Employment Opportunities for College Graduates

in Food, Renewable Energy, and the Environment

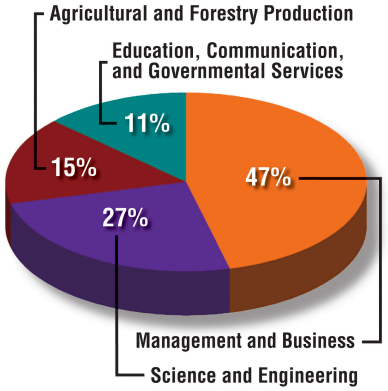
United States, 2010-2015

Overview

The agricultural, food, and renewable natural resources sectors of the U.S. economy will generate an estimated 54,400 annual openings for individuals with baccalaureate or higher degrees in food, renewable energy, and environmental specialties between 2010 and 2015. Seventy-four percent of the jobs are expected in business and science occupations; 15 percent in agriculture and forestry production; and 11 percent in education, communication, and governmental services.

During 2010-15, five percent more college graduates with expertise in agricultural and food systems, renewable energy, and the environment will be needed when compared to 2005-10. More than enough graduates will likely be available during the next couple of years in some occupations, but a shortfall of new graduates with preparation in priority business and science specialties is forecast in the latter half of the period.

Employment Opportunities



Four major factors shape the market for graduates between 2010 and 2015:

- Macroeconomic conditions and retirements
- Consumer preferences for nutritious and safe foods
- Food, energy, and environment public policy choices
- Global market shifts in population, income, food, and energy

GRADUATES

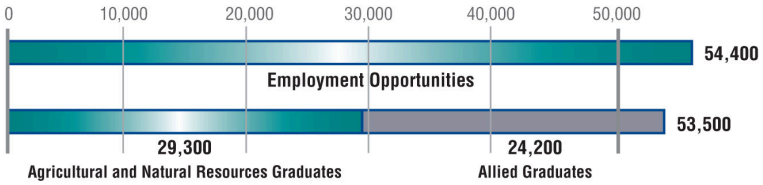
Expect approximately 53,500 qualified graduates to be available each year. About 55 percent of the total, 29,300 are expected to earn degrees from colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine. The other 45 percent, an estimated 24,200 graduates, will come from allied disciplines including biological sciences, engineering, health sciences, business, and communication.

Employers have expressed a preference for graduates from colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine who tend to have relatively stronger interests and more extensive work experiences for careers in food, renewable energy, and the environment than those from allied fields of study. These graduates will likely continue to be preferred by many employers, but it is important to note that there were nearly 10 percent fewer agriculture and life sciences, forestry and natural resources, and veterinary medicine graduates produced in U.S. colleges and universities in 2008 than in 2002.

The Food and Agricultural Education Information System maintains enrollment data by academic specialty that are reported by colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine. Enrollments during 2004-09 suggest some increases in agribusiness management, agricultural mechanization and engineering, animal science, food science, and natural resources management graduates during 2010-15. In contrast, fewer graduates in the plant sciences, soil sciences, and horticultural specialties are anticipated during the next five years, and there will likely be little change in the annual production of forestry and wildlife science graduates.

Relatively more graduates from the allied fields of biological and health sciences will be required to fill positions that address consumer preferences for a safe and nutritious food supply. Likewise, more earth and atmospheric scientists and environmental engineers will be required to deal with the evolving public policy choices in energy and the environment.

Shortfalls of qualified graduates to work as plant geneticists and plant breeders, climate change analysts, and food safety and security specialists are anticipated during 2010-15.



GROWTH OCCUPATIONS

The U.S. Department of Labor projects significant growth in selected food, renewable energy, and environment jobs during 2008–18 in the *Monthly Labor Review* published in November 2009.

Occupation – Percent Increase

Agricultural Inspectors – 12.8
Animal Scientists – 13.2
Biochemists and Biophysicists – 37.4
Computer and Information Systems Managers – 16.9
Credit Analysts – 15.0

Environmental Engineers – 30.6
Environmental Scientists and Specialists, including Health – 27.9
Financial Analysts – 19.8
Food Scientists and Technologists – 16.3
Hydrologists – 18.3

Management Analysts – 23.9
Market Research Analysts – 28.1
Natural Sciences Managers – 15.5
Pest Control Workers – 15.3
Public Relations Specialists – 24.0

Recreation Workers – 14.7
Sales Managers – 14.9
Soil and Plant Scientists – 15.5
Technical Writers – 18.2
Veterinarians – 33.0

Projected growth in these occupations is in tune with our nation's shift toward creating new businesses and jobs in local and regional food systems, capitalizing on climate change opportunities, developing renewable energy, and restoring and sustaining natural resources.

