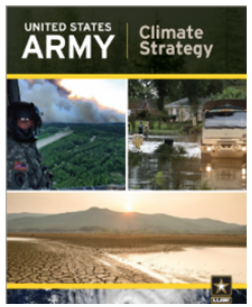
Power & Mobility (P&M)

JPO JLTV - Demand Reduction / Electrification Efforts

John Putrus, PhD

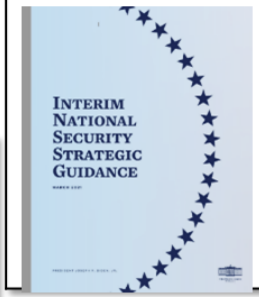
Opportunities from Army Strategies

Power & Mobility (P&M)



LOE 2 – Acquisition and Sustainment

- Field Hybrids by 2035, Full Electric 2050
- Develop Charging capability
- Revised Energy KPP
- Analyze Supply Chain for CC risk and vulnerabilities by 2025
- Develop Predicative Logistics



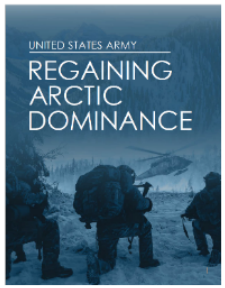
Interim NSS

- Defend against traditional and nontraditional threats
- Expand economic prosperity and opportunity
- Realize and defend democratic values

- Adaptation
- Mitigation
- Resilience

Army Data Strategy

- Accelerate data driven decisions
- Decrease time to field software
- Design Software to adapt to an unpredictable world



Army Arctic Strategy

- Contested space filled with economic resources
- Regain dominance to project power & deter conflict
- 2-Star MDO TF to train and operate in this environment

Department of Army Operational Energy Strategy (AOES)

June 2022

Army Operational Energy Strategy

- "More Fight, Less Fuel"
- Tentative Publish Date Summer 2022 followed by implementation plans
- Includes:
  - Power and Batteries
  - Power Generation
  - Vehicles

★ - Direct Role in shaping

Support of ACS LOE 2

Power & Mobility (P&M)

LINE OF EFFORT 2: ACQUISITION & LOGISTICS

STRATEGIC OUTCOME:

Increase operational capability while reducing sustainment demand and strengthening climate resilience

	INTERMEDIATE OBJECTIVES:
2.1	Modernize existing Army platforms by adding mature electrification technologies
2.2	Field purpose-built hybrid-drive tactical vehicles by 2035 and fully electric tactical vehicles by 2050
2.3	Develop the charging capability to meet the needs of fully electric tactical vehicles by 2050
2.4	Develop predictive logistics that drive more precise and faster decisions
2.5	Establish policies that standardize contingency basing to increase resilience and reduce fuel requirements
2.6	Significantly reduce operational energy and water use by 2035
2.7	Achieve carbon-pollution free contingency basing by 2050
2.8	Adopt a Buy Clean policy for procurement of construction materials with lower embodied carbon emissions
2.9	Implement a revised energy key performance parameter
2.10	Attain net-zero GHG emissions from all Army procurements by 2050
2.11	Analyze all Army supply chain Tier 1 sources and contracts for climate change risks and vulnerabilities by 2025
2.12	Develop plans, policies, and contracts to ensure Army supply chain resilience by 2028

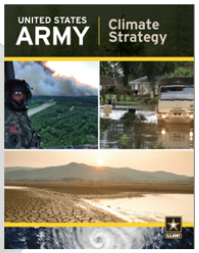
JLTV and TS | E2S2, JLTV & TS | E2S2

Tactical Vehicle Electrification

Current Requirements:
- JLTV CPD
- FMTV CPD

Emerging Requirements:
- CTT
- eLRV
- TaCV-E

- Current requirements support mild-hybrids (e.g. anti-idle)
- Emerging requirements enable greater freedom in meeting climate change/demand reduction initiatives.



Near-Term – Kits and Commercial (FY22-26)
- FMTV, HTV, HMMWV and JLTV A1 Anti-Idle kits (↑~15-20% FE)
- JLTV/HMMWV HEV Demonstrators (↑ 30% FE)
- Transmission Optimization for FMTV, HTV and JLTV (↑ ~2-5%)
- eLRV CDD and Production Contract (↑ ~30% FE)
- *HEV Decision Point for Tactical Vehicles*

Mid-Term – Hybrid Applications (FY27-FY31)
- CTT CDD and Production Contract
- *Legacy Platform Hybridization*
- *JLTV Hybrid Program*
- *Microgrid*
- *Commercial Class 2, Class 3 and Class 8 truck application*
- *Onboard Power*

Long-Term – Full Electrification (FY31-35)
- *Electric Platform Identification*
- *Charging system deployment*

Near-Term initiatives within PEO CS&CSS will be used mitigate hybrid and electric technological barriers to entry and inform future requirements.

