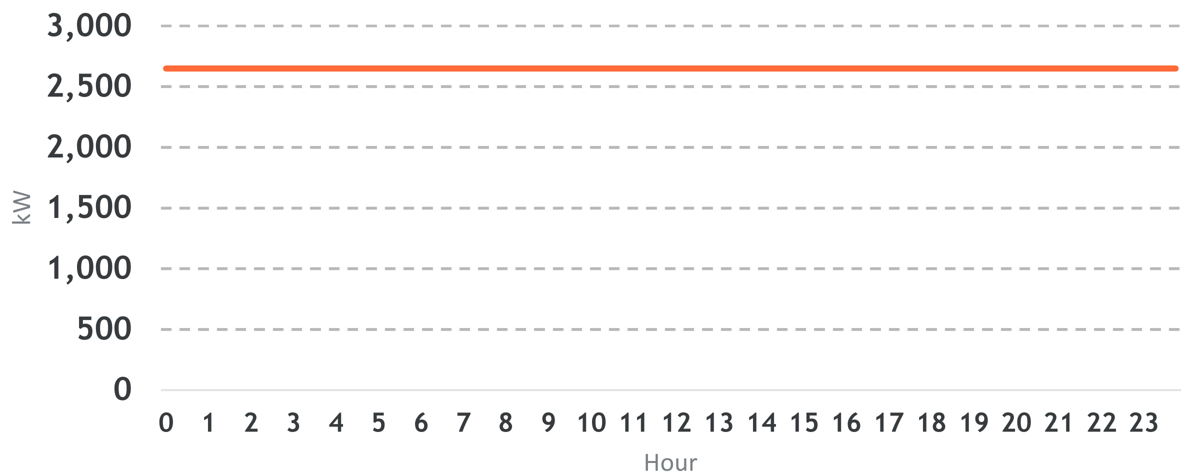
Assumptions:

- Luminosity and power requirements will match typical commercial parking lots at about 0.15 W/SF.
- Average parking lot size of about 0.985 SF for every 1.0 SF of warehouse space.
- 8,865,000 SF of parking lot space to be illuminated.

Forklifts

The Forklift charging model combines data from typical operations of forklifts from other BNSF sites and the power requirements shown at external warehouses. A planned, tactical charging approach was taken in which a small number of forklifts are almost constantly charging and simply swapped out by employees when their forklift begins to run low on energy or during scheduled breaks.

Figure 21: Forklift Average Daily Charging Profile



Assumptions:

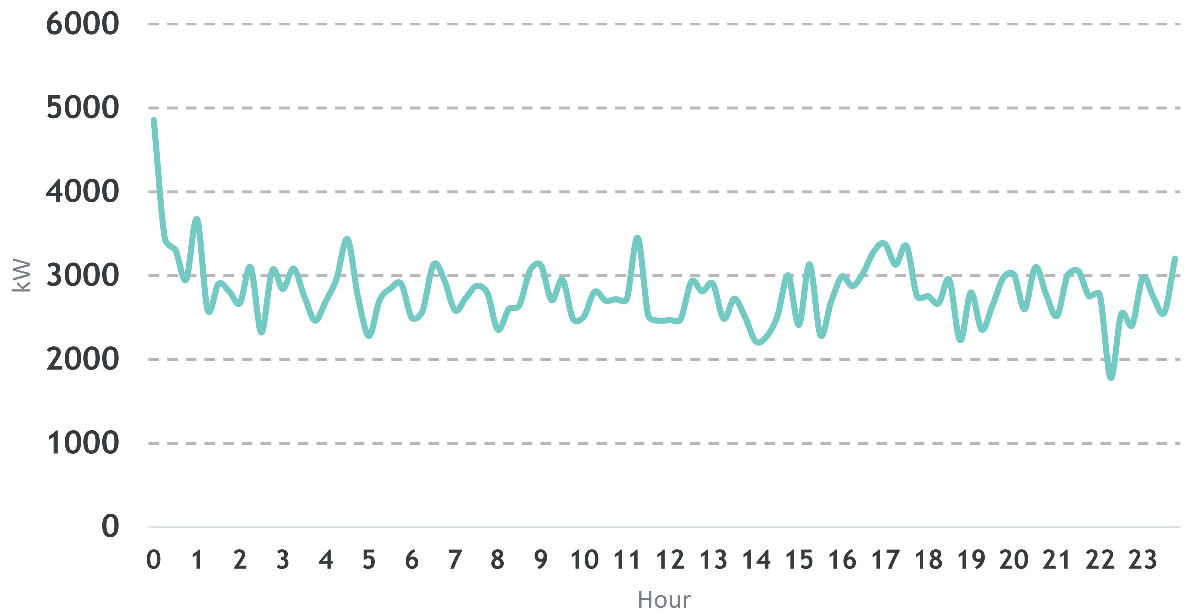
- 540 forklifts estimated by BNSF to service 9M SF of warehouse space
- 30 kWh battery capacity, with a usable capacity of 27 kWh
- Energy usage rate of 6.2 kW
- Level 2 charging stations assumed at 19.2 kW; 1:1 charger ratio to forklifts
- Staggered charging schedules.
- Similar equipment and power requirements to typical warehouse forklift operations.

Rubber Tired Gantry Cranes

Rubber tired gantry cranes (RTGs) work in tandem with the widespan cranes to move containers between rail cars, the loading zone, and drayage trucks. The RTGs are expected to be diesel hybrids for the foreseeable future at the IMF due to lack of a viable fully-electric RTG for rail operations. For this reason, RTGs are not included in the baseline power demand forecasts.

RTG forecasts were developed as part of a sensitivity test for potential implementation. Operations are expected to match the widespan cranes and exhibit similar load shape behavior.

Figure 22: RTG Grid Power Draw Profile



Near-Term Assumptions:

- Maximum instantaneous peak power draw of 0.5016 MW per crane
- 7 cranes in total, split across IMF-E-2 (3) and IMF-W (4).
- At all times (24/7), at least two cranes are assumed to be in operation. Otherwise, crane activity is modeled as decreasing during all meal break periods on account of hostler operators being on break, resulting in approximately 21 hours of daily activity for the rest of the crane fleet.

Long-Term Assumption Changes:

- 8 cranes in total, split across IMF-E-2 (4) and IMF-W (4).
- 1,020,531 annual crane lifts assumed for purposes of determining crane energy usage hourly operational intensity (~7 lifts per hour per crane).
- At all times (24/7), at least two cranes are assumed to be in operation.

Miscellaneous Charging

In the 2025 update, Miscellaneous Charging was introduced for IMF-W and IMF-E-2. This category includes charging loads from various equipment such as Intermediate Bulk Containers (IBCs), side loaders, forklifts, hybrid RTGs, and drones. It is assumed that these types of equipment follow the same operational schedule as the yard hostlers; therefore, their charging profiles are aligned accordingly.

Figure 13: Miscellaneous Charging Power Profile

Near-Term Assumptions:

- Opportunity charging characteristics:
    - Charging 1 hour, 3x per day on shift meal breaks
    - Charging of 30-45 minutes during shift changes and breaks
- A diversity factor of 20% was applied.

Long-Term Assumption Changes:

- No changes.

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