



A Public Agency

STUDY SESSION

Discussion on PG&E EV Fleet Subsidy
Grant Program Request

STAFF REPORT

To: SBWMA Board of Directors and Technical Advisory Committee
From: Matt Southworth, Sr. Facilities Engineer
Grant Ligon, Management Analyst III
Date: October 15, 2020 Board of Directors/Technical Advisory Committee Study Session
Subject: Discussion on PG&E EV Fleet Subsidy Grant Program Request (Revised 10/12/20)

Recommendation

This is an informational discussion only. The joint Staff/Recology workgroup (Workgroup) will update the Board of Directors and Technical Advisory Committee (TAC) on its initial findings to date and Zero Waste Committee and Finance Committee feedback regarding the timing, costs, and subsidy and other options available to transition a portion of Recology's current fleet of 144 renewable diesel-fueled vehicles to zero emission vehicles (ZEVs) with electric powertrains during the 2021-2026 planned fleet replacement timeframe.

The workgroup seeks Board and TAC input in preparation for a future Board action item to consider the issuance of a *Letter of Commitment* in PG&E's Electric Vehicle Subsidy Grant Program. Because program funding is finite, Staff has been advised to submit the Agency's application with urgency, therefore, we anticipate presenting this item at the November 19th Board meeting.

Summary

The current restated and amended Franchise Agreement with Recology specifies replacement of the entire collection fleet spread over the years from 2021 to 2026. A schedule of new purchases and vehicle retirements lists the numbers of vehicles and vehicle types by year. This agreement was finalized in 2018 and included a \$54 million dollar budget (with future CPI adjustments) to fund the replacement of Recology's entire 144 vehicle fleet during this period. This budget, however, was based on the standard practice of purchasing all replacement vehicles with diesel engines. Since this time, the State's climate action goals (AB32) and air emission goals for 2030 have become much more clearly defined which will require converting a portion of this replacement fleet to Zero Emissions Vehicles (ZEV). CARB now identifies ZEVs as electric powered.

Recently, the California Air Resources Board (CARB) issued requirements for this classification of commercial vehicles to transition to electric power by 2030. Additionally, the recent Executive Order (EO N-79-20) banning internal combustion engine sales in 15-25 years, and the Agency's *2020-24 Long Range Plan*, all support our Member Agency's Climate Action Plans and the Agency's goals of minimizing agency-wide greenhouse gas (GHG) emissions. This information has altered the Workgroup's recommendations to align with these aggressive climate action goals and have resulted in our recommended path forward for this fleet replacement, considering timing and available subsidy programs. These recommendations also reflect Staff's understanding of Recology's approach to moving forward with the procurement.

Background and Analysis

For many years the only feasible alternative to diesel fuel for heavy trucks was natural gas (methane, or NG). For that reason, it had been prioritized for collection fleet upgrades in recent years. This approach would have aligned nicely with the Agency's Organics-to-Energy project(s) since the Biogas end-product (Renewable Natural Gas (RNG)) could potentially fuel some of the new Recology collection trucks. However, given the State's recent laws and regulations, California's transportation policy is clearly moving towards electric power. To properly align with these fleet planning mandates, the Workgroup's research and planning activities have deliberately pivoted away from RNG and shifted over to a battery-electric powered fleet. Both directions were called out in the SBWMA's 2020-24 Long Range Plan that was adopted in 2019.

Renewable Diesel Fuel:

In November 2019, Recology and SBR (with Staff concurrence) switched from using petroleum diesel to renewable diesel (RD) to fuel their existing diesel truck fleets. In some emissions categories, RD has cleaner tailpipe emissions when compared to ultra-low sulfur diesel fuel. Renewable diesel has been priced to closely match that of ultra-low sulfur diesel. The switch to renewable diesel did not involve any changes to our fueling infrastructure or to the operation or maintenance of the diesel trucks, supporting their continued usage as a primary fuel source for the Recology and SBR fleets in the near-term. The supply of renewable diesel appears to be increasing, with the current provider (Neste) expanding their processing capacity and feedstock acquisition. Renewable diesel use will continue during the projected 10 to 15-year fleet life anticipated in the new Franchise Agreement, and not require the need for additional vehicle replacement during the current term of the Franchise Agreement.

