Ongoing materials research in the DOE-ARM program is focused in four main areas:

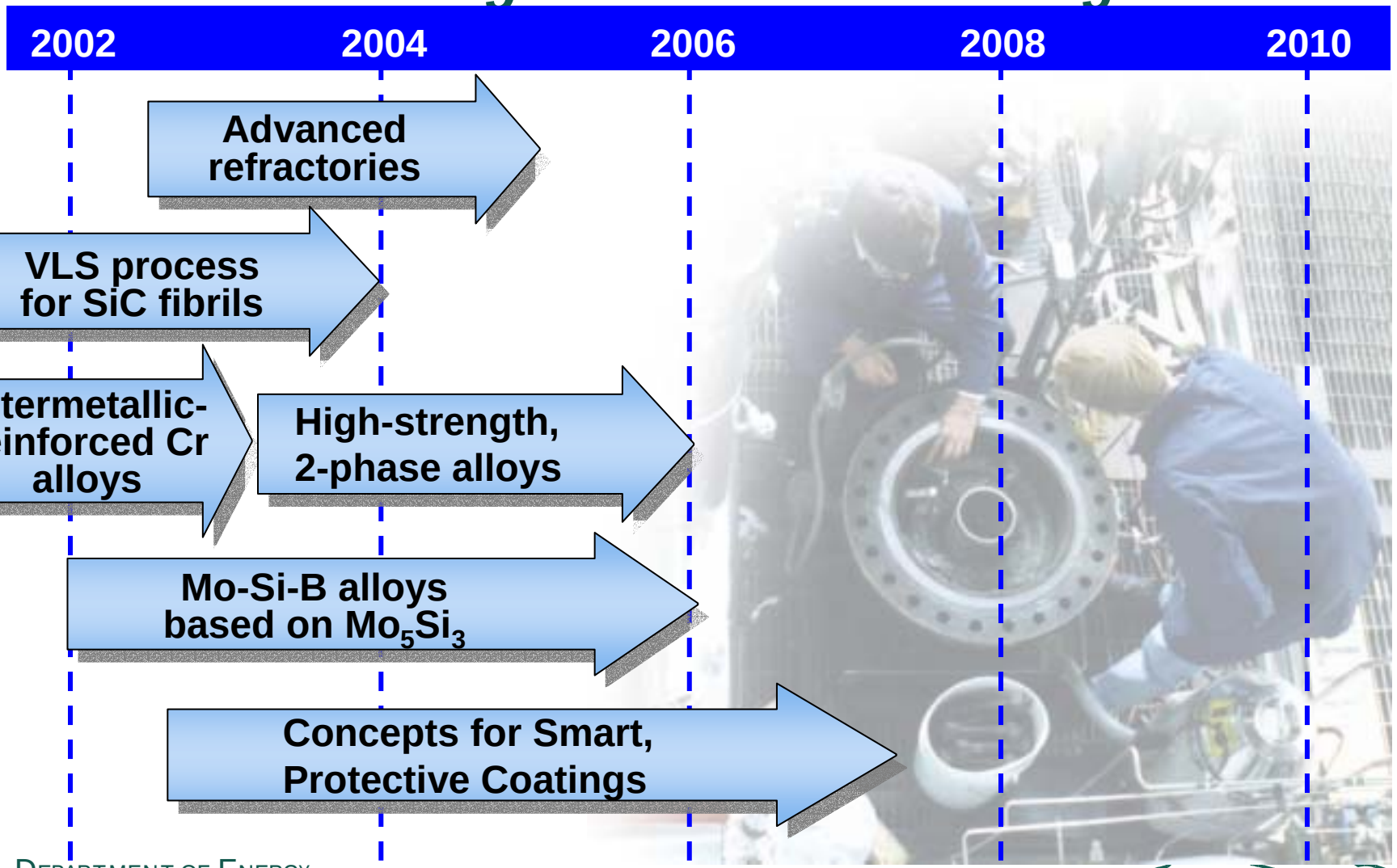
- **Functional materials**
  - alloys & ceramics for gas filtration and separation; fuel cells; catalysts
- **New alloys**
  - extend high-temperature strength & environmental resistance of alloys for specific components
  - materials for increased steam cycle efficiency
- **Coatings**
  - corrosion protection for underlying structural components
- **Breakthrough materials technologies**
  - alloys & ceramics for severe service
  - ultra-high performance materials: future directions

DOE-ARM Portfolio of Projects
Breakthrough Materials Technologies

Participant	*Project*
ARC	Refractories for gasifiers
ReMaxCo	Production of SiC fibrils
ANL	NDE for ceramics
ORNL	Multi-phase high-temperature alloys
U. Tennessee	Fatigue and fracture in intermetallics
WVU	Fracture of intermetallic alloys
ORNL	Functional surfaces/controlled oxidation
Ames Lab	Mo-Si alloys
ORNL	Mo-Si alloys
ORNL	Concepts for smart protective coatings

