CRISIS MANAGEMENT: US GOVERNMENT RESPONSE TO THE ^{3}HE SHORTAGE

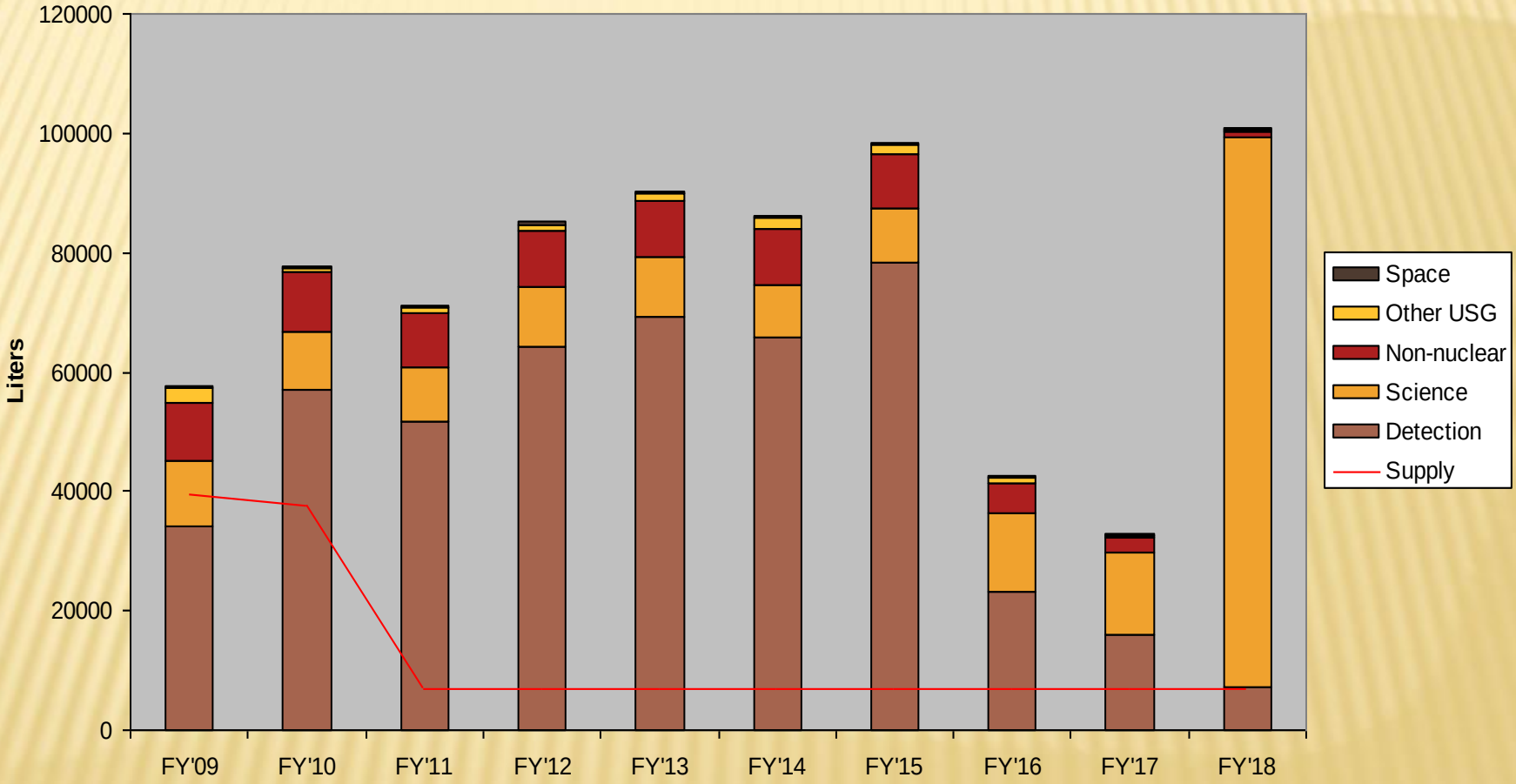
Critical Materials Flow in an Age of Constraints