The Workgroup has concluded that RD will be a suitable fuel option for the foreseeable future for the portion of Recology's non-ZEV replacement fleet vehicles. These vehicles are scheduled to be replaced between 2021-2023 which precedes the broad availability of battery-electric vehicles.

Battery-Electric:

Battery-electric trucks have been in development over the last several years and have followed the development path of battery-electric automobiles. Compared to diesel, the primary attributes favoring battery-electric trucks are:

- Zero tailpipe emissions
- Lower noise production
- Lower maintenance cost
- Lower fuel cost, and
- Lower fuel carbon-intensity (perhaps as low as zero assuming renewable electricity).

Given Peninsula Clean Energy's 100% renewable electricity provision to Shoreway via Eco-100 electricity service, these ZEVs would greatly reduce the SBWMA's Greenhouse Gas (GHG) emissions since Recology collection/support trucks and SBR long-haul trailers/support vehicles are responsible for 91% of the SBWMA's overall Scope 1 and 2 GHG emissions in the recent 2017 inventory. Disadvantages of battery-electric trucks are:

- A much higher initial purchase price (currently)
- A smaller payload capacity and operational performance

A lower payload means that more routes (and trucks/drivers) may be required to complete the current workload, based on Recology's experience with first generation BYD EV trucks. An additional factor in ZEV life-cycle cost analysis in California is a subsidy available to battery-electric vehicles of any kind through the Low Carbon Fuel Standard (LCFS). This subsidy can reduce the cost of electricity as motor fuel to near zero (or even below zero

for renewable electricity refueling). Combining the benefits of lower maintenance and fuel costs (including LCFS subsidy) with the higher (current) vehicle purchase price (up to \$275k/unit more expensive) yields an economic lifecycle trade off that is slightly more expensive at present than diesel.

Grant funding is currently available and may improve the economics, as discussed below. Economics will also likely improve with time as battery (and thus vehicle) costs decline, continuing the [trend from 2007 to 2019](#) of an average 16% annual decline in the cost of battery packs (to 2019’s level of \$161 per kWh, which if the trend holds will reach ~\$95/kWh in 2022, below the \$100/kWh price often cited as the point where EVs will reach cost parity with gas-powered vehicles).

However, because of the nascent nature of battery-electric vehicles, it has not yet been consistently demonstrated that a battery-electric refuse truck can be affordably sized to do as much work in a day as a comparable diesel truck. This is also important for staffing utilization. Pilot testing should reveal this over the next few years. It is for this reason that the Workgroup is excited by Recology’s commitment to provide us with the first short-term use of their preferred manufacturer AutoCar’s first ZEV Class 8 trucks. The first two AutoCar ZEVs are expected to arrive for SBWMA-area testing in January 2022. Also, lower long-term maintenance expenses are expected (based on market data on current battery-electric automobiles and buses), but this fact is yet to be proven. Because of these lifecycle unknowns at this time, unbudgeted replacement batteries and/or vehicles may be required during the final phase of this current 15-year Franchise Agreement term.

Regulatory Environment

There are three primary regulatory and policy drivers for this portion of the discussion:

1. **California’s SB 32, the California Global Warming Solutions Act**: passed in 2006, this requires there be a reduction in greenhouse gas emissions to 40% below the 1990 levels by 2030.
2. **California Executive Order N-72-20**: passed in September 2020, this bans non-ZEV sales by 2035 for light-duty vehicles, and by 2045 where “feasible” (likely applicable for waste collection fleets, where at least 2 manufacturers’ ZEVs are available for purchase at present) for medium- and heavy-duty vehicles like Class 8 refuse collection trucks.
3. **CARB Advanced Clean Trucks Rule**: passed in June 2020, this requires that truck manufacturer’s sales to California must include at least 9%, 11% and 13% Class 8 zero-emission trucks by 2024, 2025 and 2026, respectively (see Table 1 below). Paired with Recology’s Franchise Agreement Attachment N Fleet Replacement Schedule (see Table 2), this indicates that at least 6 electric vehicles must be purchased by Recology to satisfy this rule. Those percentages increase each year to 50 percent by the year 2030.