Timeline

Breakthrough Materials Technologies



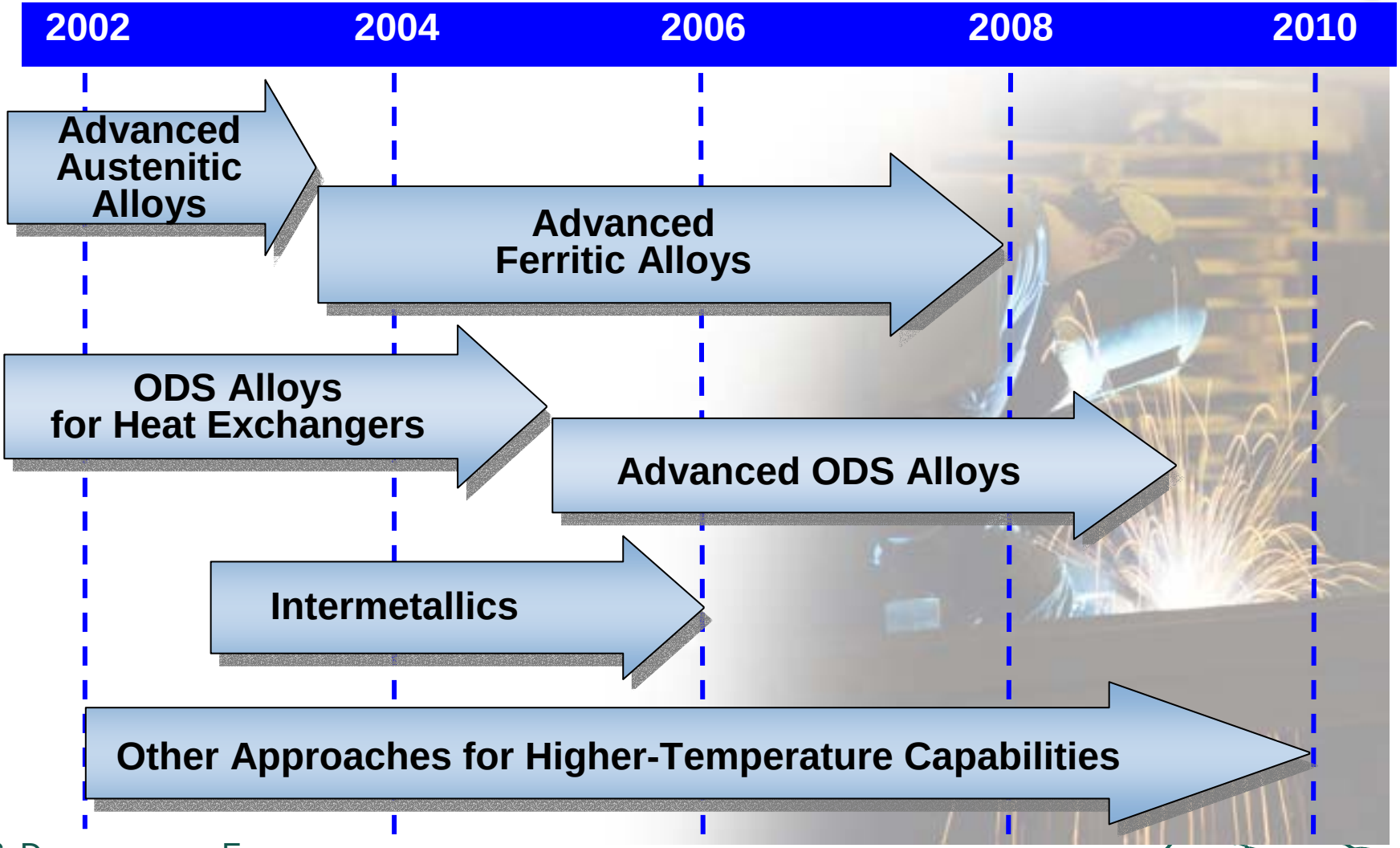
Major HT Materials Needs for Power Generation Applications

- Turbines
  - Combustors: >3000°F (ODS alloys; CMCs)
  - Combustion turbines: >2700°F RIT (SC airfoils; TBCs; next generation materials)
  - Steam turbines: >1400°F; ZEST≈3200°F
  - VHTR turbines: He at 1832°F
- Piping, Heat Exchangers
  - USC steam cycles: >1150°F (ferritic steels?)
    >1400°F (Ni-base alloys >15 ksi/100,000h)
  - V21 applications: >1650°F (ODS alloys; ceramics; where next?)
- Sensors
  - Flames/high heat flux applications: need breakthroughs
  - Molten slags; molten salts

DOE-ARM Portfolio of Projects
New Alloys

Participant	*Project*
ORNL	High creep-strength alloys
Colorado SOM	Weldability for advanced alloys
Special Metals	ODS heat exchanger tubes
ORNL	ODS alloy development
UC San Diego	ODS alloy processing optimization
U. of Liverpool	Defect reduction in ODS processing
Foster Wheeler	Field testing of adv. austenitic alloys
B&W Research	In-plant corrosion probe tests

Timeline
New Alloys



DOE-ARM Portfolio of Projects
Functional Materials

Participant	*Project*
Ames Lab	Metallic filters
LANL	H_2-separation Pd membranes
Sandia	H_2-separation membranes
ETTP	Inorganic membranes
Eltron Research	Proton-conducting membranes
ORNL	Proton-conducting membranes
ORNL	Sintering of thin, supported films
PNNL	Solid oxide seals
ORNL	Activated carbon composites

DOE-ARM Portfolio of Projects
Coatings and Protection of Materials

Participant	*Project*
Lehigh U.	Iron aluminide weld overlays
Tennessee Tech	Aluminide coatings for power generation
INEEL	Coating microstructure and properties
ORNL	Slurry-based mullite coatings
ORNL	CVD zirconia coatings
U. of Louisville	Modeling CVD zirconia coatings
ANL	Fireside corrosion studies
NETL	Materials testing in combustors
UNDEERC	Materials testing in gasifiers