# CAREER PATHWAYS IN CLEAN ENERGY

Yale Center for Business and the Environment

# What Are The Trends

## GLOBAL CLEAN ENERGY TRENDS

Global renewable energy employment has seen staggering growth in recent years. The renewable energy industry now employs more than 10 million people around the world, nearly double the number employed just five years prior.[1] This number grows significantly when accounting for energy efficiency jobs as well.

## US CLEAN ENERGY TRENDS

For years, the US has been an employment leader within the clean energy industry. As of 2017, nearly 800,000 people worked in renewable energy, and 2.2 million people worked in energy efficiency.[2] An additional 220,000 jobs exist within the clean vehicles industry, nearly half of which support hybrid electric vehicles. For context, the clean energy sector now employs as many workers as there are school teachers in the U.S., and twice as many workers as the fossil fuel industry.[3] Jobs in the wind and solar industries, in particular, have seen astronomical growth. Solar jobs now account for 1 out of every 100 new job in the U.S. economy,[4] and wind is now the third-largest employer among electric generation sources.[3]

## WHERE ARE THE JOBS

The majority of U.S. clean energy jobs are within energy efficiency, mostly coming from small businesses that are involved with construction and installation of energy efficiency solutions.[2] Jobs are relatively evenly split by energy efficiency solution, with EnergyStar appliances and HVAC technologies representing approximately one quarter each, and advanced building materials and efficient lighting each representing a slightly smaller proportion of efficiency job types.[2]

Regarding renewable energy, the majority of jobs remain in bioenergy, but growth in solar and wind industries are shifting the breakdown in recent years. Wind turbine technician has become the fastest-growing profession in the U.S.,[2] and solar employment has grown 9x faster than the overall economy.[4] The vast majority of renewable energy jobs pertain to demand-side services, such as installation and sales. Other popular professions within the renewable energy industry include component manufacturing, project development, construction, financing, engineering, system analysis, and operations and maintenance. Beyond the jobs directly within the clean energy industry, an additional 900,000 government jobs are identified as influencing the clean energy and sustainability jobs market.[2] Other peripheral employers also exist within the think-tank/non-profit, consulting, academic, and research sectors.

Geographically, clean energy jobs now exist in every U.S. state, but some regions have set themselves apart as clean energy employment leaders. Historic pioneers include California, Texas, Florida, New York, and Massachusetts. That said, additional states like Illinois, North Carolina, and Virginia are experiencing substantial job gains as their markets become more comfortable and familiar with these technologies. Beyond renewable energy and efficiency, Michigan and Ohio additionally support thousands of jobs in the clean vehicles industry.

## GETTING THE JOBS

While the rapid gain in clean energy jobs is a strong measure of the industry's success, this speed has also resulted in several "talent gaps", whereby candidates lack the knowledge and skills necessary for these new jobs. A report by NASEO[5] reveals "lack of experience, training, or technical skills" as the top reason for hiring difficulty within the electric power generation, transmission, distribution and storage industry. A second key hiring difficulty within the energy sector is "insufficient qualifications, certifications, education". These are the largest reported hiring difficulties among electric utilities, in wholesale markets, and within energy construction and professional/business services.

## THIS REPORT

This report intends to provide a "pathway" for current FES and SOM students interested in a career in the clean energy sector. In addition to sharing key employment trends and gaps within the sector, this report will share a summary of where Yale energy alumni are today (both geographically and professionally), feature a handful of spotlight interviews from these energy alums, provide a chart for navigating career paths within the clean energy sector, and conclude with resources to help current students best position themselves during their limited time at Yale.

1 "Renewable Energy and Jobs Annual Review 2018." IRENA. May 2018. www.irena.org/publications/2018/May/Renewable-Energy-and-Jobs-Annual-Review-2018

2 "Now Hiring: The Growth of America's Clean Energy & Sustainability Jobs". Environmental Defense Fund Climate Corps. 2017. http://edfclimatecorps.org/sites/edfclimatecorps.org/files/the_growth_of_americas_clean_energy_and_sustainability_jobs.pdf

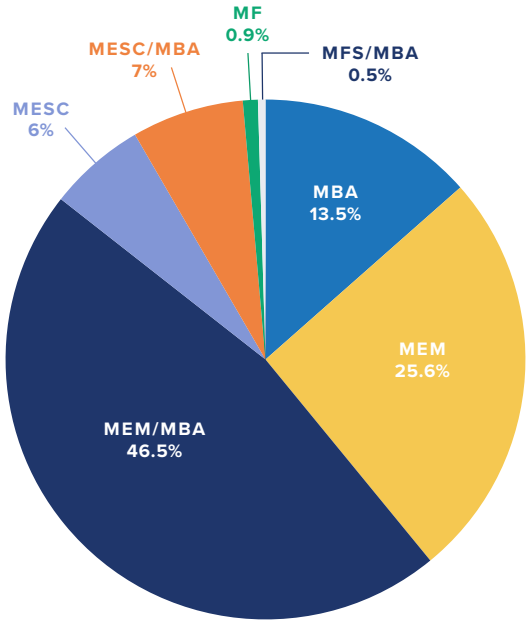
3 "Clean Jobs America". E2. May 2018. https://www.e2.org/wp-content/uploads/2018/05/Clean-Jobs-America-2018.pdf

4 "National Solar Jobs Census 2017". The Solar Foundation. 2017. https://www.thesolarfoundation.org/national/