Table 1. ZEV Sales Percentage Schedule (CARB).

| Model Year | Class 4-8 Group Vehicles (% of Fleet vehicles that must be ZEV) |
|------------|--|
| 2024 | 9% |
| 2025 | 11% |
| 2026 | 13% |
| 2027 | 20% |
| 2028 | 30% |
| 2029 | 40% |
| 2030 | 50% |

The other area of concern for CARB is criteria pollutants that form smog. While internal combustion engine emissions are much cleaner than they were 10 years ago, no matter which fuel is used, NOx is still considered a problem. Most of the heavily populated portions of California violate air quality standards periodically and are classified as “non-attainment areas”, with the Bay Area recently being classified as in marginal non-attainment for Ozone, which further suggests the need to pursue ZEV procurement.

4. **The SBWMA’s 2020-2024 Long-Range Plan Goals:** While it is not a regulation, the SBWMA has as part of its *2020-24 Long Range Plan’s Mission Statement and Guiding Principles*, one of three Triple Zero Goals being minimizing Agency-wide GHG emissions. These Agency goals were developed and adopted to be in direct alignment with each of our member agency’s Climate Action Plans, and were intended to be met in part by transitioning part of the Recology fleet to RNG- and/or electric-fueled vehicles.

Discussion

While several truck manufacturers are known to be working to bring battery-electric refuse vehicles to market, we understand others are also working on electrification, but have not yet announced models for sale. At least two manufacturers have battery-electric refuse industry trucks available now. If the SBWMA were to request that Recology replaces the old trucks with battery-electric technology according to the procurement schedule, this would be one of the earliest large or partial fleet conversions in the solid waste industry. While achieving the Agency’s environmental goals, this “early adopter” position would require more capital than currently budgeted (the budget for fleet replacement is based on lower cost diesel vehicles) and have greater technology risk, which should decline greatly with coming battery improvements and newer manufacturers and generations of EVs coming to market by the time our partial fleet EV procurement could start in 2023 for 2024 deployment.

While CARB has aggressive plans to further reduce both tailpipe emissions and that of greenhouse gases, we have not been able to find any specific regulations that would prohibit the purchase of non-zero-emissions trucks for this procurement schedule. Once the feasibility of battery-electric technology becomes sufficiently clear for heavy trucks, we expect more rules from CARB to accelerate the transition to zero-emissions fleet vehicles. With Board support, Staff will pursue important funding/subsidies to soften the economics of this transition, such as participating in PG&E’s EV Fleet program

Recology’s Commitment to Battery-Electric

On June 11th, 2020, Recology’s corporate Vice President of Equipment Procurement, Mr. Bennie Anselmo, advised the Zero Waste Committee that Recology is actively working with their preferred manufacturer Autocar to develop and purchase suitable battery-electric vehicles for our service area and others. The Workgroup has been advised that AutoCar is an solid waste industry vehicle specialist, and they recognize that the shift under way in California to battery-electric powered fleets. Recology estimates that their preferred manufacturer will have battery-electric models readily available by 2024 and that these vehicles will work for the intended purpose. Unfortunately, the procurement schedule (Attachment N) in the Franchise Agreement indicates the bulk (90) of the 144 new trucks must be acquired by 2024 to maintain driver and road safety standards (see Table 2 below). Recology’s preferred truck manufacturer, AutoCar, will not have battery-electric vehicles available for the planned 2022-23 fleet purchases of 86 vehicles. Therefore, these replacements will have standard diesel engines that will be powered by RD.

