
Green Topics: Identifying Linkages to Occupations and Education Programs Using a Linguistic Approach

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Introduction

Growing emphasis on “green” or environmentally friendly activities has a widespread impact on the world-of-work. This goes beyond a specific subset of “green jobs.” Instead, concepts such as sustainability, climate adaptation, conservation, energy efficiency, and transportation touch on a broad range of occupations across the U.S. economy.

The National Center for O*NET Development implemented a new, topical approach to the greening of the world-of-work. Occupations and education programs linked to “green topics” were identified. The initial phase of this work leveraged [previous O*NET green research](#), while primarily using a linguistic approach to identify connections between green topics and 1) occupations, and 2) instructional programs.

In the future, additional research will be conducted to refine and extend the green-related information.

Green Topics

A total of 72 green topics were identified (see Appendix A).

First, topics included in previous O*NET green-related research were reviewed (see: [Greening of the World of Work: Implications for O*NET-SOC and New and Emerging Occupations](#) and [Greening of the World of Work: Revisiting Occupational Consequences](#)). Then, topics in more recent green-related publications were considered (see Appendix B). Finally, additional topics were added by a general internet-based review.

Similar topics and terminology were combined to form a consolidated listing of green topics.

Occupation Linkages to Green Topics

This step used a linguistic approach to form linkages between green topics and O*NET-SOC occupations (see: [The O*NET-SOC Taxonomy](#)).

Each green topic was treated as a “keyword” and processed via the O*NET keyword search algorithm [see: [A Weighted O*NET Keyword Search \(WWS\)](#)]. The search ranked up to 30 occupation linkage candidates on a relevance score based on the keyword match to each occupation’s O*NET-SOC title, alternate titles, O*NET-SOC description, tasks, detailed work activities (DWAs), and/or hot technology skills.¹

Occupational analysts reviewed the relevant occupation returns for each green topic. Occupation linkage candidates were removed based on poor fit to the green topic and low face validity.

After the review, green topics had on average 19 linked occupations, with a range of 5 to 36 linkages.

¹ In some cases, the results of topics with similar wording (e.g., “recycling” and “recyclable materials”; “aquaculture” and “aqua-culture”) were combined, leading to the potential of more than 30 occupation linkage candidates.

Education Linkages to Green Topics

This step used a linguistic approach to form linkages between green topics and instructional programs included in the 2020 Classification of Instructional Programs (CIP) [see: [National Center for Education Statistics](#)].

Each green topic was treated as a “keyword” and processed using a newly designed keyword search algorithm applied to the CIP. The search ranked up to 30 instructional program linkage candidates based on the keyword match to CIP titles and/or CIP descriptions included within the 2020 Classification of Instructional Programs (CIP) to O*NET-SOC 2019 crosswalk (see: [O*NET Crosswalk Files](#)).² The algorithm was set to focus on only the most detailed level of the CIP, which includes 1,948 programs linked to O*NET-SOC occupations.

Occupational analysts reviewed the instructional program candidates for each green topic. Linkages were removed based on poor fit to the green topic and low face validity.

After the review, green topics had on average 16 linked instructional programs, with a range of 2 to 39 linkages.

Green Topics Search

The information developed in this report is included within the O*NET Program’s [Green Topics](#) search. Individuals who want to incorporate green and environmentally friendly activities within their career exploration, job search, and preparation can select one or more green topics of interest and seamlessly discover related occupations and education programs.

On the first screen, users are presented with an alphabetical list of topics, which can be filtered by name. When a topic is selected, lists of the linked occupations and instructional programs are presented in two columns. The order of linkages is based on relevance rankings from the keyword search algorithm used for the initial topic selections. For instructional programs, the CIP titles and descriptions are included, with extraneous coding guideline language removed from some CIP descriptions. Occupations linked to each of the instructional programs are also displayed when the user selects a particular program.

Conclusion

An initial linguistic approach to linking occupations and education to green topics was applied.

- 312 O*NET-SOC occupations (291 data-level occupations and 21 non-data-level) were linked to one or more green topics.
- 394 instructional programs were linked to one or more green topics.

The number of linked occupations account for approximately one-third of the total number of

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occupations in the O*NET-SOC 2019 taxonomy eligible to be linked. Previous O*NET green research conducted in 2009 led to approximately one-seventh of the total number of eligible occupations identified as new and emerging green occupations or green enhanced skills occupations. This represents a substantial increase in identified occupations involved in areas of the greening of the U.S. economy, from 14 percent to 31 percent of the total number of occupations.

