

# Oak Ridge National Laboratory

**University Programs -- Nuclear Engineering Education**

**“Where We Were ... Where We Are ... Where We’re Going”**



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July 22, 2004





# University Reactor Infrastructure and Education The Year 1996 – Where We Were Assistance Program

## FY 1996 Versus FY 2002-FY 2004 Budgets

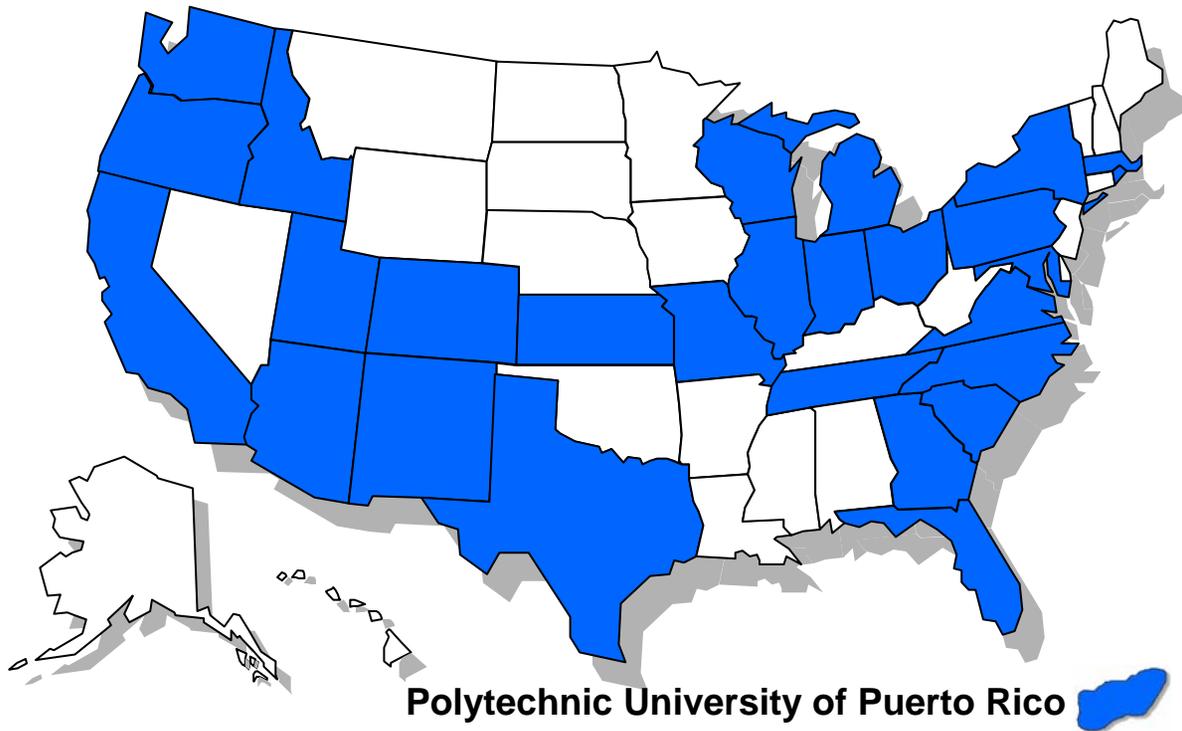
(\$ in Millions)

	FY 1996	FY 2002	FY 2003	FY 2004* Approp.	FY 2005 Request
Fuel for Reactors	\$ 2.2**				
Matching Grants (17 awards)	0.8	0.8	0.8	0.8	1.0
Fellowships/Scholarships (Includes Minority Awards)	(1.0)	1.2	1.2	1.2	2.0
Reactor Sharing	0.5**				
<b>TOTAL</b>	<b>\$ 3.5</b>	<b>9.8</b>	<b>\$ 10.5</b>	<b>\$ 15.2</b>	<b>12.2</b>
University Nuclear Infrastructure	--	5.0	4.3	5.0	4.9
Nuclear Engineering Education Research	--	--	--	--	0.2
Fellowships/Scholarships - HP	--	0.3	0.3	0.3	0.3
Radiochemistry	--	0.4	0.4	0.4	0.4
Nuclear Engineering Education Opportunities	--				
<b>TOTAL</b>	<b>\$ 3.5</b>	<b>\$17.5</b>	<b>\$17.5</b>	<b>\$22.9</b>	<b>\$21.0</b>