Table 2. Attachment N: Planned Collection Truck Procurement Schedule.

| Acquisition Year | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | Total |
|---|------|------|------|------|------|------|-------|
| # of Trucks to be purchased per Franchise Agreement | 4 | 36 | 50 | 40 | 10 | 4 | 144 |

Proposed Roadmap

The Workgroup is reviewing the feasibility of delaying vehicle procurement schedule shown in Table 2 (i.e. shifting the purchase of some of the 2023 vehicle purchases to 2024). However, even with a 2 or 3 year delay, it may not be possible to sync up the majority of the truck procurement to battery-electric ZEVs. Therefore, the default position for new truck procurement in the meantime is standard diesel engines using RD fuel.

To help understand the performance capabilities of battery-electric collection vehicles in the SBWMA service area, the Workgroup is pursuing the aforementioned two ZEV pilot project in early 2022, as supported by Zero Waste Committee on July 23rd, 2020. To charge these and later ZEVs, Shoreway will require installation of ZEV truck-charging infrastructure. Staff is currently working with PG&E to get as much information as possible to determine costs to both parties, commitments, subsidy opportunities and key planning milestones relating to facility electrical upgrades. Staff will report back out to the Board and Committees as this process and costs become known.

Table 3 (below) provides an overview of the vehicle fleet economics including the premium costs (those costs estimated to exceed those currently planned for in the restated and Amended Franchise Agreement’s fleet replacement plan). Several sets of credits are also estimated. Maintenance costs are unknown at this time so no costs have been entered. The first six cost rows are given in units of \$1000/year, while all estimates are based on the assumption that EV trucks reach diesel truck productivity (for 1:1 replacement) by 2024 deployment, unlike Recology's experience so far with BYD's first generation (trial) truck models with undersized batteries.

Table 3.

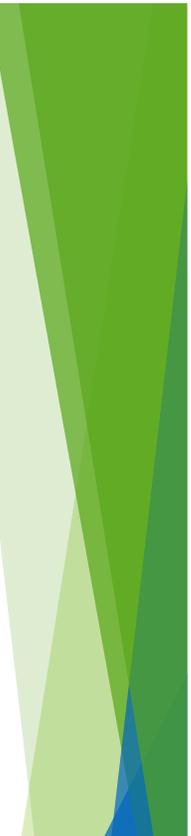
| Estimated Annual Cost and GHG Impact of ZEV Purchases | | | | | |
|---|---------|------------|-----------|---------------|---------|
| Per Year Parameter # ZEVs | Per ZEV | Pilot ZEVs | CARB Min. | ZEV Purchases | |
| | 1 | 2 | 6 | 24 | 54 |
| 1 ZEV Cost Premium (\$/year) (1) | \$31 | \$61 | \$183 | \$732 | \$1,600 |
| 2 Site Infrastr. Cost Premium (2) | \$24 | \$24 | \$42 | \$169 | \$355 |
| 3 Fuel Savings (3) | -\$1 | -\$3 | -\$8 | -\$34 | -\$76 |
| 4 LCFS Credit (4) | -\$16 | -\$32 | -\$97 | -\$389 | -\$876 |
| 5 Maintenance Savings (5) | 0 | 0 | 0 | 0 | 0 |
| 6 Total Annual Premium (6) | \$37 | \$51 | \$120 | \$478 | \$1,003 |
| 7 Rate Impact (7) | 0.03% | 0.04% | 0.10% | 0.40% | 0.84% |
| 8 Diesel Reduction (gal/yr) | 5,357 | 10,714 | 32,142 | 128,568 | 289,278 |
| 9 SBWMA % GHG Reduction (8) | 0.48% | 0.96% | 2.87% | 11.48% | 25.83% |
| Notes: | | | | | |
| 1) Assumes 10-year amortization, I = 5.5%, purchase premium of \$230,000 per vehicle, no BAAQMD Carl Moyer Program (\$9k-32k/EV), CA HVIP (similar), or other grants, and no economies of scale. | | | | | |
| 2) Assumes (for 1-6 EVs) 1-2x 150 kW chargers at \$75k per plus 150kW power level-based \$48k per install, no \$9k per PG&E EV Fleet grant and PCE free design support, and no Moyer <60% funding. For 6 EVs, assumes same charger price but \$38k per install. For 24+ EVs, that per install cost drops to \$19k, with no PG&E EVF TTM install worth \$50k study+\$15k switchgear for 1-2, \$50k for 6, \$500k for 24, \$1M for 54+, and amortization (1). | | | | | |
| 3) Assumes RD \$3.00/gallon, 2.24 mpg, electricity \$0.16/kWh, 5.0 kWhr/mile, 12,000 vehicle miles/year. | | | | | |
| 4) Assumes standard grid mix electricity credit (\$0.27/kWh) given, not \$0.33/kWh for 100% renewable mix. | | | | | |
| 5) Assumed to be 0 given its unknown status (likely cheaper costs for EVs need to be proven in field). | | | | | |
| 6) Total of (1)-(4) without effect of possible maintenance savings. | | | | | |
| 7) Assumes overall annual budget of \$120M. | | | | | |
| 8) Assumes diesel as baseline for comparison. | | | | | |