Future Research

In the future, additional research will be conducted to refine and extend the green-related information developed during the initial phase of work described in this paper.

Potential enhancements may include, but not be limited to:

- 1) Green topics
 - a. Extend and enhance the listing of topics based on research and customer suggestions/input.
 - b. Develop a standardized description of each topic.
 - c. Organize and classify the topics in a hierarchical taxonomy structure.
- 2) Occupation linkages to green topics
 - a. Populate occupation linkages within an extended, formalized green topic taxonomy structure.
 - b. Add and/or remove occupation-to-topic linkages based on research and/or subject matter expert review.
- 3) Education linkages to green topics
 - a. Populate instructional program linkages within an extended, formalized green topic taxonomy structure.
 - b. Add and/or remove instructional-program-to-topic linkages based on research and/or subject matter expert review.
 - i. Include a review of the entire CIP taxonomy structure.
- 4) Explore adding detailed work activities (DWAs) and/or task linkages to green topics

References

- Dierdorff, E. C., Norton, J. J., Drewes, D. W., & Kroustalis, C. M. (2009). Greening of the world of work: Implications for O*NET-SOC and new and emerging occupations. National Center for O*NET Development. <https://www.onetcenter.org/reports/Green.html>
- Dierdorff, E. C., Norton, J. J., Gregory, C. M., Rivkin, D., & Lewis, P. (2011). Greening of the world of work: Revisiting occupational consequences. National Center for O*NET Development. <https://www.onetcenter.org/reports/Green2.html>
- Morris, J. (2021). A weighted O*NET keyword search (WWS). National Center for O*NET Development. <https://www.onetcenter.org/reports/WWS.html>
- National Center for Education Statistics. The 2020 Classification of Instructional Programs (CIP). Institute of Education Sciences. Retrieved May 10, 2022, from <https://nces.ed.gov/ipeds/cipcode/default.aspx?y=56>
- National Center for O*NET Development. Crosswalk Files. O*NET Resource Center. Retrieved May 10, 2022, from <https://www.onetcenter.org/crosswalks.html>
- National Center for O*NET Development. O*NET® Green Reports and Documents. O*NET Resource Center. Retrieved May 10, 2022, from <https://www.onetcenter.org/research.html?c=Green>
- National Center for O*NET Development. O*NET-SOC Taxonomy. O*NET Resource Center. Retrieved May 10, 2022, from <https://www.onetcenter.org/taxonomy.html>

Appendix A: Green Topics

Agriculture
Air quality
Aquaculture
Atmospheric science
Biodegradable
Biodiversity
Biofuels
Biomass
Carbon trading
Clean energy
Climate adaption
Climate change
Climate justice
Climatology
Coastal research
Conservation
Disaster risk management
Earth science
Eco-hacking
Eco-tourism
Ecology
Energy
Energy efficiency
Energy engineering
Energy trading
Environment
Environmental health and safety (EHS)
Environmental impact
Environmental protection
Environmental remediation
Environmental science
Fisheries
Forestry
Geothermal
Glacier research
Green advocacy
Green communities
Green construction
Green economy
Green education
Green legal issues
Green policy
Green recreation
Green research
Green socioeconomic development
Green solutions
Health and safety
Hydrology
Infrastructure
Land use planning
Landscape architecture
Leadership in energy and environmental design (LEED)
Natural pesticides
Naturalist
Pollution prevention
Public health
Recycling
Regulation enforcement
Renewable
Renewable energy
Solar
Solid waste management, treatment, and reduction
Sustainability
Sustainable communities
Transportation
Urban and regional planning
Waste reduction
Wastewater management, treatment, and reduction
Water resources
Weatherization
Wildlife
Wind

Appendix B: Recent Green Related Publications

Title	Organization
Adaptation Jobs Explainer: Understanding this Critical and Growing Workforce	Environmental and Energy Institute (EESI)
Adaptation Solutions Taxonomy	The Lightsmith Group
ASAP Knowledge and Competencies Framework for Climate Change Adaptation and Climate Resilience Professionals	American Society of Adaptation Professionals
Environmental and Energy Study Institute Fact Sheet Climate Jobs	Environmental and Energy Institute (EESI)
Global Green Skills Report 2022	LinkedIn
U.S. Environmental Protection Agency Climate Adaptation Action Plan	U.S. Environmental Protection Agency (EPA)
Workforce Development Needs of Transportation Sector Climate Adaptation Professionals	National Center for Sustainable Transportation