\*Reflects general reduction and RW transfer

\*\*Contained in University Nuclear Infrastructure in FY 2002-2005

**States  
With  
Participating  
Universities**



**Program Participants**

**Polytechnic University of Puerto Rico**

Clemson University  
 Colorado State University  
 Georgia Institute of Technology  
 Howard University\*  
 Idaho State University  
 Kansas State University  
 Massachusetts Institute of Technology  
 Morgan State University\*  
 New Mexico State University\*\*  
 North Carolina State University  
 Ohio State University  
 Oregon State University  
 Pennsylvania State University

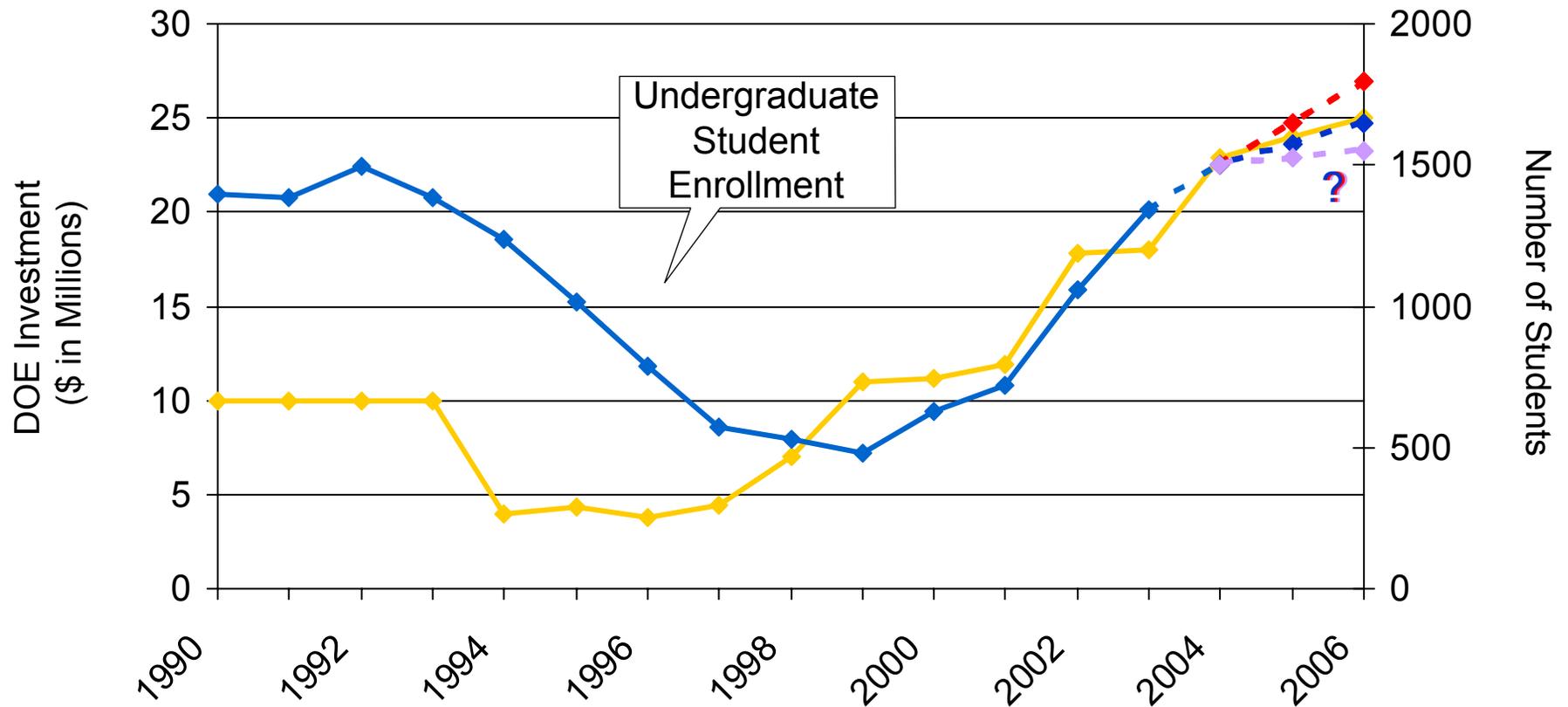
Prairie View A&M University\*  
 Purdue University  
 Reed College  
 Rensselaer Polytechnic Institute  
 Rhode Island Nuclear Science Center  
 South Carolina State University\*  
 Texas A&M University  
 Texas A&M Kingsville\*\*  
 Tuskegee Institute\*  
 University of Arizona  
 University of California-Berkeley  
 University of Cincinnati  
 University of Florida  
 University of Illinois