During the September 24, 2020 Board of Directors Meeting, several Board members expressed strong interest in the Agency pursuing as much of the PG&E EV Fleet and other subsidy programs as available. Staff has identified several subsidy/funding opportunities, including the PG&E Electric Vehicle Fleet Program. Staff has been advised that funding is finite, and is awarded on a first-come, first-served basis so a program briefing and a formal *Letter of Commitment* is being prepared for board consideration at its November 19th Board meeting. Program details will be provided in this briefing, including some economic risks on the Agency's behalf should PG&E proceed with their part of the site upgrades and the Agency chooses not to proceed. In this instance, the agency would be accountable to reimburse PG&E for some or all of these costs.

As the reader can see, converting a portion of Recology's fleet can have exciting and multifaceted benefits to our community and the collection operations workforce by implementing this mandated initiative. Much of this technology and infrastructure are emerging and long term costs are not yet fully understood. The Workgroup and Staff will do our very best to provide working updates to engage the Board at every milestone, through reports to the Zero Waste Committee, the Finance Committee and, of course, ultimately, at the Board level on our procedural options and costs.

Attachments:

Attachment A – PowerPoint Presentation - Collection Fleet Replacement: Zero Emission Vehicles (ZEV) to be presented by staff.



Franchise Agreement/ Collection Fleet Replacement: Zero Emission Vehicles (ZEV)



A Public Agency

SBWMA: Joe La Mariana, Matt Southworth, Hilary Gans, and Grant Ligon

RSMC: Mario Puccinelli, Mike Kelly, Bennie Anselmo, Tim Hester



Recology
San Mateo Coun

WASTE ZERO

ZEV Current Status: Summary

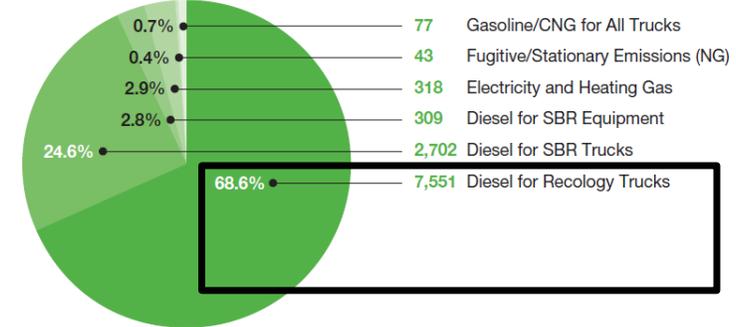
- **Recology's 100% Fleet transition:** 2021-2026 (144 vehicles)
- **New CARB Min. Requirements = 6 trucks by 2026**
 - **Other Regs:** Newsom's *EO N-79-20* non-ZEV ban by 2035 (= more ZEV)
 - **Member Agencies:** CAPs/Sustainable Vehicle Fleet Policies: Prioritizes ZEV purchases, even if costlier (MP)
- **Recology (Autocar):**
 - **2024--ZEV truck delivery (est.):** 1/2022--2 pilot Evs
 - **2024-2026:** Up to 54 ZEV vehicles
 - **Marketplace:** 1st/2nd gen ZEV Trucks in market now; more in 2021+
- **Notable ZEV Development Areas Needed:**
 - **Current Productivity Limits:** Recology's Jan 2020 pilot = 3:4 route productivity ratio
 - **Price Difference:** Higher purchase price/unit (SBWMA pays premium)
 - **Higher Lifecycle Cost:** Lower fueling costs/still higher lifecycle costs
- **Current Fuel: Renewable Diesel similar GHG/tailpipe emissions as RNG, but cheaper**
 - Recology has used since Nov-19 (plug and play); Best bridge option until ZEV transition in 2024



