

ENVIRONMENTAL ENGINEERS OF THE FUTURE (E²F)

ONE DECLINING ENROLLMENT REMEDY

NACWA'S 2008 WINTER CONFERENCE



Supply of Environmental Engineers

- **Lack of K-12 Science/Math Proficiency**
- **Declining Enrollment in Undergraduate and MS Programs**
- **Curriculum Shift**
- **Aging Workforce**

K-12 Proficiency

- Fewer than 1/3 4th and 8th graders are “proficient” in math
- U.S. 15 year-olds- 24th out of 40 countries
- 33% of 4th & 20% of 8th graders cannot do basic math

Declining Enrollment

- US undergraduate engineering degrees down from 77,000 in 1985 to 60,000 in 2002
- Percent of Undergraduate degrees in science and engineering

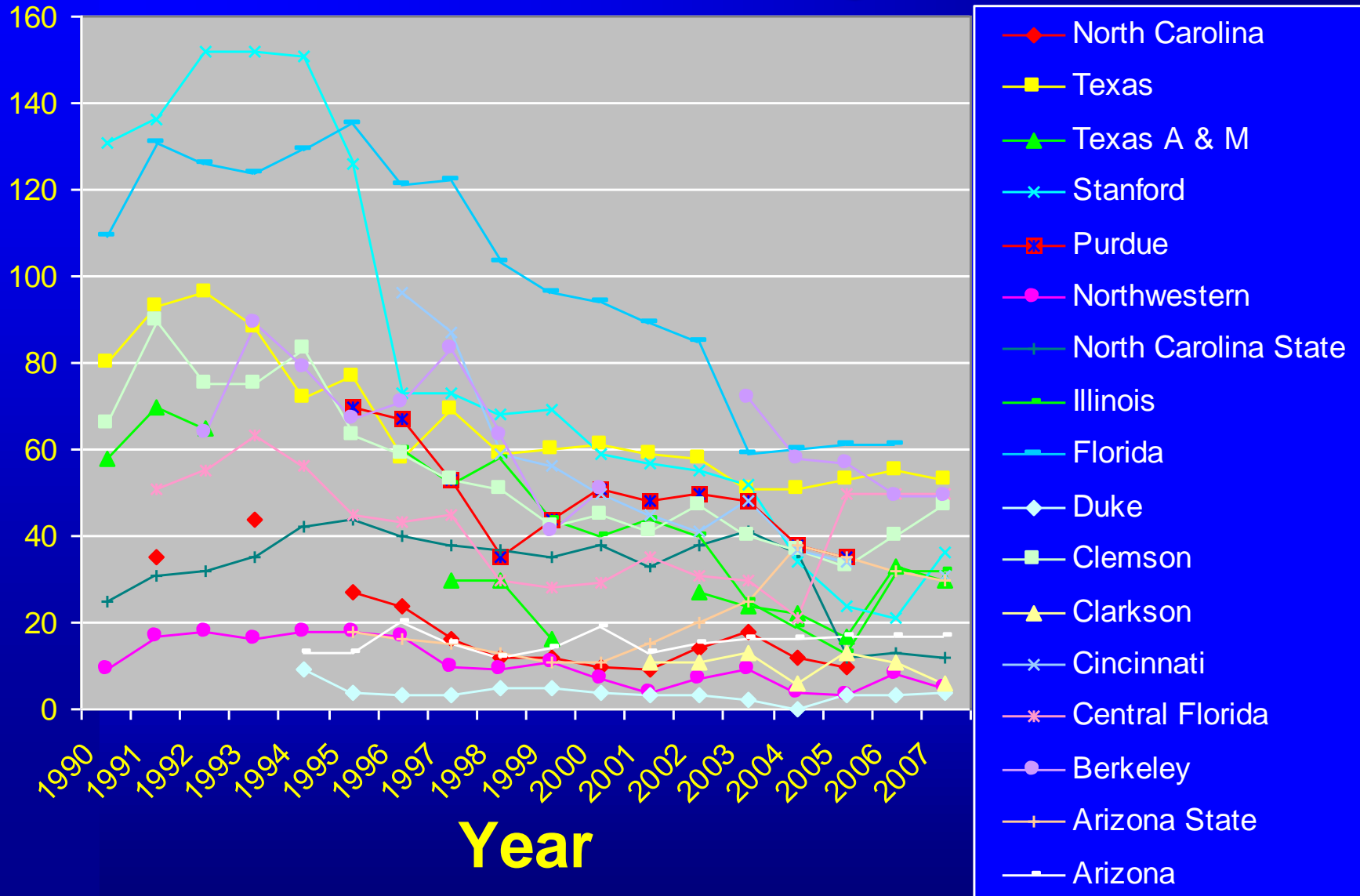
South Korea	38%
France	47%
China	50%
Singapore	67%
United States	15%