University of Maryland  
 University of Massachusetts-Lowell  
 University of Michigan  
 University of Missouri-Columbia  
 University of Missouri-Rolla  
 University of New Mexico\*\*  
 University of South Carolina  
 University of Tennessee  
 University of Texas  
 University of Utah  
 University of Virginia  
 University of Wisconsin  
 Washington State University  
 Worcester Polytechnic Institute

*\*U.S. Historically Black Colleges and Universities; \*\*Hispanic Serving Institution*



# Trends In Enrollments





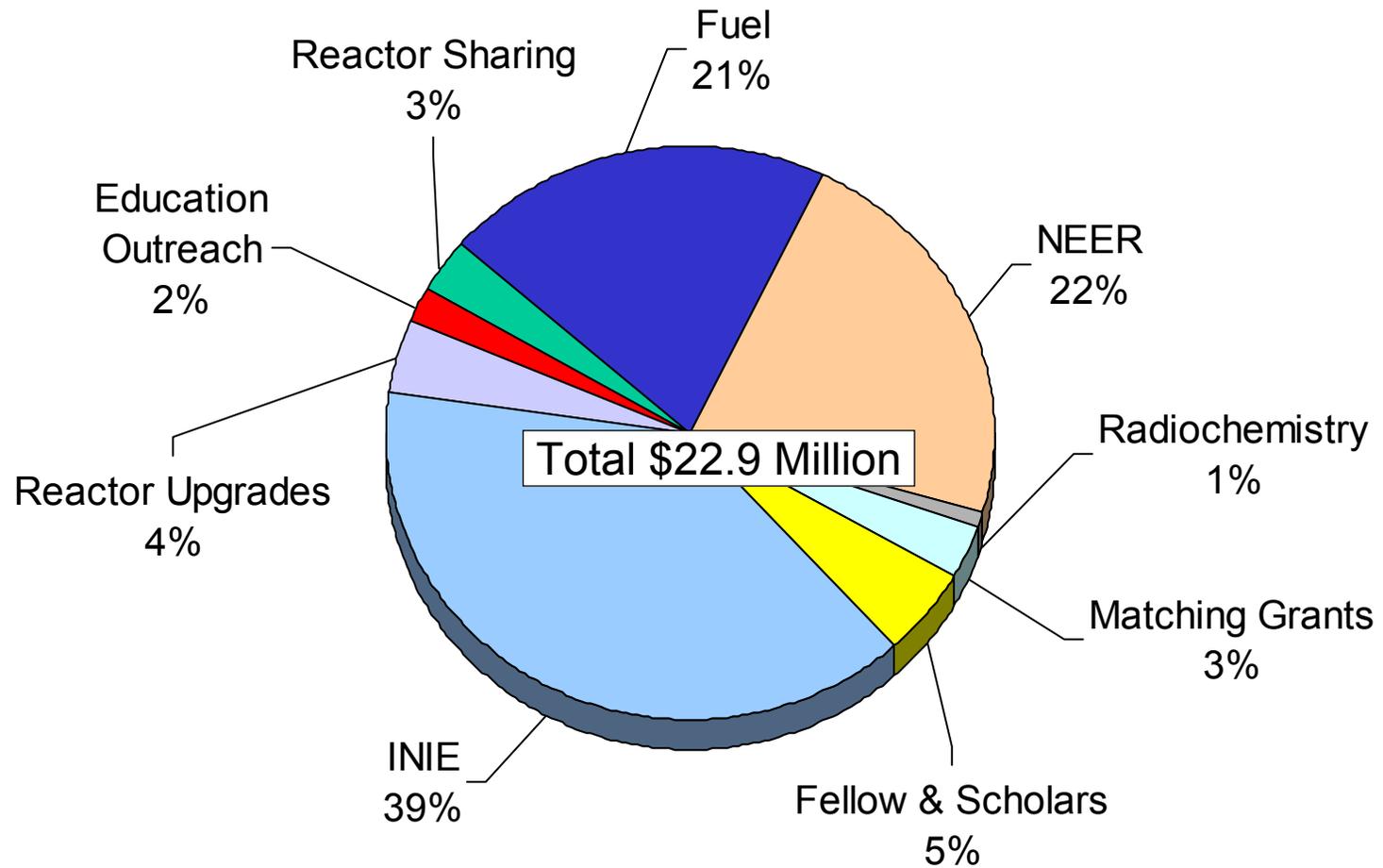
## The Year . . . 2004 – Where We Are

### NE Programs still include:

- ◆ Fuel for reactors
- ◆ Matching grants
- ◆ Fellows and scholars
- ◆ Reactor sharing