The ability to maintain a safe food supply that is more affordable and nutritious while also expanding energy production from renewable sources will increasingly depend upon the strategic integration of action teams. Those teams will need strong research and development and efficient business management skills. There will be growing opportunities for specialists who will manage our nation's water resources.

*For a two-page printable summary (PDF format, 424KB), click on the linked image, above left. You may also download a longer, eight-page **printable** version of the report (PDF, 12MB). Or, you can download a smaller-sized file, a **Web** version of the eight-page report (PDF, 950KB).*

Project Consultants

- Carol L. Anderson, Cornell University, professor emeriti
- Perry Brown, University of Montana
- Gregorio Billikopf Encina, University of California-Davis
- J. Marcos Fernandez, The Pennsylvania State University
- Mike Gaul, Iowa State University
- Patrick D. O'Rourke, Illinois State University
- Govind C. Sharma, Alabama A&M; University

- Bettye K. Walters, Virginia-Maryland Regional College of Veterinary Medicine

Authors

- Allan D. Goecker, Purdue University
- P. Gregory Smith, U.S. Department of Agriculture, NIFA
- Ella Smith, U.S. Food and Drug Administration
- Rebecca Goetz, Purdue University

Design: Russ Merzdorf

Web: Wright Frazier

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under Award No. 2007-38837-18626. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

Employment Opportunities for College Graduates

in Food, Renewable Energy, and the Environment

United States, 2010–2015

Management & Business

Expect about 25,700 average annual job openings for management and business representatives in agricultural and food systems, renewable energy, and the environment during 2010–15. An estimated 12,100 qualified graduates will be available from agricultural and life science, forestry and natural resources, and veterinary medicine disciplines and 11,700 from allied fields of study.

Sales and service occupations will continue to be the primary source of jobs in this employment cluster. Private practices in veterinary medicine will be major providers of jobs along with businesses that buy and sell agricultural commodities and forest products.

Look for good opportunities as credit analysts, information systems managers, financial planners, renewable energy economists, retail sales managers, and human resources specialists. Management jobs will continue to shift from production and manufacturing to the services sector of the economy. A growing number of managerial jobs will be found in environmental compliance and restoration ecology.

Priority Occupations

- Agricultural Sales and Service Representative
- Environmental Compliance Specialist
- Financial Planner and Manager
- Food Marketing Manager
- Forest Products Manager
- Grain Merchandiser
- Green Industry Products Manager
- Human Resources Specialist
- Land Use Planner
- Resource and Alternative Energy Economist

Employment Opportunities for College Graduates

in Food, Renewable Energy, and the Environment

United States, 2010-2015

- Management & Business
- Science & Engineering
- Agricultural & Forestry Production
- Education, Communication, and Governmental Services

Science and Engineering

Anticipate about 14,500 average annual job openings for science and engineering positions in agricultural and food systems, renewable energy, and the environment during 2010-15. Relatively more of the openings are expected during the latter portion of the period with the anticipation of a stronger macroeconomy and the need to replace retired workers. An estimated 6,200 qualified graduates will be available from agricultural and life science, forestry and natural resources, and veterinary medicine disciplines, and 7,900 from allied fields of study.

Animal science, food science, environmental science, and agricultural and biological engineering will provide one-half of all graduates from agricultural and life science, forestry and natural resources, and veterinary medicine disciplines. In contrast, plant scientists will account for fewer than ten percent of the total graduates from these academic programs.

There will be good opportunities for plant geneticists and breeders, climate change analysts, food safety specialists, renewable energy engineers, nutritionists, biostatisticians, public sector veterinarians, nanotechnologists, biochemists, and animal pathologists.

Priority Occupations

- Animal Pathologist
- Biological Engineer
- Biostatistician
- Environmental Scientist
- Food Scientist
- Human Nutritionist
- Nanotechnologist
- Plant Geneticist and Breeder
- Public Practice Veterinarian
- Renewable Energy Engineer

Employment Opportunities for College Graduates

in Food, Renewable Energy, and the Environment

United States, 2010-2015

- Management & Business
- Science & Engineering
- Agricultural & Forestry Production
- Education, Communication, and Governmental Services

Agricultural and Forestry Production

Look for approximately 7,900 average annual job openings for graduates in agricultural and forestry production occupations — the foundation of the U.S. food, agricultural, and natural resource system. An estimated 7,100 qualified graduates will be available from agricultural and life science, forestry and natural resources, and veterinary medicine disciplines, and 950 from allied fields of study.

