MANPOWER ASSESSMENT BRIEF

U.S. Department of Energy

Number 29, June 1995

Scientist and Engineer Energy Employment¹ Expected to Decline During 1994-2000 as DOE Funding is Reduced

SUMMARY

Employment Changes

Employment of scientists and engineers in energy activities is expected to decline by 2.3 percent (from 392,000 to 383,000) between 1994 and 2000.

- This decline will result from reductions in DOE-funded R&D employment more than offsetting increases in private sector energy R&D employment and non-R&D employment.
- Employment of bachelor's and master's scientists and engineers in energy activities is expected to decline only slightly from 344,900 to 342,300. Ph.D. employment is expected to decline from 47,100 to 40,700, or by over 13 percent.
- FY 1996 budget schedules will result in major reductions in DOE federal and contractor employment (both R&D and non-R&D) which are expected to fall from 165,000 to 130,000 total workers from 1994 to 1998.

Scientific and engineering employment is expected to increase in renewable and fossil energy areas between 1994 and 2000.

- Employment in renewable energy is expected to be the fastest growing in percentage terms (7 percent).
- Fossil energy employment, which makes up one-half of all employment in energy activities, is expected to grow the most in absolute terms (from 195,900 to 205,200 scientists and engineers).

Scientific and engineering employment in several major energy areas is expected to decline from 1994 to 2000.

- Nuclear energy scientific and engineering employment is expected to fall primarily as a result of employment declines in three nuclear activities: environmental management, DOE-funded nuclear R&D, and weapons.
- Scheduled DOE-funding reductions are expected to result in scientist and engineer employment declining by 19 percent in basic research (including fusion research).
- "Other energy" scientist and engineer employment (those not working on a specific fuel area) is expected to fall by 15 percent.

Job Openings for New S&E Graduates

Over 72,000 job openings in energy activities are expected for new graduate scientists and engineers between 1994 and 2000.

- Approximately 9,000 science and engineering positions will be lost in energy activities between 1994 and 2000. However, approximately 81,000 currently employed scientists and engineers are expected to retire, die, or switch to employment outside of energy fields; thus 72,000 net job openings are expected.
- Approximately 68,000 job openings in energy activities are expected for new scientists and engineers with bachelor's or master's degrees; mechanical and electrical engineers will make up one-third of these new hires.
- Over 4,000 job openings for new Ph.D.s are expected; approximately one-fourth of these new doctoral hires will be chemists.

Figure 1. Scientists and Engineers in Energy Activities, 1982-2000

Source: ORISE.

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¹ Scientists and engineers in energy activities include those persons who are involved in energy/fuel work activities or funded by the U.S. Department of Energy (including employees).

MASTER

Scientists and Engineers in Energy Activities Expected to Decline by 2.3 Percent During 1994-2000

The number of scientists and engineers in energy activities is expected to decline modestly from 392,000 in 1994 to 383,000 in 2000 (Figure 1). The Bureau of Labor Statistics expects the total employment of scientists and engineers in the national economy to increase by almost 20 percent during this same time period.² This will result in the percent of all scientists and engineers who are employed in energy activities declining from approximately 10 percent in 1994 to about 8 percent in the year 2000. The percent of all scientists and engineers employed in energy activities has been declining over the last two decades.

About one-half of all scientists and engineers employed in energy activities are in fossil energy (Figure 2). Nuclear energy is the second largest energy area, with approximately one-fifth of all scientists and engineers in energy activities.

DOE-Funded Energy R&D Scheduled to Decline by 27 Percent During 1994-2000

The number of scientists and engineers who are employed in energy R&D activities is expected to decline from 129,600 in 1994 to 118,000 in the year 2000. This decline will offset expected employment growth from 262,400 to 265,000 among scientists and engineers in non-R&D energy activities for the same period (Figure 3).

DOE-funded R&D employment declines mirror scheduled DOE R&D funding reductions of 27 percent in real terms from 1994-2000 as

Figure 2. Scientists and Engineers in Energy Activities by Energy Source, 1994

Source: ORISE.

Figure 3. Science and Engineering Employment in Energy Non-R&D and Energy R&D by Source of Funding, 1994-2000

	1994	2000
Private Sector R&D	57,400	62,800
Other R&D	8,300	8,300
DOE R&D	63,900	46,900
TOTAL Energy R&D	129,600	118,000
Energy Non-R&D	262,400	265,000
TOTAL All Energy	392,000	383,000

1994-2000 Percentage Change

Source: ORISE.

contained in the FY 1996 DOE budget. These figures are a considerable departure from last year's FY 1995 DOE budget schedules which called for R&D funding (and employment) to be almost constant for the 1994-2000 period. Private sector energy R&D employment growth will

result from increasing world energy prices which should spur research into alternatives to fossil fuels as well as using existing fuels more efficiently.

DOE FY 1996 budget schedules will result in major reductions in

² George Silvestri, "Occupational Employment: Wide Variations in Growth" *Monthly Labor Review*, vol. 116, no. 11 (November 1993), pp. 58-86.

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DOE federal and contractor employment (both R&D and non-R&D) which are expected to fall from 165,000 to 130,000 total workers from 1994 to 1998. From 1994-2000, bachelor's and master's scientists and engineers employed in DOE-funded R&D are expected to decline from 39,500 to 29,100; Ph.D. employment is expected to fall from 24,400 to 17,800. Overall DOE R&D funding is expected to hold almost constant from 1994-1996, with the largest reductions scheduled for 1997-2000.