# University Programs FY 2004





## We've Expanded . . .

- ◆ **Supporting 6 Innovations in Nuclear Infrastructure and Education (INIE) Consortia**
- ◆ **Supporting 26 new and 21 continuing Nuclear Engineering Education Research (NEER) grants**
- ◆ **Granting 95 Fellowships/Scholarships/Internships**
- ◆ **University Reactor Instrumentation – 20 grants**
- ◆ **Providing Reactor Sharing support to 21 universities**
- ◆ **Supporting 35 Teacher Workshops through the American Nuclear Society**
- ◆ **Funding 3-4 Radiochemistry programs**
- ◆ **Funding 5 University Partnership Programs at minority institutions**
- ◆ **Supporting 2 new nuclear engineering schools**
- ◆ **Providing fresh fuel and spent fuel support for all requesting university research/training reactors**
- ◆ **Supporting 6 U.S. and 6 foreign students in the International Student Exchange Program**
- ◆ **Outreach to High School Students – Hydrogen Initiative**



## University Nuclear Science and Reactor Support

### ◆ The “University” Program has ten distinct activities:

- Providing fresh fuel to university research reactors via the **Reactor Fuel Program**
- Providing funding for innovative research at universities under the peer-reviewed **Nuclear Engineering Education Research Program**
- Providing institutional support to universities offering a degree in nuclear engineering through the **DOE/Industry Matching Grants Program**
- Encouraging universities with research reactors to “share” them with surrounding institutions providing research, training, and instructional opportunities through the **Reactor Sharing Program**
- Encouraging partnerships among universities with research/training reactors, other universities, industry and utilities to improve the nuclear infrastructure regionally in the U.S. (**INIE**)



## University Nuclear Science and Reactor Support

### ◆ The “University” Program has ten distinct activities (cont.):

- Awarding fellowships and scholarships to nuclear engineering students and minority students through the **Fellowship and Scholarship** Program
- Partnering minority institutions with Nuclear Engineering Universities for the purpose of increasing the number of minorities in the nuclear disciplines (**University Partnerships**)
- Making improvements to university research reactors via the **Reactor Upgrade** Program
- Supporting **Radiochemistry** graduate and postgraduate students and faculty through fellowships and faculty assistance
- Supporting the **Nuclear Engineering Education Recruitment** program to encourage high school students to consider careers in nuclear engineering and related scientific courses of study by providing information on nuclear issues to them through American Nuclear Society Teacher Workshops



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For Example . . .



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First . . .



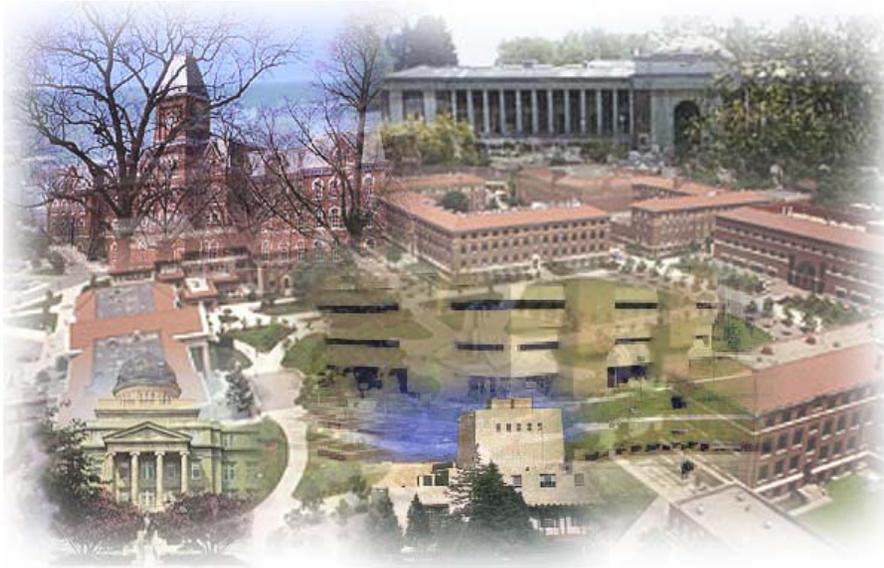
## University Partnerships in Nuclear Engineering Education: *Program Objectives and Purpose*

- ◆ **Designed to attract minority college students into the field of nuclear engineering**
- ◆ **Partners a majority school with a nuclear engineering program with a minority institution**
- ◆ **Students at the minority school can complete their degree in a selected scientific field while obtaining a second or advanced degree in nuclear engineering**





