VCDNP Webinar – Nuclear Technology for Research and Sustainable Development: The Benefits of Accelerator And X-ray Technologies
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How Electron Beam and X-ray Technologies can Improve Food Security and Economic Development

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eBeam Technology for Cleaning, Healing, Feeding, and Shaping this World and Beyond…

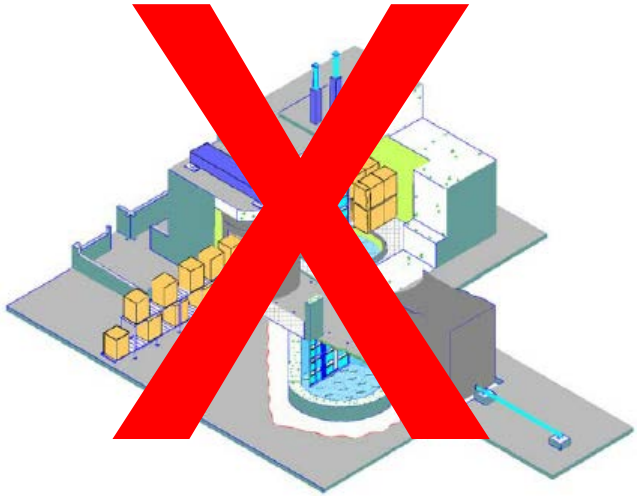
an International Atomic Energy Agency Collaborating Center for Electron Beam Technology

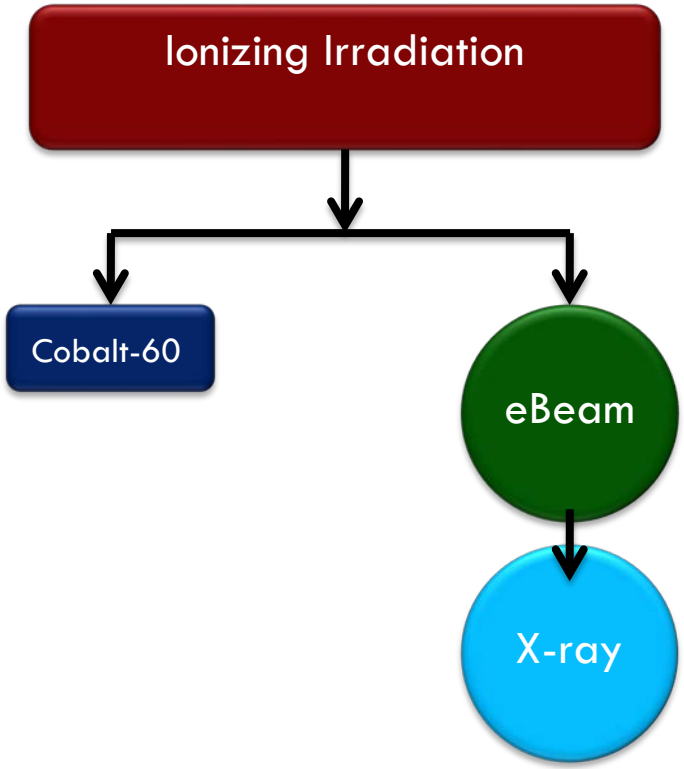
Reality on the Ground

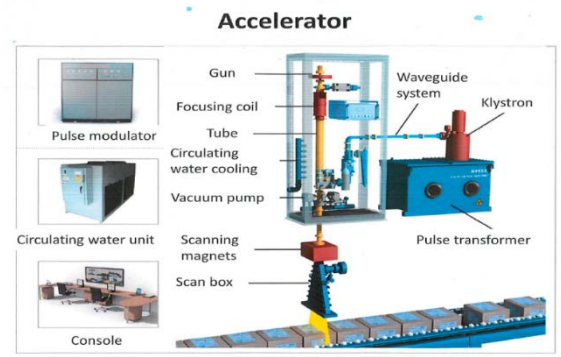
- Food safety, food security, quarantine issues, and food defense are shaping national priorities worldwide
- Global sourcing of ingredients and foods makes adoption of food security and food defense technologies almost a necessity
- Climate change requires new thinking on global food security
- Cobalt-60, electron beam (eBeam) and X-ray technologies are the only proven non-thermal, chemical-free technologies that countries have to address food security, food safety, and food security

