

NASA – Johnson Space Center

Clean Cities Technologies Conference

Electric Vehicle Panel



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NASA & JSC

How many EVs
does NASA have
in their fleet?



- **NASA**
 - 9 Plug-In Electric vehicles
 - 26 Hybrid Electric vehicles
 - 247 Low-speed Electric vehicles
 - 67% of vehicle fleet is Alternative Fuel capable
 - 37% Alternative Fuel used
 - 17% reduction of Agency Vehicle Inventory
 - Currently exceeding 2017 milestone for per-mile GHG emissions reduction (2016 SSPP)

- **Johnson Space Center**
 - 2 PHEVs (first on Dec. 31, 2015) out of 110 vehicles
 - Ford C-Max Energi
 - Ford Fusion
 - Additionally, 49 LSVs → 23 LSEVs (street/non-street legal)

Why did NASA invest in EVs?

Executive Order 13693

Planning for Federal Sustainability in the Next Decade



Goal 1 | Greenhouse Gases

- Reduce direct GHG emissions (onsite or offsite) by 47% and reduce indirect GHG emissions (e.g., commuting, travel) by 32% by FY 2025, compared to 2008



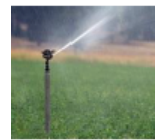
Goal 2 | Sustainable Buildings

- Reduce energy use/GSF by 2.5% annually through FY 2025, compared to FY 2015
- 1% of the agency's existing buildings above 5,000 gross square feet intended to be energy, waste, or water net-zero buildings by FY 2025
- At least 23% of buildings, or 30% of Gross Square Footage, will meet Guiding Principles by FY 2025



Goal 3 | Clean & Renewable Energy

- At least 10% of agency's total electricity consumption is from renewable energy sources, for FY 2016 and FY 2017
- At least 10% of agency's total electricity consumption and thermal energy is from clean energy sources, for FY 2016 and FY 2017



Goal 4 | Water Use

- Reduce potable intensity (gal/sq ft) by 2% annually through FY 2025, compared to 2007; reduce use for industrial, landscaping, and agricultural by 2% annually through FY 2025, compared to 2010; install appropriate green infrastructure to improve storm water and wastewater management



Goal 5 | Fleet Management

- Reduce per-mile GHG emissions by 4% by 2017, 15% by 2021, 30% by 2025, compared to 2014



Goal 6 | Sustainable Acquisition

- Ensure that environmental performance and sustainability factors are considered to the maximum extent practicable for all applicable procurements
- Award 1,100 contracts with Biopreferred and biobased criteria, with estimated value of \$1,000,000, to be delivered in FY 2016



Goal 7 | Pollution Prevention & Waste Reduction

- Divert 50% of solid waste (excluding construction and demolition debris); divert 50% of construction and demolition debris
- Reduce acquisition, use, and disposal of toxic and hazardous materials, particularly when helpful in meeting GHG reduction goals



Goal 8 | Energy Performance Contracts

- Award \$73.9M investment value in Energy Savings Performance Contracts and Utility Energy Services Contracts by the end of 2016