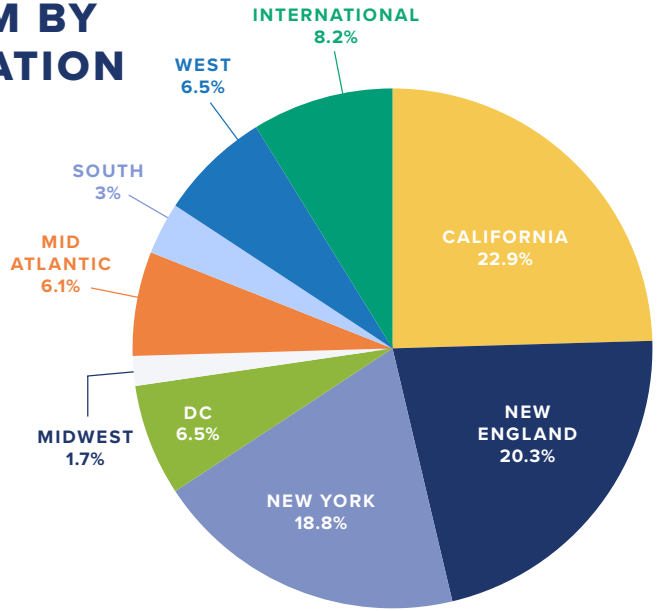
5 "U.S. Energy and Employment Report". National Association of State Energy Officials. May 2018. https://static1.squarespace.com/static/5a98cf80ec4eb7c5cd928c61/t/5afb0ce4575d1f3cdf9ebe36/1526402279839/2018+U.S.+Energy+and+Employment+Report.pdf

# YALE ENERGY ALUMNI DATA

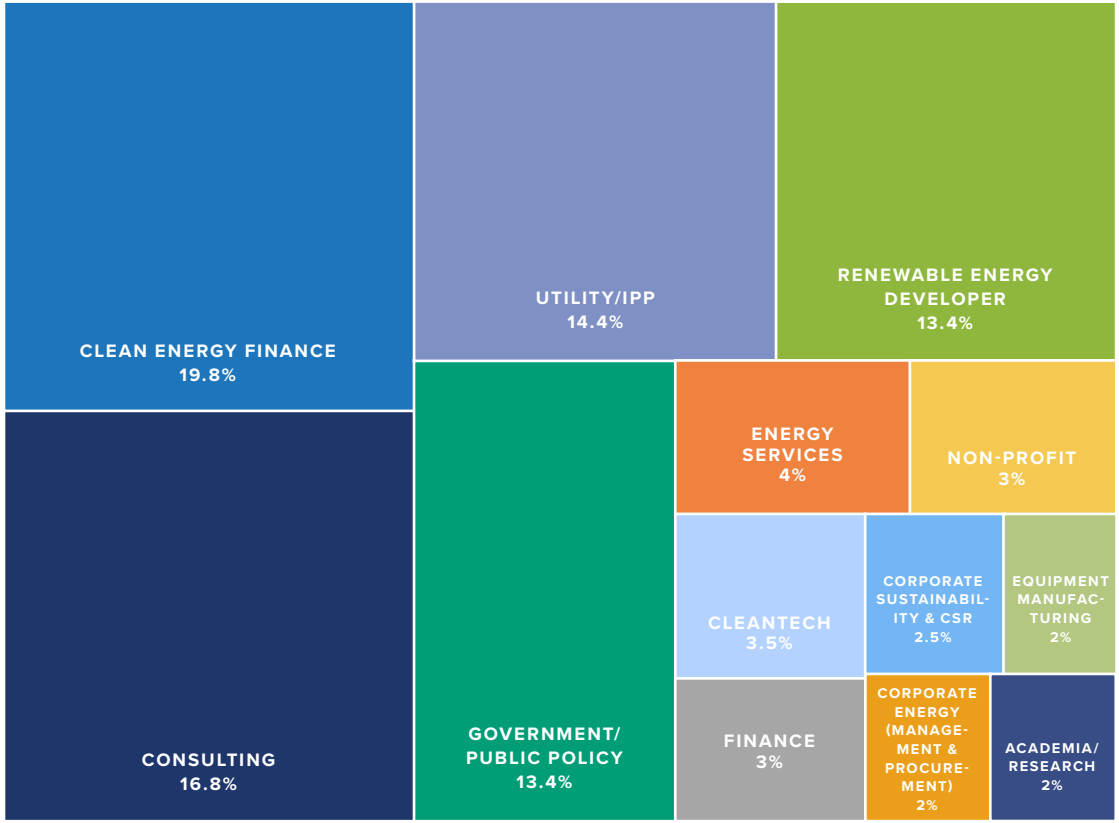
## ALUM BY DEGREE




## ALUM BY LOCATION




## ALUM BY SECTOR



# ALUMNI SPOTLIGHTS

NAME

**Lisa Veliz**

DEGREE/S, FOCUS, YEAR

**MBA/MEM, 2017**

CURRENT ROLE

**Management Associate, Pacific Gas & Electric (PG&E). San Francisco, CA**

## Describe your role with PG&E

I am currently involved in a leadership development program at PG&E, an investor-owned utility that provides natural gas and electric services to millions of California customers. PG&E's leadership program provides a 2-year rotational experience to offer exposure into a variety of the utility's business functions. I spent my first rotation working with the Business Technology team, as part of the IT department. My second (and current) rotation is with the Community Wildfire Safety team, within the Customer Care business unit. Specifically, this work entails managing direct customer outreach, and engaging with external parties to broaden education and awareness to harder-to-reach or more vulnerable customer segments during proactive power shutoffs. My primary priority is to manage several communication workstreams and align operations across all communications channels for customers, which is crucial for broadcasting power emergencies. My second priority is to interface with key third-party groups like NGOs, state agencies, and private entities that have direct relationships with and access to PG&E's most vulnerable customers, and help "evangelize" emergency preparedness around power outages.

PG&E's rotational program was what really enticed me to work with the utility. In the first year, participants are able to express preference for which department they would like to be placed in, but assignments are ultimately left up to the utility. The second year is much more flexible - participants in the program can network in their first year to seek out opportunities for their next rotational.