Recology's Planned Fleet Replacement Schedule + GHG impacts

- **120 total Class-8 trucks (2021-2026)**
 - +24 Support vehicles
- **Possible ZEV fleet candidates: 2024-2026**
- **Recology's (Autocar) at-scale ZEV delivery: 2024**
- **Up to 54 trucks could be ZEVs**
- **CARB minimum (by 2024): 6 ZEV's**

Figure 28. Agency Greenhouse Gas Emissions (in Metric Tons of Carbon Dioxide-Equivalents, 2017)



| Year | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 |
|----------|------|------|------|-----------|-----------|----------|
| # Trucks | 4 | 36 | 50 | 40 | 10 | 4 |



54 units



Est. Annual Cost of ZEVs (w/no subsidies)

| Estimated Annual Cost and GHG Impact of ZEV Purchases | | | | | | |
|---|----------------------------------|--------------|--------------|--------------|---------------|----------------|
| | | Per ZEV | Pilot ZEVs | CARB Min. | ZEV Purchases | |
| Per Year Parameter | # ZEVs | 1 | 2 | 6 | 24 | 54 |
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Proposed ZEV Roadmap + Subsidy Considerations

○ Proposed Next Steps (1 of 2):

- **Continue use of RD as Bridge Fuel** (Recology)
- **Research Subsidy Programs** (Staff/Recology/tech consultants)
- **ZEV pilot (Jan. 2022)—Plan/Begin; Analyze pilot data** (Staff/Recology)
- **Recology Comp Review (Attachment N); propose changes** (Staff/Recology to ZWC/Finance Committee/Board)
- **Site/Facility Power Assessment** (Staff/Technical consultant then to ZWC/Finance Committee/Board)
- **Charging station for Pilot ZEV trucks by Jan.2022--Install** (Staff/Recology)
- **Charging infrastructure at Site--Plan/Install** (Staff/Tech consultant/Recology then to ZWC/Finance Committee/Board)
- **ZEV Pilot Results/costs-Evaluate/Review Mkt. Options** (Staff/Recology/Tech consultants then ZWC)

Proposed ZEV Roadmap + Subsidy Considerations

- Proposed Next Steps (2 of 2):
 - **Develop ZEV Fleet transition Plan** (Staff/Recology/Tech consultants to ZWC/Finance Committee/Board)
 - Base recommendation: 6 ZEVs (CARB Mandate)
 - Option 1: + 24 additional ZEVs (current PG&E Fleet Subsidy Max)
 - Option 2: Up to 54 ZEVs (All eligible Recology replacement vehicles planned in 2024-26)
 - **Subsidy Funding Opportunities:**
 - **PG&E: Apply immediately before money expires:**
 - Submit Letter of Intent (Needs BOD approval)
 - Fleet Subsidy: \$9k/vehicle
 - Site Upgrades: \$50k-\$500k “Behind the meter” expenses covered
 - **TBD: BAAQMD; Fed/State; PCE**