Goal 9 | Electronic Stewardship & Data Centers

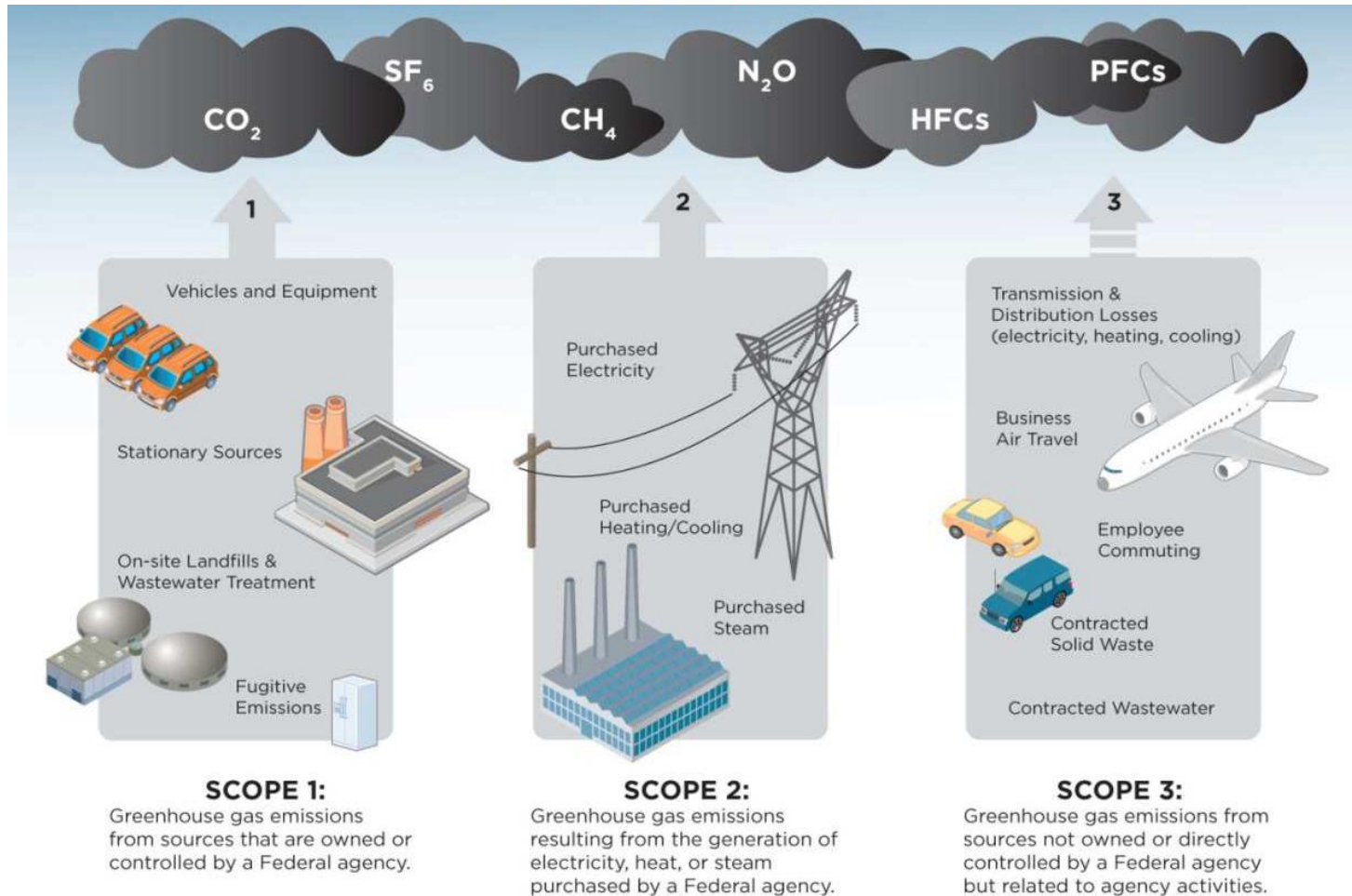
- Ensure 95% of monitors, PCs, and laptops acquired meet environmentally sustainable electronics criteria (EPEAT registered)
- Ensure 100% of computers, laptops, and monitors have power management features enabled; follow environmentally sound methods for disposal



Goal 10 | Climate Change Resilience

- Evaluate climate change risks to identify and manage the effects of climate change on the agency's operations and mission in both the short and long term

Common Sources of Federal GHG Emissions



How NASA utilizes their vehicles?



- One PHEV is a sub-pool vehicle for check-in and –out. Driver's destinations may be on-site or off-site for official Govt. meetings, training, etc.
- The other belongs to a JSC contractor on-site.

How does NASA charge EVs?



- Charged every day through pre-existing wall outlets.
- Some charging stations built; on hold for HQ guidance to charge POVs.
- Contractor vehicle plugged-in to NEMA Type 5-20R (120 volts, single phase, 60 hertz)

Promoting EVs



- Featured in [MotorWeek Clean Cities Segment](http://www.motorweek.org/features/green_motoring/clean-cities-johnson-space-center)
 - http://www.motorweek.org/features/green_motoring/clean-cities-johnson-space-center
- “Sustainability Champion” initiated pre-existing line during new construction; allows future charging station to be installed more easily
- To reduce gasoline consumption and conserve energy



Thank You

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Solar Powered Vehicles



- Multi-panel solar array
 - Fully illuminated, generate ~140 watts for up to 4 hours/sol per sol (a Martian day)
- ~100 watts to drive; equivalent to a standard light bulb in a home
- Capability reduces to ~50 watts due to anticipated dust coverage and change in season
- They drive on Mars.

Kennedy Space Center

Cape Canaveral, Fla.
On display at the NASA News
Center; Vehicle Assembly
Building in background



Photo credit: NASA/Jim Grossmann

- **“.... include compressed natural gas, bi-fuel, diesel fuel and flex fuel vehicles....”**