## What were you doing before Yale?

I really had no prior work experience in the energy industry before my time at Yale. I knew I was interested in exploring a career in the private sector, and wanted to work in a field where there was an opportunity to align environmental and business impacts. Ultimately, I landed on the energy sector to meet these objectives, but also considered corporate sustainability. After my first year at Yale, I still wasn't sure exactly what role or function within the energy sector was most interesting to me. For my first summer, I was an EDF Climate Corp intern and worked with the San Francisco Public Utility Commission. My second summer I interned with PG&E, which helped "feed" me into their rotational program.

## What experiences at Yale were most helpful for your work now?

My summer internships were enormously helpful in securing a full-time role after graduation. I can strongly attribute my job offer from PG&E to my internships with utilities. I would definitely advise against settling for a mediocre internship experience. Hold out for something you think will provide functional skills or networking opportunities for the future. Several courses were also helpful in increasing my confidence in the professional world. Renewable Energy Project Finance, for instance, gave me really good exposure to financial concepts of energy projects. Independent studies also provide valuable opportunities for industry networking, gaining insight into the job market, and creating new bullet points on your resume. I created an independent study around electric vehicles, which gave me an opportunity to talk with lots of experienced people in the field. I was lucky to have an involved and dedicated advisor, but students should also seek out professors or other mentors that can support you in your exploration of project ideas or career paths.

## NOTE:

PG&E has recently suspended its MBA Leadership Development Program. Similar program opportunities are available at National Grid, Sempra Energy, San Diego Gas & Electric, and other utilities.

# ALUMNI SPOTLIGHTS

NAME

**Miles Braxton**

DEGREE/S, FOCUS, YEAR

**Certificate in Financing and Deploying Clean Energy, 2020**

CURRENT ROLE

**Business Development Analyst, Sol Systems**

## Describe your role with SCS

I am an analyst on the Business Development team at Sol Customer Solutions (SCS). My focus is on commercial and industrial-size solar and energy storage solutions for corporate and municipal clients in select state markets on the east coast. Sol Customer Solutions is a joint venture between Sol Systems and the clean energy investment firm Capital Dynamics, which has over $7B in clean energy infrastructure assets across the world.

SCS has a collaborative and fun work environment. Being part of a small team is exciting because it allows me to see the direct impact of my work and its contribution to the overall success of the company. At a high-level, my job is to get solar projects off the ground in SCS' early-stage pipeline. There are three key duties necessary to achieve this goal:

1. I design grid-interconnected and local meter-interconnected photovoltaic (PV) rooftop, ground-mount, and carport array systems using CAD software. Imagine drawing a series of 3D shapes and instantly depicting a solar solution for a prospective client. This is one of the most fun parts of my job.
2. I create and analyze early-stage project financial models to ensure project viability and determine the optimal method of project financing. This requires evaluating factors such as projected Engineering, Procurment and Construction (EPC) costs, development expenses, interconnection costs, array electricity production and efficiency, and revenues from renewable energy credits (RECs) and incentives.
3. I generate detailed business-to-business firm proposals and responses to publicly released requests for proposals (RFPs). This is one of the most important parts of my job, as it engages potential corporate and municipal clients and demonstrates the benefits of "going solar" with SCS.

## How did you get there?

My interest in solar started in my first year at the University of Virginia (UVA). I worked in a PV cell lab under the leadership of Dr. Mool Gupta, the world's most distinguished Photonics researcher. A colleague and I were tasked with improving the efficiency of perovskite solar cells. This experience sparked my interest in renewable energy deployment and innovation as a future career path.

I was very fortunate to have several internships in the sustainability sector while I was at UVA. This exposure helped me narrow down my professional interests and pursue a career that continues to fulfill my passion in clean energy transitions. I held internships at the Montgomery County Department of Environmental Protection, the D.C. Department of Energy and Environment (DOEE), and the SunShot Initiative at the U.S. Department of Energy (DOE). At the DOEE and DOE, I was working at the forefront of solar program implementation, which gave me the chance to see how the public sector engages with and enables the private sector by releasing RFPs and government funding for projects.

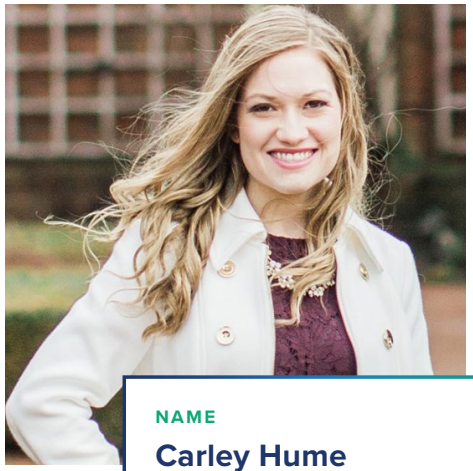
Upon graduating in 2018, I accepted an opportunity at ITility, a small defense contracting company transitioning into renewable energy project development. ITility had won a $2M contract from a municipal administration to convert 220 tons of chicken manure into electricity through anaerobic digestion. While my main role was to create internal project and risk management tools for the new division, I was nonetheless able to utilize my technical skills. I used stoichiometry to analyze energy & mass balance equations/conversions and assisted in selecting an anaerobic digester EPC contractor.

## How do you see the energy sector evolving in the future, and where will the biggest job opportunities emerge?

Energy storage is going to be a very important subject as the clean energy industry continues to expand. Solar technology is one of the cheapest and easiest clean energy systems to finance and deploy at a large scale. While solar panels can only generate electricity during the day, battery storage allows solar to charge a battery and store energy for discharge at a later point in time. This will be essential in the next 50 years as we increase the resiliency of the utility grid and accommodate a growing population and rising energy demand.