Ionizing Irradiation Technologies

- Isotope based radiation
  - Gamma radiation (cobalt-60 and cesium-137)





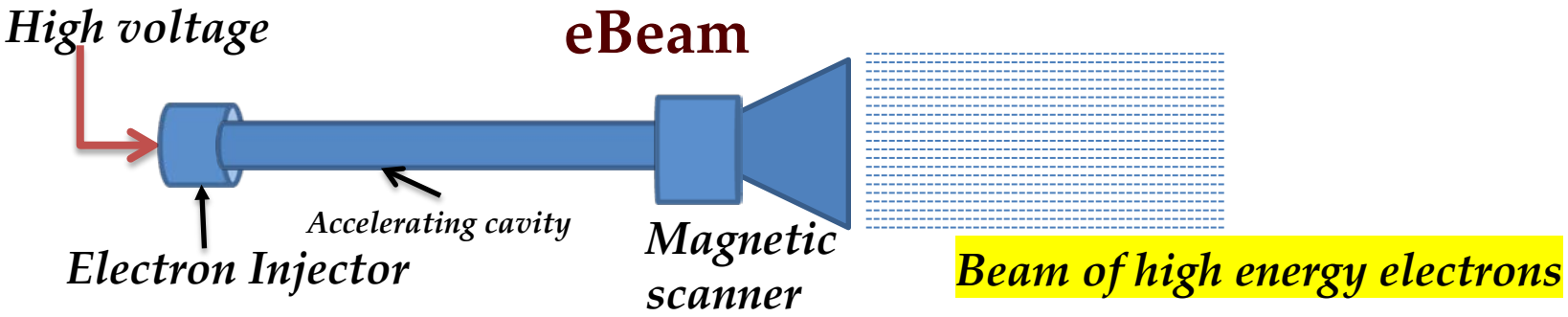


Machine generated (linear accelerators)

