The Electric Bus
Get on Board!
Why Go Electric?

• Clean – No Tailpipe Emissions
• Quiet – Less motor noise and vibration
• Comfortable – Smooth Starts and Stops
• Efficient – Lowest Fuel Cost, Lowest Maintenance Cost
Clean – No Tailpipe Emissions

• A battery electric bus does not emit:
  • Greenhouse gas (CO2) that harms the planet
  • Particulates that cause health problems
  • Smog-forming combustion byproducts (they stink)

• Benefits Include:
  • Cleaner air in our communities
  • Less asthma and respiratory disease
  • Less global warming
Quiet – Less Motor Noise

- Electric motors make less noise than internal combustion motors
- Electric motors do not vibrate like gas, diesel, or CNG motors
- When the bus is stopped, the electric motor is stopped, but a gas engine must keep idling
- Electric motors produce high power at low speed, so they do not need to be revved up to get the bus moving
- A more pleasant experience for riders, drivers, and bystanders
Comfortable – Smooth Ride

• Electric buses use regenerative braking – the motor becomes a generator that recharges the battery as it slows the bus
• Starts and stops are smoother than with a gas engine, gear shifts, and friction brakes
• That means less particulates from brake wear, and cleaner air
• The result is a smoother and more pleasant ride
Efficient – Low Cost Operation

• Electric motors are more efficient – less energy is wasted as heat
• Even if the electricity is generated by burning fossil fuel at a power plant, it takes less fuel than an internal combustion engine on the bus
• If the electricity is from renewables like solar and wind, the carbon emissions are zero and the fuel cost is even lower
• Batteries are usually charged at night, when unused wind power is plentiful and rates are the lowest
• Maintenance costs are lower for electric motors
Issues

• Initial Cost of Buses
• Range
• Operations and Maintenance
• Charging Infrastructure
• Electricity Cost
Bus Cost

• Electric buses are still more expensive than diesel or CNG
• Total cost of ownership is lower due to lower fuel & maintenance
• Competition and economies of scale will further reduce initial cost
• Over the last four years, the cost has dropped by 20 to 25%
• This is mainly due to improved battery technology
• Costs are expected to decline further relative to other fuel types
Range

• Rapidly improving battery technology is improving range
• Battery density has increased by 40% in the last four years
• Buses with 200 miles per charge are commonly available
• Maximum ranges keep increasing, 350 miles/charge is available
• Well over half of urban bus routes are less than 150 miles/day
Operations and Maintenance

- Electric buses have lower maintenance costs than other fuel types
- Electric drive trains have far fewer moving parts
- Oil changes are not required
- Electric motors last longer than internal combustion engines
- Electric transit vehicles (trains, trolleys) have been in use for more than 100 years – the technology is mature
- Extended warranties on batteries are available
- Some companies offer battery leases
Charging Infrastructure

• There is a one-time startup cost to install charging infrastructure

• SDG&E is working on innovative approaches to funding, where they would install and rate-base the electrical infrastructure
Electricity Cost

• Electric power is already the cheapest bus fuel per mile
• Installing solar on or offsite could reduce costs further
• Low Carbon Fuel Standard Credits are about $9,000 per bus per year
• Charging can mostly be done when electricity rates are lowest
• Utilities are proposing favorable new tariffs for transit electrification
Get On Board the Electric Bus

• This summer, the California Air Resources Board (CARB) will be issuing a rule requiring a transition to electric buses in future years
• Many transit agencies are already running some electric buses, and more have electric buses on order
• It is time for our transit agencies, MTS and NCTD, to get on board
For More Information

• Union of Concerned Scientists Report on Electrification of Transit
  http://www.ucsusa.org/clean-vehicles/electric-vehicles/freight-electrification#.WQ3pktyVu01

• King County Wa Feasibility Report

• EBUS http://ebus.com/

• GreenPower http://www.greenpowerbus.com/

• Proterra https://www.proterra.com/