Fewer commercial farm and ranch operators are forecast by 2015, but a higher percentage will have a baccalaureate or higher degree. Anticipate more growers of specialty food crops, including organic fruits and vegetables, and bioenergy crops. Advancing technologies will require additional precision agriculture specialists. There will be good opportunities for restoration foresters in managing natural resources.

Poultry production managers and livestock herd managers are expected to have good employment opportunities along with food animal veterinarians. Crop management consultants will continue to have good job prospects.

Priority Occupations

- Crop Management Consultant
- Food Animal Veterinarian
- Herd Manager
- Land Use Manager
- Poultry Production Manager
- Precision Agriculture Specialist
- Organic Agriculture Entrepreneur
- Renewable Energy Crop Producer
- Restoration Forester
- Seed Producer

Employment Opportunities for College Graduates

in Food, Renewable Energy, and the Environment

United States, 2010-2015

Education, Communication, and Governmental Services

Expect approximately 6,200 average annual job openings during 2010-15 in education, communication, and governmental operations involved with agricultural and food systems, renewable resources, and the environment. Agricultural and life sciences, forestry and natural resources, and veterinary medicine disciplines will produce about 3,900 qualified graduates annually, and approximately 3,600 are anticipated from allied fields of study.

The strongest agricultural education opportunities are projected in community colleges, and in higher education specialties including plant and animal health, climate change, food safety, and bioenergy. Government agencies are expected to hire graduates with expertise in food safety and security, and in natural resources and environmental management.

Communicators who are proficient in multimedia and social media operations will be in the strongest employment position. Individuals with specialized talents in electronic information architecture, computer graphics, health communication, and science communication will be needed.

Priority Occupations

- Climate Change Analyst
- Computer Graphics Technologist
- Distance Education Specialist
- Ecotourism Specialist
- Electronic Information Architect
- Food Safety Information Specialist
- Health Communicator
- Natural Resources Conservation Specialist
- Rural Development Specialist
- Science Communicator

Employment Opportunities for College Graduates

in Food, Renewable Energy, and the Environment

United States, 2010-2015

- Management & Business
- Science & Engineering
- Agricultural & Forestry Production
- Education, Communication, and Governmental Services

Market Factors

Four major factors shape the market for graduates between 2010 and 2015:

- Macroeconomic conditions and retirements
- Consumer preferences for nutritious and safe foods
- Food, energy, and environment public policy choices
- Global market shifts in population, income, food, and energy

Employment Opportunities for College Graduates

in Food, Renewable Energy, and the Environment

United States, 2010-2015

- Management & Business
- Science & Engineering
- Agricultural & Forestry Production
- Education, Communication, and Governmental Services

Characteristics of Graduates

Data about the gender, ethinicity, and citizenship of graduates of graduates of U.S. Colleges of Agriculture and Life Sciences, Forestry, and Veterinary Medicine will be included at a later date.

- Management & Business
- Science & Engineering
- Agricultural & Forestry Production
- Education, Communication, and Governmental Services

Sources and Methodology

AVAILABLE GRADUATES

Numbers of qualified graduates—baccalaureate degree and higher—for food, renewable energy, and environment positions in the United States were determined from using 2007-08 degrees conferred data from the Integrated Postsecondary Education Data System (IPEDS) surveys conducted by the National Center for Education Statistics (NCES) of the U.S. Department of Education. The NCES data include postsecondary degrees conferred by all accredited public and private universities in the United States. Graduates are classified by degree level, degree specialization, and selected demographic characteristics.