The standard battery for energy storage systems is based on a lithium-ion electrolytic reaction. These batteries depend on a lithium compound in the cathode. At the current rate of lithium mining, the element will be completely depleted in the next 40 years. Developing new energy storage technology is no small task, but it will open up many job opportunities for chemical, electrical, and mechanical engineers, and financial analysts. These are all important cogs in financing and building renewable energy and energy storage systems of the future.

# ALUMNI SPOTLIGHTS



NAME

**Carley Hume**

DEGREE/S, FOCUS, YEAR

**MEM, 2015**

CURRENT ROLE

**Strategy Project Manager, New York Power Authority. White Plains, NY**

## Describe your role with NYPA

I am a Strategy Project Manager at the New York Power Authority (NYPA,) the nation's largest state-owned electric utility. NYPA provides low-cost power to public customers throughout the state of New York. We own and operate 25% of the state's generation, a third of its high voltage transmission, and serve end-use customers in a deregulated market with a progressive energy agenda.

As a member of the team going through NYPA's 2030 Strategic Planning cycle, we are taking the lead on evaluating the Authority's long-term strategic priorities, specifically as they pertain to our role in meeting New York's GHG and de-carbonization goals. I also manage project development for an internal program aimed at finding new and innovative ways to provide distributed energy resources to our customers. NYPA's Project Edge program aims to more holistically value distributed assets on the electric grid.

As with most people, my day-to-day work varies quite a bit. On the strategic planning side, I work with our senior leadership and across departments to develop a strategic narrative and get internal buy-in. On the project management side, I oversee the process from customer evaluation through implementation. At this point in program development, we create a custom business model for each customer based on their technical specifications and risk appetite. Eventually, these models mature into distinct service offerings that are widely available to all customers. Success requires my team to collaborate externally with our customers and stakeholders, as well as internally with NYPA's other departments.

## What were you doing before Yale?

Before starting at FES, I worked for the Environmental Protection Agency (EPA) in Washington, D.C. to help implement its Pathfinder Innovations Projects, which awarded seed funding to innovative research projects. I really enjoyed watching innovative research being produced, but found there were not always resources to continue or expand this research after the initial program ended. Going into my first semester at Yale, I knew I was interested in the role of government as a catalyst for new ideas, but wanted to find a route to turn this work into meaningful and scalable applications. I also decided to narrow my focus to clean energy.

After FES, I first worked for the NYC Economic Development Corporation, where I represented the City on the NYC Solar Partnership. Just over a year ago, I made the transition to NYPA. It's worth mentioning that I was directed to both of these jobs through Yale connections.

## What experiences at Yale were most helpful for your work now?

Unfortunately, I didn't take many financial courses at Yale, but learned a lot from Financing Green Technologies with Richard Kauffman and Financial Concepts for Environmental Managers with Maureen Burke. Energy Systems Analysis has been incredibly helpful in getting a "macro lens" on the energy sector. The consulting clinics provided great hands-on experience as well - I did a project with Chipotle as part of the Business & Environment consulting clinic. CBEY offers a great network and supports student exploration of topics and ideas. I helped CBEY with their Sabin and Sabotka Prizes for funding innovative solutions, which aligned closely with my career interests.

## How do you see the energy sector evolving in the future, and where will the biggest job opportunities emerge?

It is my view that the distribution side of the grid will see some of the biggest changes and opportunities in the utility industry. Customers are expecting an "Amazon" for utilities, where they are engaged and empowered actors in their energy consumption. Going forward, more job opportunities will emerge in customer engagement and advocacy, as well as customer-sited energy. This will require softer skillsets to make complex technologies and systems more digestible for a new "owner" or "end-user". The industry will be looking to hire "bridge-builders" between the financial and technical side and the community side. I have full confidence that FES will be able to prepare its students for these types of exciting and necessary roles in the energy marketplace.

# ALUMNI SPOTLIGHTS

NAME

**Ben Serrurier**

DEGREE/S, FOCUS, YEAR

**MEM, 2017**

CURRENT ROLE

**Policy Manager, Western Markets. Cypress Creek Renewables. San Francisco, CA**

## Describe your role with Cypress Creek:

I am the Policy Manager for Western Markets at Cypress Creek, and I sit within the Government and Political Affairs team. Cypress Creek is a full-service solar and storage project developer, which means we are involved in the complete life cycle of solar and storage projects from siting, development and permitting to EPC and long-term asset management.

Most of my job is focused on the steps that happen before we even begin developing projects in a particular market. At a high level my job is looking at markets where we are not yet significant players, figuring out the key policy and economic drivers in that market, understanding what opportunities might exist within that market, and ultimately helping to improve the landscape for solar and storage development in these new markets that we are considering expanding into. There are three key areas that I focus on:

1. Monitoring and intervening in legislative and policy work happening at state legislatures.
2. Actively engaging in public utility commission proceedings at the state-level focused on utility resource planning, implementation of federal laws like PURPA and getting into the weeds on technical rule-making for issues like interconnection.
3. Developing and implementing a broader strategy in new markets, which may include activities like supporting ballot initiatives, conducting outreach and education in local communities, and reputation building.

## What were you doing before Yale?

I received my Bachelor's degree in Politics and Environmental Studies from Whitman College in Washington state. After college I moved to Seattle and worked for Climate Solutions, a climate and clean energy nonprofit organization focused regionally on the Northwest. I worked on a range of energy-related projects including transportation fuels, energy efficiency and grid management policies for the Bonneville Power Authority. It was during these few years that I spent with Climate Solutions that I really began to see the connections between climate systems and energy systems, which ultimately became my focus at Yale.