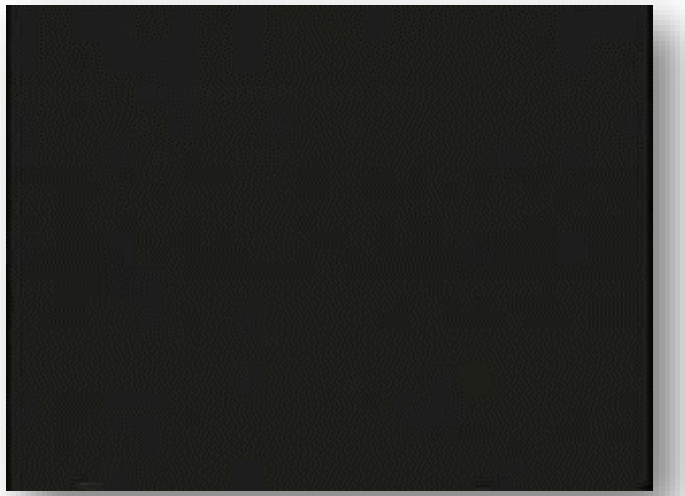
Electron Beam (eBeam): electrons

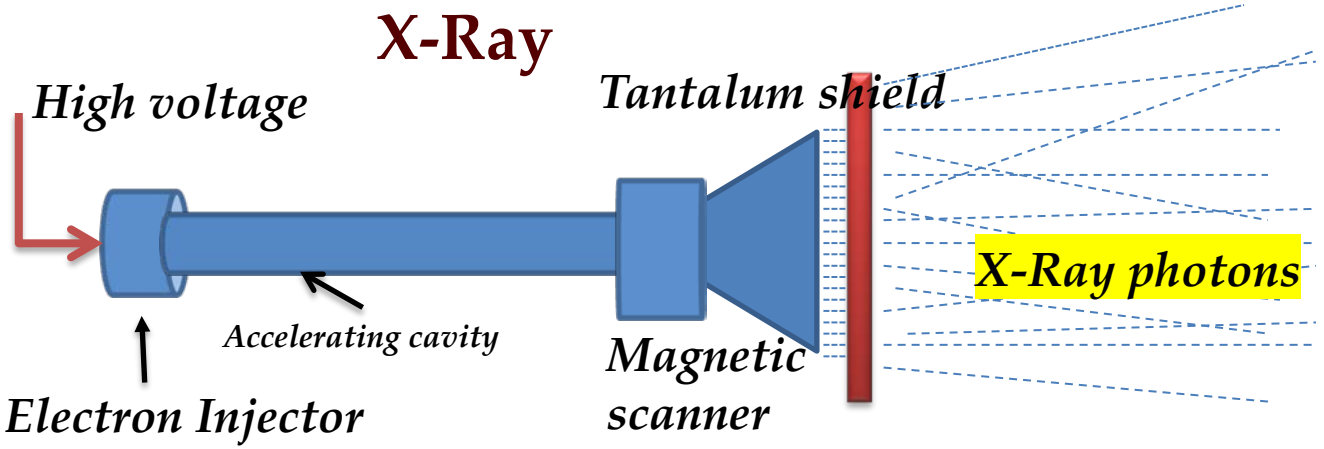
X-ray: photons

Alternative Technologies (eBeam and X-ray technologies)



Energy: Penetration capability
Dose : Grays (Gy) or Kilograys (kGy)
Dose rate : Grays per unit time





Alternative Technology Applications in Food Security

- Plant mutation breeding
- Surface sterilization of seeds
- Soil treatment as seed dressing

- Sterile Insect Technology
- Animal and Poultry Vaccines
- Water Reuse

- Storage pest control
- Long-term storage of grains and cereals
- Improved bioplastics for packaging

- Elimination of food borne pathogens
- Increasing shelf life of food by eliminating spoilage organisms
- Elimination of insects and pests (phytosanitation)