May 25, 2011

^{3}HE CONTEXT

- ^{3}He is used in many areas:
  - Portal monitors and portable search systems for national security applications
  - Neutron scattering experiments
  - Reactor instrumentation and safeguards measurements
  - Oil and gas exploration
  - Cryogenics
  - Medical imaging
- ^{3}He supplies are diminishing while demands are increasing
- Fairly aggressive USG allocation actions taken, but not a long-term solution

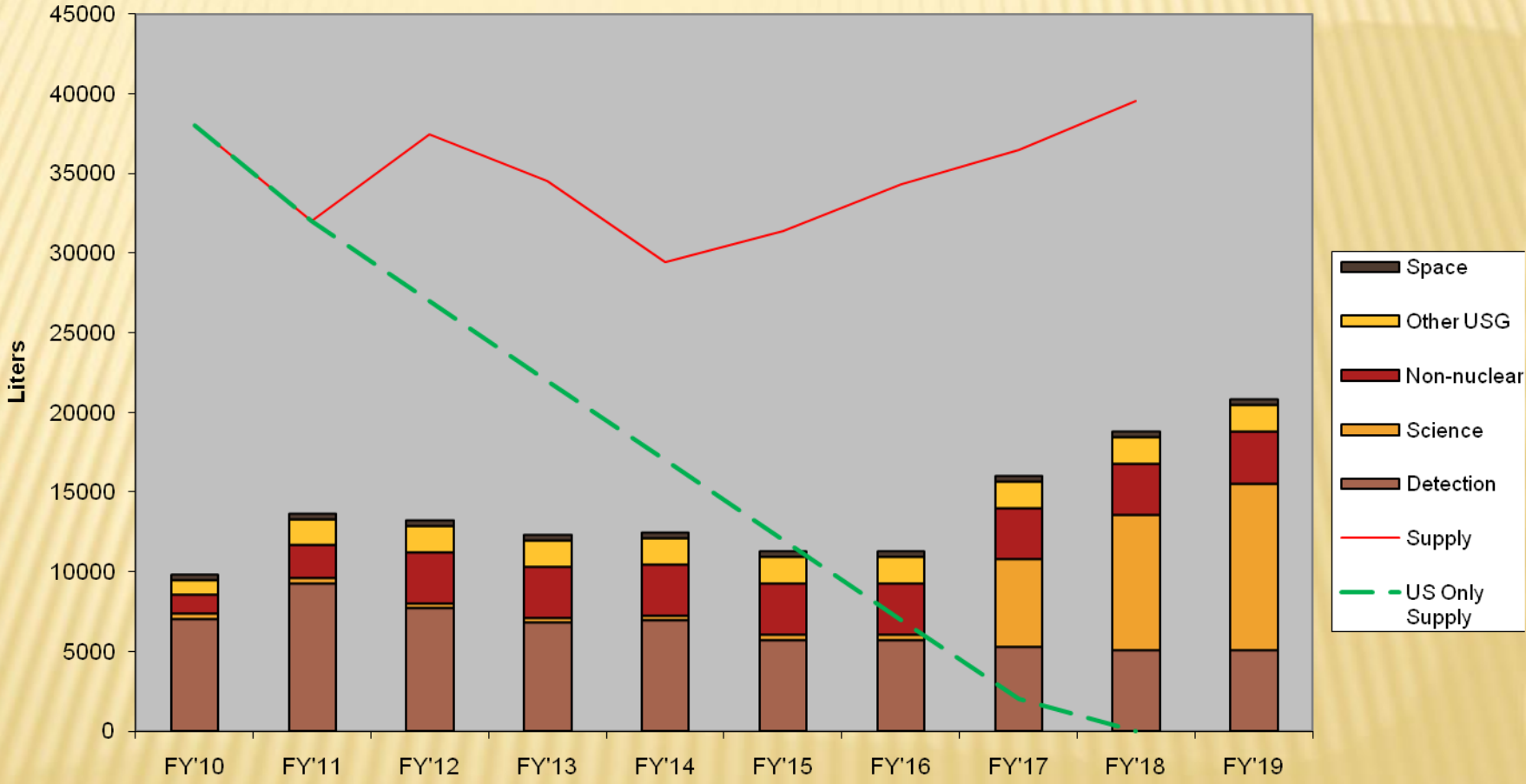
THE PROBLEM:
PROJECTED US SUPPLY AND DEMAND (2009)