## What experiences at Yale where the most helpful for your work now?

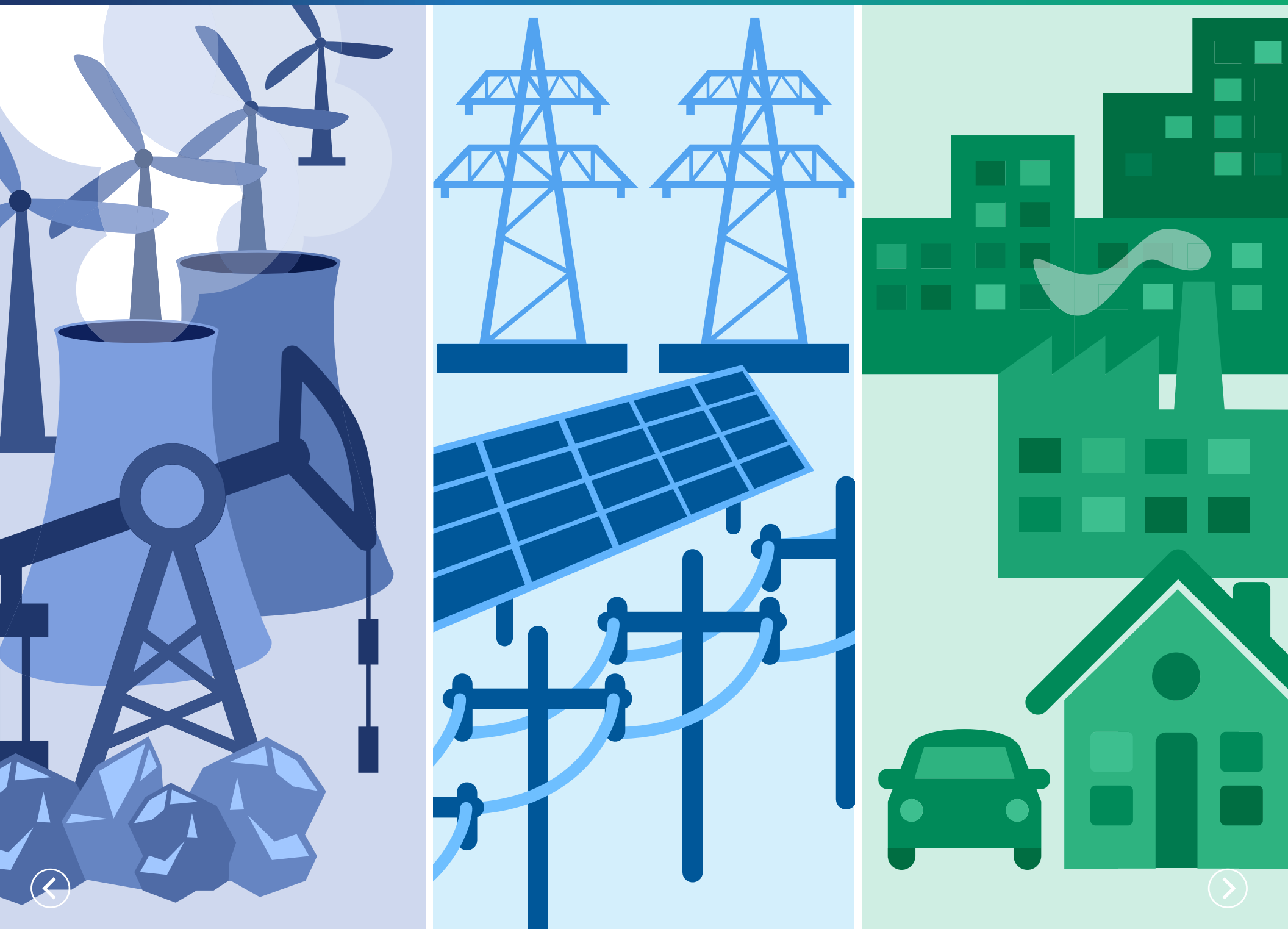
I took just about every energy class that was offered at FES, SOM and the Law School and found most to be helpful in some capacity. However, the most valuable experiences for me were outside of the classroom including client-focused projects, conferences, and the various clubs & SIGs.

One of the great opportunities of being a graduate student is the ability to explore new interests and structure your time however you want. I had the ability to watch a technical conference held at FERC during my second year at FES, and I learned so much from that experience. I went into my interview with Cypress Creek several weeks after attending the conference and was able to speak meaningfully about these cutting-edge technical policy issues in a way that learning about them in a classroom might not have prepared me.

## Your role requires you to make decisions based on rapidly evolving information - how do you stay up-to-date on the markets that you track?

I joke that much of job is simply making sure that there are no surprises, which can be quite difficult because there is so little press coverage on these niche regulatory issues. I've found Twitter to be a great resource for tracking the energy industry and personally follow a number of energy practitioners, academics and policy makers. Twitter updates also have the added benefit of being extremely timely and tend to come with first-cut analysis on the news of the day. I also subscribe to a number of industry publications like Utility Dive and AEE Power Suite. The biggest challenge for me is staying up-to-date on regulatory proceedings and legislative updates and I get a big assist from our trade organization on this. It is their job to be my eyes and ears on the ground and track these regulations step by step.