EV Fleet Process and Timing

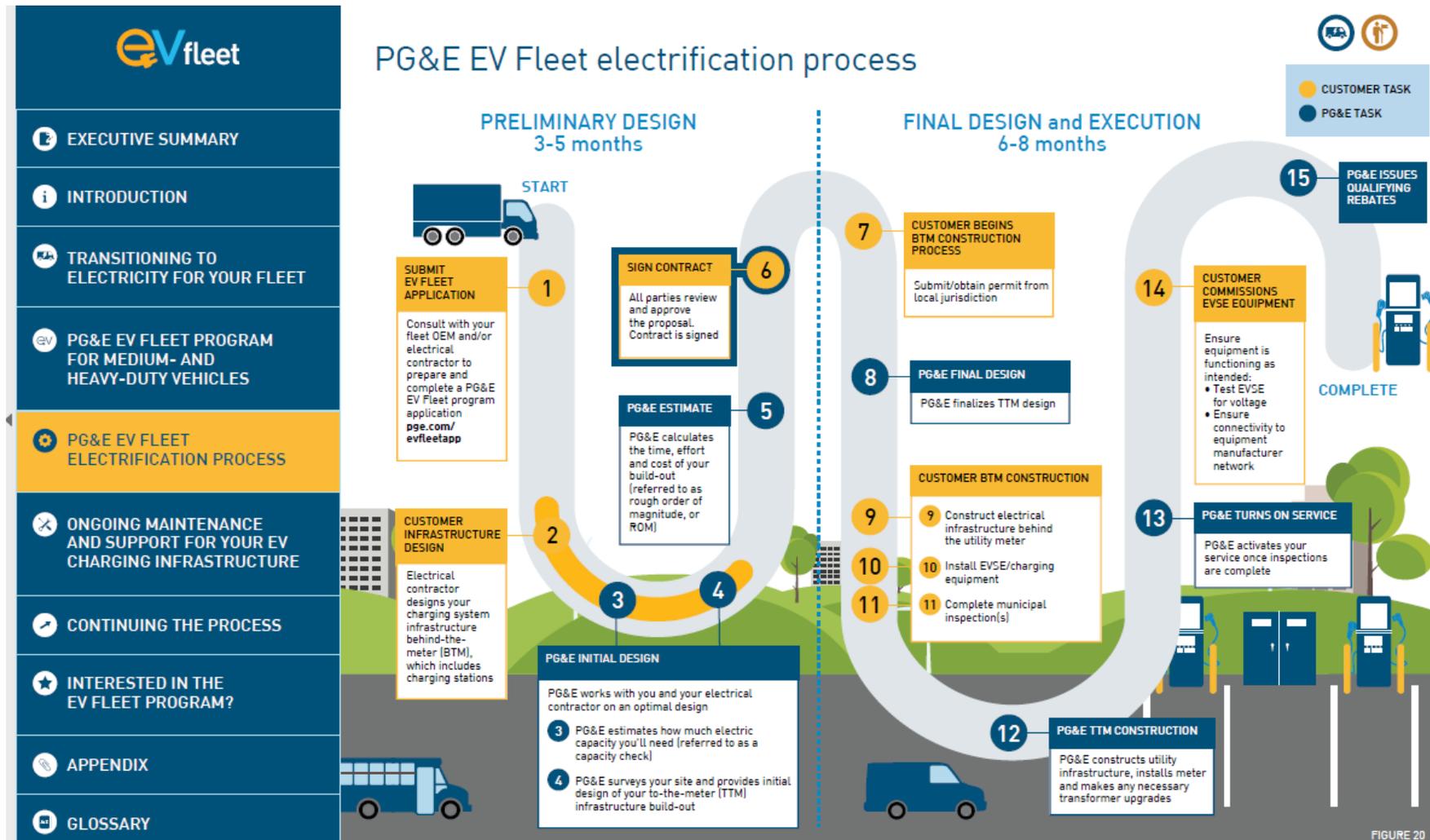


FIGURE 20

