GETTING TO AN ENHANCED MMRTG. D. F. Woerner[1], D. Cairns-Gallimore[2], J. Zakrajsek[3], T. O'Malley[4], [1]Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA, 91109, david.f.woerner@jpl.nasa.gov, [2]U.S. Dept. of Energy, NE-75, 19901 Germantown Rd, Germantown, MD, 20874, dirk.cairns-gallimore@nuclear.energy.gov, [3,4]NASA Glenn Research Center, 21000 Brookpark Road Cleveland, OH, 44135, [3]june.f.zakrajsek@nasa.gov, [4]tfomalley@nasa.gov.

Introduction: NASA flies fewer missions that use Radioisotpe Power Systems (RPS) today than at the introduction of RPS more than five decades ago, and even more concerning, the RPS built over the last 3-4 decades were designed and built in an episodic manner. These two factors have resulted in loss of talent within the RPS community and diminished innovation. Episodic RPS redevelopment costs are also very high in comparison to an investment to simply preserve and sustain some of the key companies, engineers, and talent within the RPS community.

NASA and the U.S. Department Of Energy (DOE) have flown three different Radioisotope Thermoelectric Generators (RTGs) in the last 35+ years. Manufacturing of MHW-RTGs was discontinued after the twin Voyagers were launched in 1977, and the entire manufacturing capability was dismantled and disbursed. All the staff were let go. The sunk cost at the time of shuttering the plant was significant, on the order of $80M in 1980 dollars.

The subsequent Galileo mission to Jupiter required the DOE to re-establish manufacturing capabilities to produce a space qualified RTG for deep space missions. This new capability led to the GPHS-RTG. Then GPHS-RTG manufacturing was discontinued after Cassini's launch to Saturn in 1997. Again, the entire manufacturing capability was dismantled and disbursed. All the staff were let go. The sunk cost at the time of shuttering the plant was significant, on the order of $100M in 2003 dollars.

The Mars Science Laboratory project required the development of a space qualified Multi-Mission RTG (MMRTG) capable of meeting deep space and planetary surface operation requirements. MMRTG capabilities would have been lost in the last year without the implementation of the program described in this talk. The sunk cost of shuttering this plant would have been significant, of order $175M just for the generators for MSL in 2012 dollars.

NASA and DOE have developed a plan to end this episodic RTG redevelopment cycle for the foreseeable future. MMRTG production will be preserved—a significant achievement in itself—and this comes with the potential for an enhanced MMRTG, or eMMRTG, and even more advanced RTGs. In short, NASA is sustaining an industrial partner's manufacturing capability and funding design studies for an eMMRTG and Advanced RTG to preserve key engineering and manufacturing talent for future mission needs while preserving the capability to produce more MMRTGs. This paves the way for the DOE to complete a flight system development of a generator or the MMRTG for missions launching in the next decade.

This critical partnership is being formed between researchers, industry and the government to bring stability to the nation's capability to provide radioisotope power for space exploration. None of these partners can operate independently. The goal of the partnership is to ensure a continuing capability, inject innovation, and maintain the high safety standard necessary to conduct nuclear missions.

Each partner has specific expertise that was taken into consideration as the plan has developed. Mission users, both NASA and private industry, need a reliable power supply that is predictable for longer duration exploration. Researchers and industrial partners need ways to provide innovation to prevent stagnation and attract new talent, and the DOE needs to be able to ensure that any system meets safety criteria and that it can be manufactured and fueled.

This talk elaborates on the history that lead to this plan, the plan itself, the results and status to date, and planned actions for the coming years.