Conclusions from the 2002 AEESP/ NSF Workshop on Environmental Engineering

- MS in Environmental Engineering has been the **cornerstone** of the profession
- Project-based MS is declining toward extinction
- Large scale support no longer exists

Declining Enrollment MS Environmental Engineering

MSEE Enrollment



Curriculum Pressures

- Shift from basic public health protection to more complex problems
- Federal funding for basic research
- Pressure to be cutting edge

Joint Water Pollution Control Plant





Workforce Changes by 2010

- **U.S. labor 10 million short**
- **Water and Wastewater demand up 45%**
- **Environmental engineering demand up 14,000 jobs (27 %)**

Baseline year 2000

Demand

- **Decaying infrastructure**
- **Population growth**
- **Changes in regulations**

Decaying Infrastructure

ASCE 2005 Report Card

- Drinking Water D-
- Hazardous Waste D
- Navigable Waters D-
- Solid Waste C+
- Wastewater D-
- Overall GPA D

Corroded Sewer

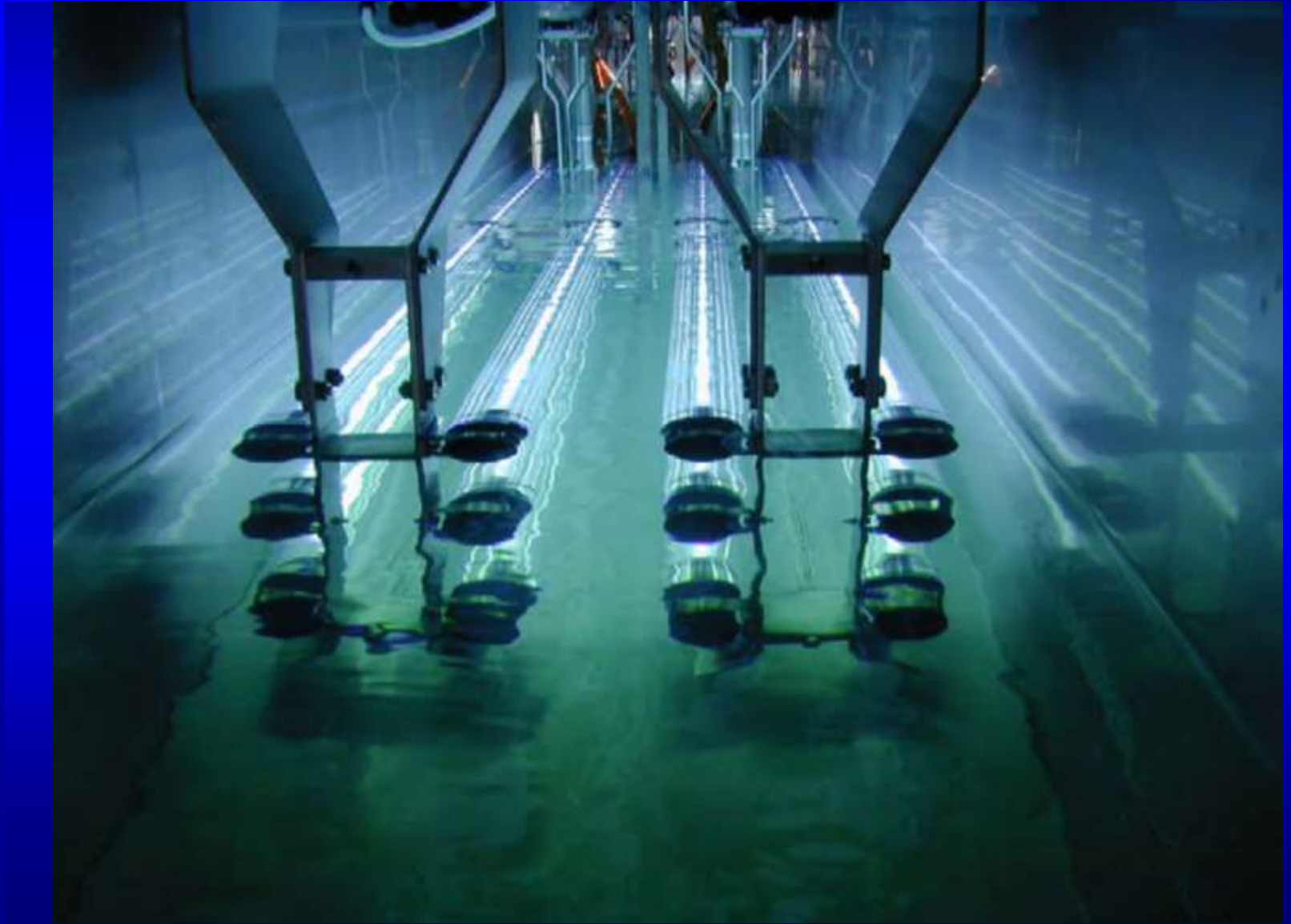


United States Population Projection



Source: U.S. Census Bureau 2004

Changes in Regulations



RECLAIMED WATER



Solutions

- K-12 Education- Sewer Science, Think Earth
- Engineers need to deliver message: “Our work makes a difference.”
- Undergraduate engineering incentives
- University administrators need to understand problem- industry interaction
- Funding for mainstay- Masters Degree