## University Partnerships in Nuclear Engineering Education: *Program Description*



- ◆ **Addresses the decline in the number of independent nuclear engineering programs and the increasing workforce requirements in nuclear science**
- ◆ **Administered by South Carolina State University with the assistance of South Carolina Universities Research and Education Foundation (SCUREF)**



## University Partnerships in Nuclear Engineering Education: *Program Participants*

- ◆ **Since the program was established the following partnerships have been established:**
  - South Carolina State University/University of Wisconsin
  - Tuskegee Institute/University of Cincinnati
  - University of New Mexico/New Mexico State University
  - Prairie View A&M University – Texas A&M, Kingsville/Texas A&M University
  - NCA&T – NCSU (terminated after 2 years)
- ◆ **New Partnering in 2004: Polytechnic University of Puerto Rico and the University of Missouri-Columbia**
- ◆ **Support has been provided for over forty (40) students and two junior faculty members**



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Second . . .



## Innovations in Nuclear Infrastructure and Education (INIE)

### ◆ Origins:

- INIE established on basis of recommendations of the DOE's independent advisory committee - the Nuclear Energy Research Advisory Committee (NERAC)
- NERAC had concerns about the Nation's ability to respond to the growing demand for trained experts in nuclear science and technology
- NERAC's three person task force (Long, Cortez, Sessoms) concerned about the closing of valuable university research reactors



## Innovations in Nuclear Infrastructure and Education (INIE) (cont.)

### ◆ Process and Selection:

- INIE solicitation issued 12/20/01
- Proposals submitted March 2002
- April 2002 - seven member peer review panel meets and selects best proposals from 13 submitted
- Mid-April 2002 - top six projects selected
- September 2002 - funding provided to four consortiums
- Summer 2003 - fifth and sixth INIE awarded



## Innovations in Nuclear Infrastructure and Education (INIE) (cont.)

- ◆ **Six university consortiums funded – grown from 14 to 32 schools**
- ◆ **For FY 2004 -- \$9.0M available**
- ◆ **Consortium members**
  - BIG-10: Penn State, Illinois, Wisconsin, Ohio State, Purdue and Michigan
  - MIT: MIT, Rhode Island Nuclear Science Center, Massachusetts-Lowell
  - Southwestern: Texas A&M, Texas, and New Mexico
  - Western: Oregon State, UC-Berkeley, UC-Davis, Washington State, Idaho State, Reed, and UC-Irvine
  - Southeastern (MUSIC): NC State, Tennessee, South Carolina, Maryland, Georgia Tech, Florida, Air Force Institute, and South Carolina State
  - Midwest: Missouri-Columbia, Missouri-Rolla, Missouri-KC, Tuskegee, and Polytechnic University of Puerto Rico



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Third . . .

Idaho Falls High School,  
Idaho Falls, Idaho

Orangeburg-VTimmerline High School, Boise, Idahoouth Carolina





## Education: Supporting President's National Hydrogen Fuel Initiative

- ◆ Visit high schools and demonstrate benefits of using hydrogen for transportation in a fuel cell model car
- ◆ Car kit left at each school: Pittsburgh, Pennsylvania; Boise, Idaho Falls, and Hailey, Idaho; and Orangeburg, South Carolina
- ◆ Students in Boise and Idaho Falls got to attend GIF meeting in Sun Valley





## Where We're Going

- ◆ **Support for new research reactor designs and/or increases in power at existing research reactors**
- ◆ **Support of Junior Faculty research**
- ◆ **More support for INIE and Matching Grants**
- ◆ **Additional University partnerships to increase the number of minority nuclear engineers – links with other minority schools (*i.e.*, Livingstone College)**
- ◆ **Improving the fuel manufacturing process through the modernization of fuel fabrication facilities**
- ◆ **Support of health physics and increased fellowship and scholarship support at NE/HP schools**
- ◆ **Even greater security at research reactors per NRC guidelines and increased focus on the eventual conversion of university reactors to LEU fuel**
- ◆ **Partnering with School Districts to offer nuclear science instruction to high school students (Pittsburgh)**



## Summary

- ◆ **University Program has come a long way from, essentially, a fuel supplier to a program that supports major initiatives in many aspects of nuclear engineering education**
- ◆ **Enrollments are soaring; funding is steadily rising, and the university nuclear engineering community is working cooperatively with one another**
- ◆ **New initiatives will make more research funding available for young professors, help design a new research reactor, and increase student interest in NE, therefore increasing enrollments**
- ◆ **Need to grow student population carefully so that supply is consistent with demand; this will help preserve salary levels, job opportunities and retain student interest in nuclear engineering**



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