# ENERGY SYSTEM CAREERS



# Full System

Fuels

Equipment

Upstream Ecosystem

Generation

Transmission/ Transportation

Distribution

Midstream Ecosystem

Residential

Transportation

Commercial

Industrial

Downstream Ecosystem

UPSTREAM

MIDSTREAM

DOWNSTREAM

# Upstream

Creating/developing the inputs required for useful energy

Fuels

Equipment

Upstream Ecosystem

# Fuels

Includes liquid and solid fossil fuels and biofuels

| Job Topic | Job Role/Function (Sample Employers) |
|---|---|
| FOSSIL | **Exploration** (Anadarko)<br>**Mining/Extraction** (Chesapeake)<br>**Refining** (Chevron, Shell)<br>**Siting and Permitting** (County Office)<br>**Trading** (JP Morgan Chase desk) |
| RENEWABLE | **Resource Measurement** (Solargis)<br>**Feedstock Development** (Renewable Energy Group)<br>**Siting Assessment/Permitting** (Tetra Tech) |

**UPSTREAM** › Equipment

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Equipment

Infrastructure to capture and transform chemical, mechanical or solar energy

| Job Topic | Job Role/Function (Sample Employers) |
|---|---|
| **FOSSIL** | **Manufacturers** (GE)<br>**Services** (Halliburton)<br>**Policy/Regulation** (UL) |
| **RENEWABLE** | **Manufacturers** (Vestas, First Solar)<br>**Distributors**<br>**Policy/regulation** (EnergyStar)<br>**Investment/finance** (DBL Partners, Khosla Ventures) |

**UPSTREAM** › Fuels

**UPSTREAM** › Ecosystem Jobs

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

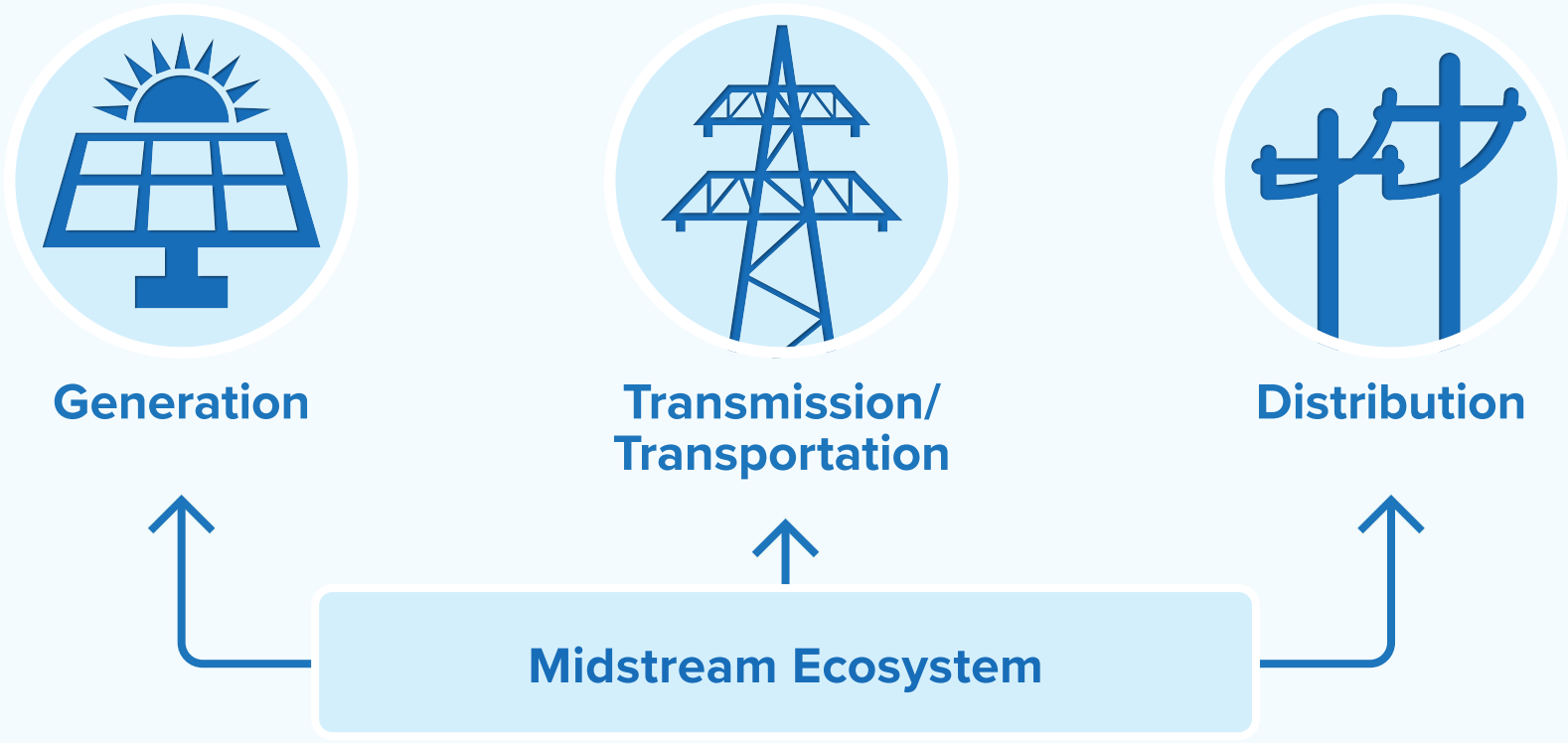
# Upstream Ecosystem Jobs

These are jobs that support and influence fuels and equipment roles

| Job Topic | Sample Employers |
|---|---|
| ADVOCACY/POLICY/ LOBBYING | Sierra Club, The Nature Conservancy, Western Resource Advocates, SolarWorld |
| TRADE ORGANIZATIONS | Solar Energy Industries Association, American Wind Energy Association |
| RESEARCH AND DEVELOPMENT | Department of Energy, National Research Labs (i.e. NREL) |