Program Features

- Up to \$20,000 toward MS in Environmental Engineering
- Course requirements
- Undergrad- CE, ME, ChemE, Env. Eng. or related engineering field- ABET
- Work for funding partner for 3 yr
- **Target student: graduating senior- undecided on grad school specialty**

E²F Website



www.engineeringmastersfunding.org



**Timothy
Alba**
University of
Washington



**Kevin
Bingley**
Stanford
University



E²
**ENVIRONMENTAL
ENGINEERS
OF THE FUTURE**

Masters Degree Funding Recipients



**Morgan
Bruno**
Oregon State
University



**Meghann
Chell**
Cal Poly
SLO



**Nick
Cilic**
UC
Berkeley



**Aaron
Cook**
Purdue
University



**Lisa
Cuellar**
UCLA



**Caitlyn
Feikle**
UC
Berkeley



**Frances
Fierst**
University of
Colorado



**Miguel
Guerrero**
Stanford
University



**Andrew
Hall**
Utah State
University



**Patrizia
Hall**
UC
Davis



**Joshua
Hirschi**
Utah State
University



**Theresa
Hlavinka**
University of
Washington



**Marianna
Kawalczyk**
UC
Berkeley



**Laura
Levine**
Northwestern
University



**Lam
Mo**
UC
Davis



**Alicia
Ng**
Stanford
University



**Katherine
Nierva**
University of
Arizona



**Jodie
Nygaard**
UCLA



**Mark
Peterson**
Cal Poly
SLO



**Dave
Riedel**
Virginia
Tech



**Jacqueline
Shaw**
University of
Arizona



**Frances
Smith**
UC
Berkeley



**Nick
Wiehardt**
University of
Illinois



**Kimberly
Wilson**
Stanford
University



**Larry
Wong**
UCLA



**Kevan
Yamahara**
Stanford
University

Funding Partners

- Black & Veatch
- Carollo Engineers
- CDM
- CH2MHILL
- Phoenix Water Services Department
- King County, WA Wastewater Trmt. Div.
- LA County Sanitation Districts
- Malcom Pirnie
- MWH
- Parsons

Funding Partner Role

- Participate in selecting recipients
- Mentoring
- Initial financial contribution
- Refill funding pool upon hiring graduate

Participating Universities

Arizona State	Manhattan College	Tufts	University of Minnesota
Auburn	Michigan State	UC Berkeley	University of Nebraska
Cal Poly San Luis Obispo	Michigan Technological University	UC Davis	University of New Hampshire
Carnegie Mellon	MIT	UCLA	University of New Mexico
Clarkson	New Mexico State	University of Arizona	University of North Carolina
Clemson	North Carolina	University of Central Florida	University of South Florida
Colorado School of Mines	Northeastern	University of Cincinnati	University of Southern California
Colorado State	Northwestern	University of Dayton	University of Texas
Cornell	Old Dominion	University of Delaware	University of Utah
Duke	Oregon State	University of Florida	University of Washington
Georgia Tech	Penn State	University of Idaho	University of Wisconsin
Illinois Institute of Technology	Purdue	University of Illinois	Utah State
Iowa State	Rice	University of Maryland	Virginia Tech
Johns Hopkins	San Diego State	University of Massachusetts	
Loyola Marymount	Stanford	University of Michigan	
	Texas A&M		

Course Requirements

- Two required courses
 - Biological treatment
 - Physicochemical treatment
- Three elective courses from approved list
 - Air, water, solid waste
- Universities are pre-approved

Current Status

- Non-profit organization formed
- 60 universities
- 10 funding partners
- 28 students funded
- \$500,000 in funding provided

Moving Forward

- Additional funding partners
- Improved marketing to students
- Additional universities
- Involvement by AAEE and AEESP

Summary

- Disparity between supply of engineers and demand for services jeopardizes our ability to serve society in the manner expected
- Multi-level approach needed
- Education funding program for cornerstone of profession- **one part of the solution**

More Information

Website:



www.engineeringmastersfunding.org/