THE U.S. STRATEGY

- Decrease Demand
  - Understanding of enduring needs/market needs
  - Conservation
  - Alternative Technologies
- Increase Supply
  - commercial heavy-water nuclear reactors
  - extraction of ^{3}He from natural gas
  - International outreach
- Optimally allocate existing supplies

PROJECTED US SUPPLY AND DEMAND (2011)



DECREASE DEMAND

Conservation

- User needs in the short and long term
- Many users have recalculated their needs and have come back with alternative strategies that have brought the demand down by **orders of magnitude.**

DECREASE DEMAND

Alternative technologies

- Approximately 30 research projects underway across the USG
- Two Test Campaigns conducted to encourage industry, release technical specifications, gage progress, and provide vendor feedback
  - Oct 09 – Near term commercial products tested
  - Oct 10 – Government Sponsored Detectors tested
- GE commercialized a boron lined technology for portal monitors with demonstrated 3He equivalent detection performance
- DHS' Request for Proposals (RFP): will procure and independently validate up to five different technologies for portals with the results in early FY12

DECREASE DEMAND

International Cooperation

- Major international neutron scattering facilities collaborating on development of neutron detectors that do not rely on ^{3}He
- The U.S. Government is working with the International Atomic Energy Agency (IAEA) to promote the use of alternatives to ^{3}He detectors in safeguards applications.
- A technical conference was held in March 2011 at the IAEA to review current efforts and promote continued cooperation amongst suppliers of safeguards equipment.

INCREASE SUPPLY

Exploring Foreign Supplies and Inventories

- The USG initiated a vigorous campaign with the international community to inform them of the worldwide shortage. Countries that have potential ^{3}He resources have shown interest in partnering with the U.S. or are investigating developing their own internal capabilities.
- Potential sources of ^{3}He include tritium produced as a byproduct in commercial heavy-water nuclear reactors and extraction of naturally occurring ^{3}He from natural gas.
- Until recently, the ready supply of ^{3}He from the nuclear weapons program meant that these alternative sources were not considered economic. With the current shortage, those economics have changed.

RECYCLING

- The National Nuclear Security Administration Emergency Responder community has committed to provide up to 15% of their own demand through recycling.
  - Under their recycling program, enough additional gas has been located that will provide 50% of their FY11 requirements.
- The National Institute of Health received a proposal that will recover ^{3}He to an extent of 91% from medical imaging (human and animal research) and purify by cryogenic distillation

OPTIMALLY ALLOCATE EXISTING SUPPLIES

- The interagency committee has determined that all users need a vehicle by which their demand is vetted through the ^{3}He Sub-IPC.
- To date, the federal program funding agency serves as the "champion" for the ^{3}He user. The funding agency defends the users' interests at Sub-IPC meetings to ensure users receive the ^{3}He necessary to fulfill agency missions.
- All efforts are guaranteed a champion, even if the effort is international or not federally funded. The international efforts are championed by State and non-federal requests are championed by the DOE – Office of Science Program.

CHAMPIONS

- DOE Science (Office of Science)
- DOE NNSA
- DHS
- DoD
- DOC/NIST
- DHHS/NIH
- DOS
- ODNI
- Non-USG sponsored Domestic Research
- Roads (acting)
- Oil and Gas
- NSF
- NASA

QUESTIONS?