Status of Gateway Power and Propulsion Element (PPE)

NASA ADVISORY COUNCIL

Human Exploration and Operations Committee

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07 December 2018
Approach to Power and Propulsion Element Development

- PPE leverages advanced solar electric propulsion (SEP) technology development and demonstration formulation:
  - First Gateway element capability targeted for launch readiness in 2022
  - Leverage with U.S. industry current capabilities and future plans for future use of SEP
  - Developed through public-private partnership
  - Spaceflight demonstration of advanced solar electric propulsion spacecraft for industry and NASA objectives
  - Also provides for communications, and transportation, controls, power to future Gateway elements
PPE Solicitation Update

• Broad Agency Announcement for PPE released; proposals were due on November 15 (note, we are in blackout)
• Followed RFI, studies with 5 companies solicited through BAA, sources sought, draft solicitation release & industry comment. Worked very closely with industry throughout to address their written comments and questions.
• PPE development and demonstration through research and development partnership with industry
• Partner will own PPE through up to 1 year spaceflight demonstration
• Includes contract option to acquire residual asset (PPE) for NASA use, after demonstration completion
• More than one industry partner may be selected.
• NASA and its PPE partner(s) will begin upon contract award, which is targeted for March 2019 (TBD).
• Launch date September 2022, followed by demonstration up to one year
• Partnership concludes 24 months after successful spaceflight demonstration if all options are executed.
PPE NASA-Unique Spaceflight Demonstration Objectives

• Demonstrate high-power, 50kW-class solar array and electric propulsion technology in relevant space environments
• Demonstrate continuous long-term electric propulsion operation sufficient to predict the xenon throughput capability and lifetime of high power systems
• Demonstrate the deployment and successful long-term, deep-space operation of high power solar array systems with applicability to future higher power missions
• Characterize in space operation of a next generation electric propulsion string
• Demonstrate integrated SEP end-to-end system performance in relevant space environments
• Observe and characterize performance of integral high-power SEP system including thrusters, arrays, bus, and payloads as they operate as an integrated system and as they respond to the natural and induced in-space environments
• Demonstrate extended autonomous high-power SEP operations in deep space
• Demonstrate a high data throughput uplink and downlink communication system
• Demonstrate PPE insertion into a crew-accessible Near Rectilinear Halo Orbit (NRHO)
• Obtain design, development, and flight demonstration data to determine acceptability of the PPE for the Gateway
Gateway Milestones: PPE Highlights

☑️ September 6: PPE Final Solicitation Released
☑️ September 9: Schedule Technical Interchange Meeting (TIM) with International Partners
☑️ September 10-14: Formulation Sync Review (FSR) Kickoff
☑️ October 2 – 5: International Habitat Technical Interchange Meeting (TIM) @ ESTEC
☑️ October 4: FSR Requests for Action due
☑️ October: European Space Agency/European System Providing Refueling Infrastructure and Telecommunications (ESPRIT) Virtual TIM
☑️ October 23: Logistics Services Sources Sought Notice Issued
☑️ December 17: Habitation Element and Logistics Element Procurement Strategy Meetings

Looking Ahead
• Gateway program transition from formulation to center program management
• PPE Selection(s) – March 2019
• Science/Utilization Workshop – Spring 2019
• Gateway U.S. Logistics and U.S. Habitation solicitations – Spring/Summer 2019
Recent examples of PPE efforts supporting Gateway

EXAMPLES:
- PPE presented initial refueling concept of operations analysis results at the TIM with Gateway and European Space Agency/European System Providing Refueling Infrastructure and Telecommunications (ESPRIT)
- PPE is supporting Gateway FSR activities and closure plans
- PPE supported NASA Docking System (NDS) Block 2 System Requirements Review (SRR)
Gateway in the Near Rectilinear Halo Orbit (NRHO)
PPE Milestones & Events the Past Quarter

- Final BAA released for Spaceflight Demonstration of a PPE  
  Sept 6, 2018
- PPE participation in ISS/Gateway schedule Technical Interchange Meeting (TIM) with international partners  
  Sept 9, 2018
- Gateway Formulation Sync Review (FSR) Kickoff  
  Sept 10-14, 2018
- AIAA Space Forum panel participation*  
  Sept 18, 2018
- International Astronautical Congress 2018 PPE status presentation*  
  Oct 1, 2018
- PPE participation in Gateway/ESPRIT/PPE Virtual TIM with international partners  
  Oct 16, 2018
- PPE Leadership Retreat, Plum Brook Station  
  Oct 24-25, 2018
- Proposals to Final PPE Solicitation due  
  Nov 15, 2018
- NASA Day on the Hill*  
  December 4, 2018
  - PPE partnership contract selection(s)  
    March 2019 (TBD)
  - IEEE Aerospace Conference PPE studies presentation*  
    March 2-9, 2019

*External events