FE – Fuel Efficiency
CTT- Common Tactical Truck
JLTV – Joint Light Tactical Vehicle
eLRV- Electric Light Reconnaissance Vehicle
TaCV-E = Tactical and Combat Vehicle Electrification
FMTV – Family of Medium Tactical Vehicles
HTV- Heavy Tactical Vehicles
HMMWV – High-Mobility Multipurpose Wheeled Vehicle
HEV – Hybrid Electric Vehicle

Climate Change Approach

Power & Mobility (P&M)

Objective: Transition reliable and cost-effective fuel reduction technologies to the light tactical fleet in support of the Army Climate Change Strategy

Approach:

- Leverage commercial technologies
- Demonstrators and STPs to inform requirements
- Identify opportunities to standardize – batteries, charging, architecture
- Retrofit kits for legacy systems as appropriate
- Limitations understood and accepted by User community
- Informed Application to Fleet as appropriate

Climate Change Strategy – Focus Areas

Power & Mobility (P&M)

Planned/Proposed/Potential Future Efforts: (F) = Funded

LOE 2.1
- JLTV A1 Anti-Idle (JPO/GVSC) (F)
- HMMWV Anti-Idle (JPO/DIU) (F partial)
- A2 Anti-Idle (Contract incentive)
- HMMWV HEVs (RCCTO) (F - prototype)
- JLTV HEVs (RCCTO) (F – prototype)
- MTV/HTV Anti-Idle (F)
- MTV OBVP (TIG) / MTV OBVP Hybrid (Advanced Propulsion) (F)
- HTV OBVP (TIG) / HTV OBVP Hybrid (Advanced Propulsion) (F)

LOE 2.2
- eLRV (PL GMV) (UFR/POM 24)
- Plasan ATeMM (GVSC CRADA)
- Electric M915 (Market Research) (F)
- Common Tactical Truck

LOE 2.3
- Forward Area Charging
- eLRV Charging (PL GMV)
- Novel Engine APUs
- MTV OBVP (TIG) (F)
- HTV OBVP (TIG) (F)

LOE 2.4
- Predictive Logistics (PL) – JLTV/MTV/PLS/HEMTT (POM 24)
- PL Central Monitoring and control / efficiency improvements
- A2 NGVA (JPO) (Contract)
- CTT and HDT (Contract)

LOE 2.6
- JLTV A2 OTM fuel Reduction (JPO)
- Force Provider Enhancements
- Fuel Sense 2.0 (JLTV/FMTV/HTV) (F)

LOE 2.10
- Improved refrigerants

LOE 2.11
- SCRM (JPO)
- SCRM PM TS

LINE OF EFFORT 2: ACQUISITION & LOGISTICS

STRATEGIC OUTCOME:

Increase operational capability while reducing sustainment demand and strengthening climate resilience

INTERMEDIATE OBJECTIVES:

2.1	Modernize existing Army platforms by adding mature electrification technologies
2.2	Field purpose-built hybrid-drive tactical vehicles by 2035 and fully electric tactical vehicles by 2050
2.3	Develop the charging capability to meet the needs of fully electric tactical vehicles by 2050
2.4	Develop predictive logistics that drive more precise and faster decisions
2.5	Establish policies that standardize contingency basing to increase resilience and reduce fuel requirements
2.6	Significantly reduce operational energy and water use by 2035
2.7	Achieve carbon-pollution free contingency basing by 2050
2.8	Adopt a Buy Clean policy for procurement of construction materials with lower embodied carbon emissions
2.9	Implement a revised energy key performance parameter
2.10	Attain net-zero GHG emissions from all Army procurements by 2050
2.11	Analyze all Army supply chain Tier 1 sources and contracts for climate change risks and vulnerabilities by 2025
2.12	Develop plans, policies, and contracts to ensure Army supply chain resilience by 2028

JPO Anticipated Challenges

Power & Mobility (P&M)

- Hardening commercial technology for military applications (e-machine, power electronics, energy storage systems)
- Electric drive performance over OMS/MP (watt-hour/mile & automotive perf.)
- Energy storage impact on survivability – thermal management
- Energy storage impact on payload and packaging
- Duty cycle assumptions and impact to ROI
- Reliability impact of more complex systems (e.g. anti-idle and parallel hybrid)
- Risk associated with accelerated timelines to fully mature systems – reliability, safety, performance
- Maintenance of high voltage and software intensive systems
- Charging infrastructure required for battery dominant solutions
- Naval certifications for emerging energy storage systems
- Cost-benefit to be determined based on testing and mission uses