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Texas A&M AgriLife Research

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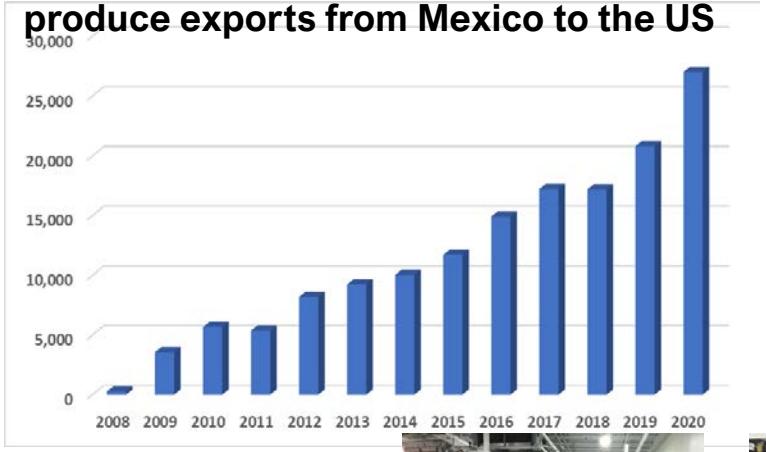
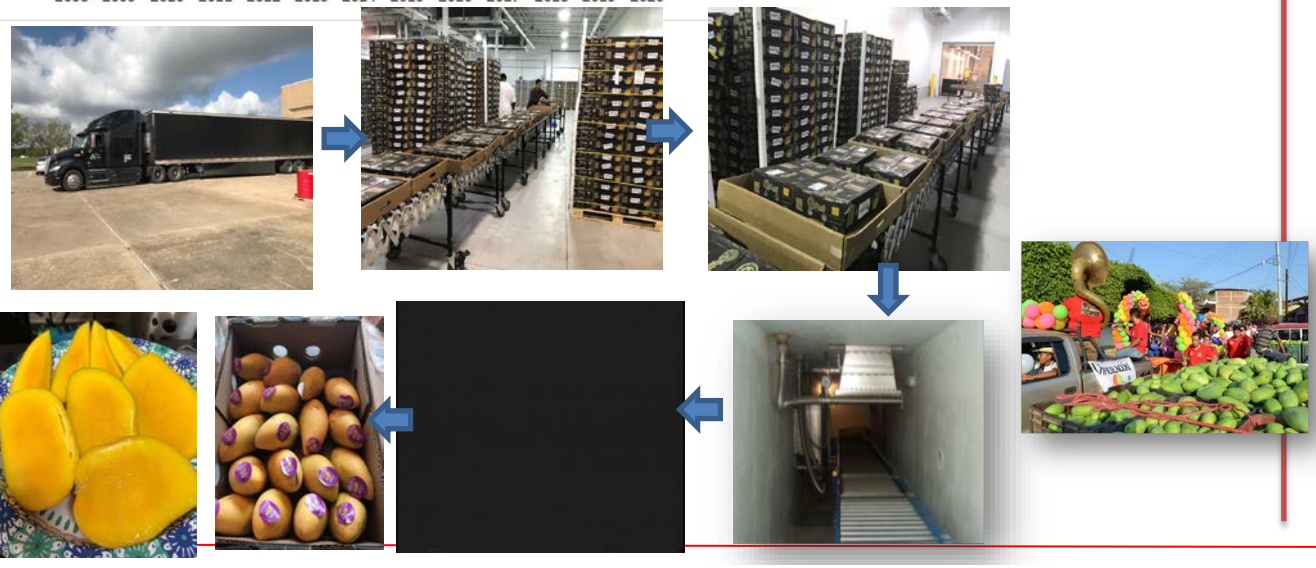
eBeam Technology for Phytosanitary Treatment of Fresh Agricultural Produce
(Case Study - Mexico & Pakistan)

Growth trends in ionizing technology processed fresh produce exports from Mexico to the US



efoods IMPORTS

e-AGRO INDUSTRIAL



Increasing mango exports from Pakistan to the United States

- Karachi → Dubai → Houston → Texas A&M eBeam facility

~ 30-40 hours

Mexican mangoes: ~ 3,500,000 lbs of Mexican mangoes treated in 3 months

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Impact of Adoption of eBeam Technologies (~ $12 million investments per facility)

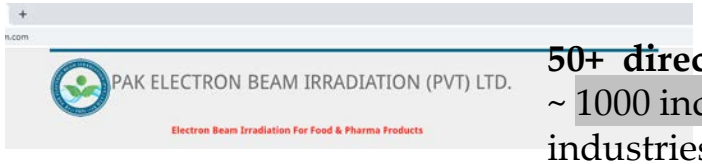
- **Avantti MediClear – Tijuana, Baja California, Mexico**

~ **45 direct new high paying jobs (3 shifts/day)**
~ 1000 indirect jobs in supporting industries e.g., logistics, catering, manufacturing,

- **e-Agro Industrial – Aguascalientes, Aguascalientes, Mexico (*under construction)***

~ 60-70 **direct new high paying jobs (3 shifts/day)**
Between 1000-2000 indirect jobs in supporting industries e.g., logistics, manufacturing, packaging, catering,