# Midstream

The production and movement of useful forms of energy




UPSTREAM › Equipment

MIDSTREAM › Generation

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Generation

The process of generating useful energy from primary energy sources

| JOB TOPIC | Job Role/Function (Sample Employers) |
|---|---|
| PROJECT CONSTRUCTION | **Engineering, Procurement and Construction** (Swinerton Renewable Energy, Sunworks)<br>**Developers** (NextEra, NRG, Southern Company, Dominion) |
| POWER MARKETING | **Energy Trading** (JP Morgan, Goldman Sachs)<br>**Energy Contracting** (Level 10, Edison Energy)<br>**Wholesale Market Administration** (ISO New England, California ISO) |
| INVESTMENT/FINANCE | **Project Finance** (GE Capital)<br>**Tax Equity** (Goldman Sachs) |
| ASSET MANAGEMENT | **Asset Ownership** (Pension Funds - CalPERS)<br>**Contract Management** (Law Firm)<br>**O&M** (Cypress Creek, Frist Solar) |
| ENVIRONMENTAL ATTRIBUTES | **RECs Trading** (SolSystems, SRECTrade)<br>**Lifecycle Analyst** (Navigant, ICF)<br>**RPS Compliance** (State PUC)<br>**Certification** (Green-E) |

MIDSTREAM

**MIDSTREAM** › Transmission/Transportation

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Transmission/Transportation

The process of moving useful energy from where it is generated or produced to its distribution network

| Job Topic | Job Role/Function (Sample Employers) |
|---|---|
| CONSTRUCTION AND O&M | **Pipeline Developer** (Kinder Morgan)<br>**Transmission Developer** (Avangrid)<br>**Transmission Construction** (Aecom)<br>**Asset Management** (Eversource) |
| INVESTMENT/FINANCE | **Investors/Financiers** (*Berkshire Hathaway)* |

**MIDSTREAM** › Generation

**MIDSTREAM** › Distribution

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Distribution

The process of distributing and delivering useful energy to where it is demanded

| Job Topic | Job Role/Function (Sample Employers) |
|---|---|
| INFRASTRUCTURE | **Distribution Grid Developer** (ConEdison)<br>**EV Charging Station** (Chargepoint) |
| ENERGY STORAGE AND MICROGRIDS | **Offgrid and Emergency Energy** (Siemens)<br>**Network Upgrade Deferral** (Fluence) |
| GRIDEDGE SERVICES | **Software Providers** (Ventyx)<br>**Forecasting and Analytics** (IBM, Intel, SAS) |

**MIDSTREAM** › Transmission/Transportation

**MIDSTREAM** › Ecosystem Jobs

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Midstream Ecosystem Jobs

These are jobs that support and influence generation, transmission/transportation, and distribution sectors

| Job Topic | Sample Employers |
|---|---|
| ADVOCACY/POLICY/ LOBBYING | Rocky Mountain Institute, Regulatory Assistance Project, Climate Policy Initiative |
| TRADE ORGANIZATIONS | Business Renewables Center, Smart Electric Power Alliance, American Petroleum Institute |
| REGULATION/OVERSIGHT | FERC, RTOs/ISOs, Public Utility Commissions |
| RESEARCH AND DEVELOPMENT | Department of Energy, National Research Labs (i.e. NREL) |