Renewable Energy Employment Expected to Increase at the Highest Rate

Employment in renewable energy is expected to be the fastest growing in percentage terms (Figure 4). Renewable energy employment will be driven by increases in private sector R&D and non-R&D employment resulting from expected increases in world oil prices.

Fossil energy scientist and engineer employment is expected to grow the most in absolute terms, as growth in private sector R&D and non-R&D employment is expected to offset declines in DOE-funded fossil energy R&D. Fossil energy employment of scientists and engineers is strongly related to world oil prices which were at a 20-year low in 1993. The Energy Information Administration (EIA) expects future world oil prices to increase modestly through the year 2000, but these projected price increases are less than were projected by EIA in previous years.³ Coal production is forecast to grow through the year 2000, but expected increases in labor productivity are projected to result in declining coal employment for this period. The number of scientists and engineers employed in the fossil utility industry is expected to remain stable.

Conservation and energy efficiency scientist and engineer employment is expected to decline

only slightly during the 1994-2000 period as reductions in DOE-funded R&D employment will be offset by growth in non-DOE employment.

Scientist and engineer employment in several major energy areas is expected to decline substantially from 1994 to 2000. Nuclear energy scientist and engineer employment (R&D and non-R&D) is expected to decrease by 11 percent (from 83,400 to 74,000) primarily as a result of employment declines in three activities: environmental management; nuclear DOE-funded R&D (including weapons); and non-R&D nuclear weapons.

Scheduled DOE funding reductions in basic research (including fusion research) are expected to result in a 19 percent decline in scientist and engineer employment in basic energy science research. "Other energy" scientist and engineer employment (those not working on a specific fuel area) is expected to fall by 15 percent.

Future Job Openings in Energy Activities

Approximately 9,000 science and engineering positions will be lost in energy activities between 1994 and 2000 as a result of declining employment. However, approximately 81,000 positions will be vacated by scientists and engineers who retire, die, or switch to employment outside of energy fields; thus 72,000 net job openings are expected. Of these 72,000 net job openings in energy activities, approximately 68,000 job openings are expected for new scientists and engineers with bachelor's or master's degrees. Almost 11,000 positions vacated by currently employed Ph.D. scientists and engineers are expected to offset employment losses of about 7,000 resulting in 4,000 net job openings for Ph.D.s.

Figure 4. Science and Engineering Employment by Energy Source, 1994-2000

Source: ORISE.

³ U. S. Department of Energy, Energy Information Administration, *Annual Energy Outlook 1995* (Washington, D.C.: USGPO, 1995), p. 1.

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Net job openings for new graduate engineers in energy activities for the 1994-2000 period are expected to be 51,000, or about 19 percent of total 1994 energy engineering employment (Figure 5).

Approximately 13,000 of these engineering job openings (one out of four) are expected in the field of mechanical engineering, another 11,000 will be for electrical and electronic engineers. Petroleum engineers are expected to have actual growth in total employment and to require the largest number of new hires relative to 1994 employment; however, this is a small field compared to other engineering areas.

Approximately 21,000 new graduate scientists are expected to be hired to fill job openings for the 1994-2000 period in energy activities (Figure 6). Scientists in the fields of earth sciences/geology are expected to be over 40 percent of these net new hires (9,700 new graduates). These earth scientist hires are expected as a result of increased employment growth in the fossil energy area. Chemists are expected to make up about 18 percent of new scientist hires (3,800 new graduates). Only about 10 percent of the earth scientist hires will be Ph.D.s; Ph.D.s are expected to be about 30 percent of the chemist hires.

The cancellation of the Superconducting Super Collider and Advanced Neutron Source as well as other DOE funding reductions are expected to result in a decline in physicists employment of 2,500 from 1994 to 2000; about one position of every five will be lost. Because workforce attrition is expected to be approximately 2,900 physicists during this same period, about 400 new graduate physicists are expected to be hired for energy employment from 1994 to 2000. Over one-half of these will be Ph.D.s.

Figure 5. Employment of Engineers and Job Openings for New Graduate Engineers in Energy Activities, 1994-2000

	1994 Employment	1994-2000 Changes		
		Growth	Replacement	Job Openings
All Engineering	264,900	-3,600	54,800	51,200
Chemical	18,300	-600	3,800	3,200
Civil	19,600	-200	3,800	3,600
Computer	3,700	0	700	700
Electrical	59,500	-400	11,400	11,000
Environmental	3,000	-400	600	200
Industrial	6,500	-100	1,300	1,200
Mechanical	57,400	-100	12,800	12,700
Metals/Materials	6,300	-800	1,200	400
Mining/Mineral	4,200	-100	900	800
Nuclear	11,000	-400	2,300	1,900
Petroleum	20,600	1,900	4,600	6,500
Other Engineering	54,800	-2,400	11,400	9,000

Job Openings as a Percent of
1994 Employment

Source: ORISE.

Figure 6. Employment of Scientists and Job Openings for New Graduate Scientists in Energy Activities, 1994-2000

Source: ORISE.

Notes:

This report is based on work performed under Contract Number DE-AC05-OR00033 between the U.S. Department of Energy and Oak Ridge Associated Universities.

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