Agriculture and Natural Resources Graduates

- From the NCES Classification of Instructional Programs (CIPS) 2000, educator consultants to the project and report authors selected degree specializations that are offered by colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine.
- Educator consultants to the project and report authors used historical graduate employment information, personal observations, and experiences to estimate the percentage of qualified graduates by degree specialization who are expected to enter occupations in the food, renewable energy, and environment employment sectors. Next, the report authors and educator consultants identified four occupational clusters for the purpose of categorizing graduates with degree specializations into four broad areas of expertise. The clusters are Management and Business, Science and Engineering, Agricultural and Forestry Production, and Education, Communication, and Governmental Services.
- The following adjustments were made to total qualified agriculture and natural resources graduates.
    - Reduced qualified baccalaureate degree graduates by two percent. Survey data indicate that this percentage of graduates do not enter the labor force.
    - Reduced qualified baccalaureate degree graduates by 24.74 percent. This proportion was determined to enter graduate and professional schools.
    - Reduced qualified master's degree graduates by 19.02 percent to account for those who enter doctor of philosophy degree programs.
    - Included 70 percent of the non-resident alien doctor of philosophy degree recipients as qualified to enter the U.S. labor force. Surveys of earned doctorates conducted by the National Science Foundation indicate that only 30 percent of these graduates return immediately to their country of origin upon receipt of their degrees.
- Educator consultants to the project and report authors assigned percentages of qualified graduates in each selected degree specialization to the four occupational clusters of Management and Business, Science and Engineering, Agricultural and Forestry Production, and Education, Communication, and Governmental Services.
- For additional details, click on *Available Graduates - Agriculture and Natural Resources*

Allied Graduates

- From the NCES Classification of Instructional Programs (CIPS) 2000, educator consultants to the project and report authors selected degree specializations that are offered by colleges of biological sciences, engineering, health sciences, business, communication, etc. whom are expected to compete with agriculture and natural resources graduates for employment.
- Educator consultants to the project and report authors used historical graduate employment information, personal observations, and experiences to estimate the percentage of qualified graduates by degree specialization who are expected to enter occupations in the food, renewable energy, and environment employment sectors. Next, the report authors and educator consultants identified four occupational clusters for the purpose of categorizing graduates with degree specializations into four broad areas of expertise. The clusters are Management and Business, Science and Engineering, Agricultural and Forestry Production, and Education, Communication, and Governmental Services.

- The following adjustments were made to total qualified allied graduates.
    - Reduced qualified baccalaureate degree graduates by two percent. Survey data indicate that this percentage of graduates do not enter the labor force.
    - Reduced qualified baccalaureate degree graduates by 24.74 percent. This proportion was determined to enter graduate and professional schools.
    - Reduced qualified master's degree graduates by 19.02 percent to account for those who enter doctor of philosophy degree programs.
    - Included 70 percent of the non-resident alien doctor of philosophy degree recipients as qualified to enter the U.S. labor force. Surveys of earned doctorates conducted by the National Science Foundation indicate that only 30 percent of these graduates return immediately to their country of origin upon receipt of their degrees.
- Educator consultants to the project and report authors assigned percentages of qualified graduates in each selected degree specialization to the four occupational clusters of Management and Business, Science and Engineering, Agricultural and Forestry Production, and Education, Communication, and Governmental Services.
- For additional details, click on *Available Graduates – Allied Fields*

EMPLOYMENT OPPORTUNITIES

Estimated employment opportunities that require college graduates with expertise to enter occupations in the food, renewable energy, and environment employment sectors were based upon data maintained by the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor (DOL). Occupational employment data for 2008 with projections to 2018 were published in the December, 2009 *Monthly Labor Review*. Projected annual employment opportunities are reported for each occupation included in the BLS taxonomy.

- Educator consultants to the project worked with the report authors to select occupations that would be expected to require college graduates with expertise to work in the food, renewable energy, and environment employment sectors.
- Educator consultants to the project worked with report authors to calculate average annual job openings for each selected occupation, representing one-tenth of the 10-year BLS projections.
- For each selected occupation, educator consultants to the project and report authors determined a percentage of the average annual job openings that would require graduates having expertise in food, renewable energy, and environment academic specialties. Average annual employment opportunities for each selected occupation were determined from these percentage estimates.
- Educator consultants to the project and report authors assigned percentages of the annual employment openings in each selected occupation to the four occupational clusters of Management and Business, Science and Engineering, Agricultural and Forestry Production, and Education, Communication, and Governmental Services.
- For additional details, click on *Employment Opportunities*.

REPORT SERIES

The report, Employment Opportunities for College Graduates in Food, Renewable Energy, and the Environment, United States, 2010-2015 is the seventh in a series of five-year projections initiated by the U.S. Department of Agriculture in 1980. While there have been some refinements to the methodology used in conducting these studies, the methodological structure outlined above was initially determined by Drs. Kyle Jane Coulter and Marge Stanton who authored the 1980 report entitled, Employment Opportunities for College Graduates in the Food and Agricultural Sciences, 1980-85—Agriculture, Natural Resources, Veterinary Medicine.