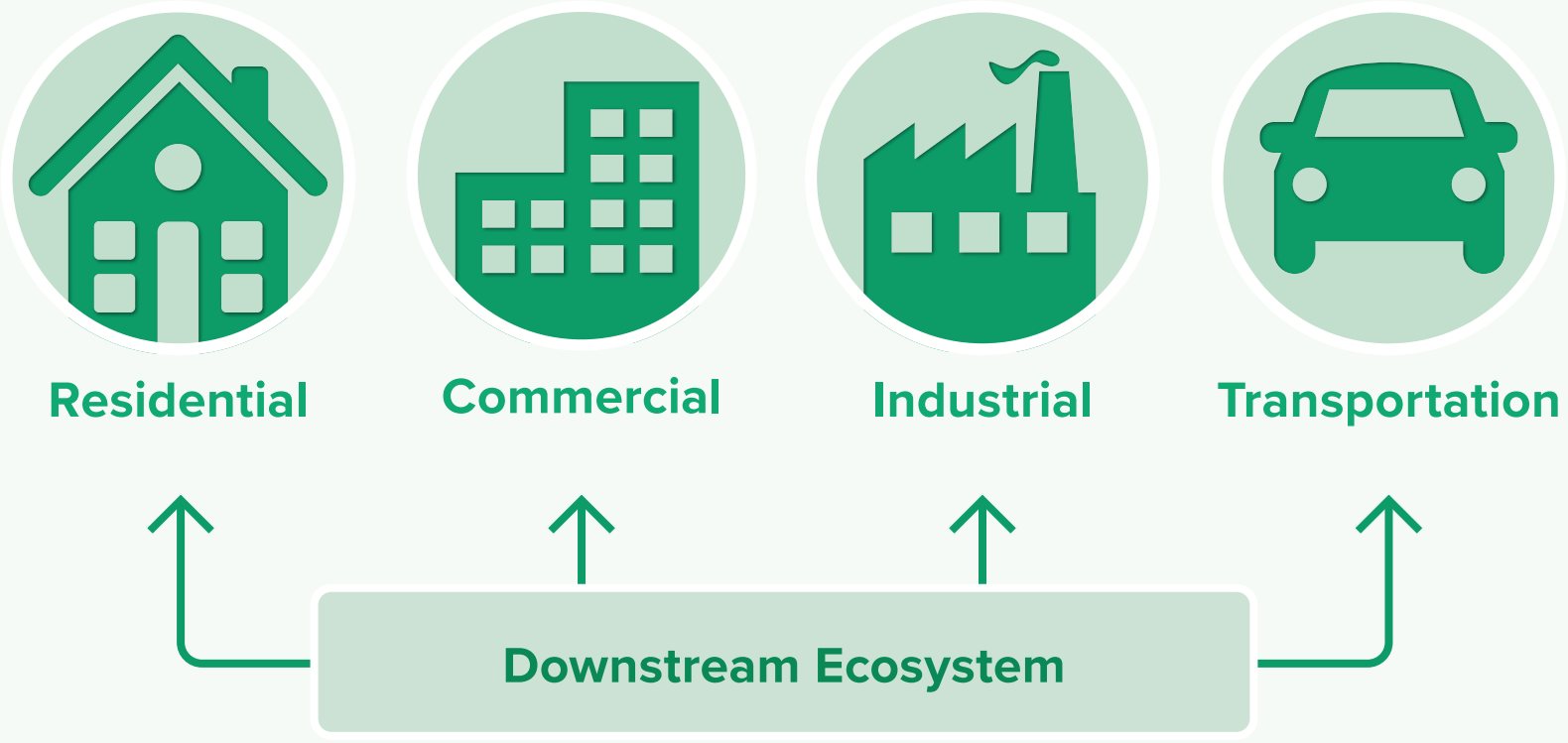
MIDSTREAM › Transmission/Transportation

DOWNSTREAM

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Downstream

Consumption of energy services by end-users




MIDSTREAM › Ecosystem Jobs

DOWNSTREAM › Residential

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Residential

The consumption of energy services by residential customers

| Job Topic | Job Role/Function (Sample Employers) |
|---|---|
| CUSTOMER-SITED RENEWABLES | **Rooftop Solar Developer** (Vivint Solar)<br>**Solar Lenders** (NYSERDA)<br>**Storage Developer** (Tesla, Stem) |
| BEHAVIOR CHANGE | **Efficient Appliances** (GE)<br>**Efficiency Management** (Nest, Samsung, Apple)<br>**Energy Efficiency Contracting** (ClearResult) |
| SMART HOME | **Behavioral Economics** (O-Power)<br>**Dynamic Retail Pricing** (PG&E) |

DOWNSTREAM

DOWNSTREAM › Commercial

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Commercial

The consumption of energy services by businesses and other commercial customers

| Job Topic | Job Role/Function (Sample Employers) |
|---|---|
| CORPORATE ENERGY MANAGEMENT & PROCUREMENT | **Energy Manager/Operations** (Google, Microsoft)<br>**Procurement and Advisory Services** (Edison Energy) |
| DEMAND/BILL MANAGEMENT | **Peak Load Shifting/Reduction** (EnerNOC)<br>**Energy Efficiency Contracting** (Ameresco)<br>**Behind the Meter Storage** (Stem) |
| CUSTOMER-SITED RENEWABLES | **Solar EPC** (Sunworks) |
| COMMERCIAL ENERGY FINANCING | **Property-Assessed Clean Energy** (Connecticut Green Bank, Greenworks Lending)<br>**On-Bill Financing** (SDG&E) |

**DOWNSTREAM** › Residential

**DOWNSTREAM** › Transportation

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Transportation

The consumption of energy services by vehicles

| Job Topic | Job Role/Function (Sample Employers) |
|---|---|
| HOME/OFFICE CHARGING | **Charging Developer** (Chargepoint, EVgo)<br>**Smart Charging Programs** (PG&E, eMotorWerks) |
| MOBILITY PROVIDER | **Ride Sharing** (Uber, Lyft, Lime)<br>**Vehicle Providers** (GM, Tesla, Toyota, Proterra)<br>**Public Mobility** (MTA, Port Authority, BART) |

**DOWNSTREAM** › Commercial

**DOWNSTREAM** › Industrial

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Industrial

The consumption of energy services by industrial and manufacturing customers

| Job Topic | Job Role/Function (Sample Employers) |
|---|---|
| ENERGY MANAGEMENT AND PROCUREMENT | **Continuous Improvement - Lean, Six Sigma** (Consultants-Bain)<br>**Energy Hedging/Trading** (Shell)<br>**Energy Engineer** (Rise Engineering)<br>**Procurement and Advisory Services** (Edison Energy)<br>**Advocacy and Lobbying** (REBA, BRC) |
| CERTIFICATION/ VERIFICATION | **Energy Auditor** (Engineering Consultant)<br>**Voluntary Compliance and Management** (ISO Consultant) |

**DOWNSTREAM** › Transportation

**DOWNSTREAM** › Ecosystem Jobs

FULL SYSTEM | UPSTREAM | MIDSTREAM | DOWNSTREAM

# Downstream Ecosystem Jobs

These are jobs that support and influence energy services across all end-users

| Job Topic | Sample Employers |
|---|---|
| ADVOCACY/POLICY/ LOBBYING | Green For All, TransForm, Alliance to Save Energy |
| TRADE ORGANIZATIONS | World Business Council for Sustainable Development, US Green Building Council |
| REGULATION/OVERSIGHT | Local zoning boards |
| RESEARCH | Pecan Street, Clean Coalition, IoT Consortium |

DOWNSTREAM › Industrial

## News/Media Outlets:

- Greentech Media
- UtilityDive
- Bloomberg New Energy Finance
- GreenBiz
- Vox
- E&E
- NRDC Switchboard

## Academic Journals/Magazines:

- Energy Policy
- Clean Energy Finance Forum
- Electricity Policy
- RTO Insider

## On Campus Resources:

- CBEY
- E-SIG + SOM Energy Club
- Energy Learning Community
- CBEY Online Certificate – Financing and Deploying Clean Energy

## Classes:

- Renewable Energy Project Finance
- **Energy Economics and Policy Analysis**
- **Energy Systems Analysis**
- Financing Green Technologies
- Electric Utilities
- Renewable Energy

## Podcasts:

- The Energy Gang
- Political Climate
- The Energy Transition Show
- Berkeley Energy Lab
- Currents