- **PAK Electron Beam Irradiation (Pvt) Ltd. – Karachi, Pakistan**

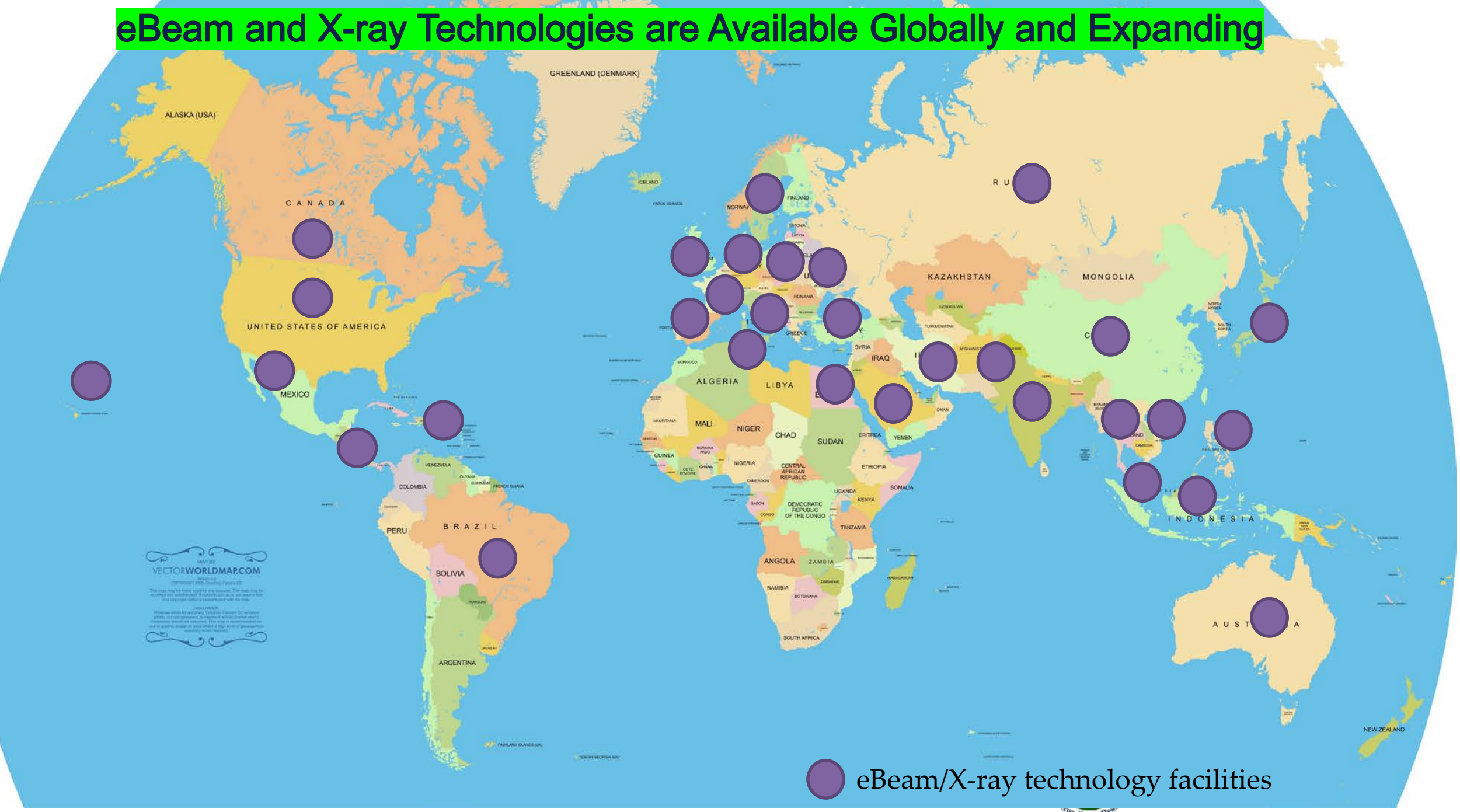


50+ direct new jobs (3 shifts/day)
~ 1000 indirect jobs in supporting industries e.g., logistics, catering, manufacturing, 0

- **Spices, medical supplies, food ingredients**

- **Another new eBeam facility under construction in Lahore**

eBeam and X-ray Technologies are Available Globally and Expanding



eBeam/X-ray technology facilities

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http://ebeam-tamu.org