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ENERGY EQUITY 101

DESCRIPTION

Energy Equity 101 introduces the fundamentals of energy literacy, exploring how energy flows through natural and human systems, the differences between energy sources, and the importance of efficiency and conservation. It examines the historical and social dimensions of energy equity and environmental justice, highlighting the role of community engagement and policy in shaping a sustainable energy future. Through real-world examples and critical analysis, participants will learn how individuals and institutions can influence energy systems to advance climate resilience and social equity.

LEARNING OBJECTIVES

After completing this course, you should be able to:

1. trace energy flows and think in terms of energy systems;
2. understand how much energy you use, what you use it for, and where it comes from;
3. assess the credibility of information about energy;
4. communicate about energy and energy use in meaningful ways;
5. make informed energy use decisions based on an understanding of the impacts and consequences; and
6. choose to continue learning about energy throughout your life.

FORMAT

Energy Equity 101 is a self-paced online course that includes 7 video lessons of 15-30 minutes each. At normal playback speed, the entire course is approximately 3 hours. You may watch the videos on YouTube or earn a certificate of completion by taking the quiz version. There are 45 multiple-choice questions in the quiz version and you will have two attempts to complete each video assignment.

[Continues on next page]

OUTLINE

UNIT	DURATION	LEARNING OBJECTIVES
Unit 1: Energy Defined	19:32	• Summarize the importance of energy literacy. • Define energy and name the natural and market sources of energy. • Explain how energy flows through ecosystems and how humans are part of that process. • Explain the difference between potential energy and kinetic energy using everyday examples. • State the first and second laws of thermodynamics. • Define power and identify units of measuring power.
Unit 2: Equity Defined	31:36	• Interpret the role of historical inequities in shaping the modern energy landscape in the U.S. • Critically evaluate common approaches to differentiating between equity and equality. • Identify examples of environmental injustice. • Explain why community engagement is crucial to shaping a clean energy future. • Explain how governments and utility companies could advance energy equity.
Unit 2 Conversation	17:14	
Unit 3: Energy & Climate Change	31:23	• List examples of renewable and nonrenewable energy sources and explain the advantages and disadvantages of each. • Describe the connection between slowing climate change and restoring and protecting natural spaces. • Describe how solar electricity generation varies throughout the day. • Define the concept of net energy. • Explain the importance of electrification.
Unit 4: Energy Consumption	28:21	• Differentiate between energy efficiency and energy conservation and provide examples of each. • Explain why electricity is a flexible form of energy. • Explain why some energy sources are subsidized. • Explain the relationship between energy services and energy efficiency.

		• Describe energy saving opportunities in the transportation sector.
Unit 5: Energy Policy & Advocacy	16:30	• Describe how energy demand varies throughout the day. • Define the duck curve. • Explain how an energy-efficient smart grid can save energy and money. • Explain why a transition to a sustainable energy system is needed. • List ways an individual community member can influence energy policy.
Unit 5 Conversation	22:46	

LAND AND LABOR ACKNOWLEDGEMENT

We acknowledge the violent systemic injustices upon which our settlement came into being.

We extend our respect to the past, present, and future Luiseno, Cahuilla, Cupeno, Kumeyaay, and Northern Diegueño people who have lived on and cared for this land since time immemorial. We honor their continued legacy of stewardship and reciprocal balance with the land and we uphold their knowledge that we are part of, not separate from, the natural world.

We acknowledge that our nation was built by the enslavement of Black and Indigenous people, families, and communities. We also recognize the many workers from China, Mexico, Central and South America, and the Philippines, as well as countless women and children whose forced or underfunded labor continues today. It is our shared responsibility to face these truths and to actively dismantle their ongoing impacts.

PARTICIPANT RESPONSIBILITIES

In order to gain the most out of the course, you should complete all five units including the two interviews. In the quiz version, be sure to progress to the very end of the video and click “Submit and Continue” to complete each lesson.

ABOUT IGC

In Good Company is a 501(c)(3) nonprofit organization in San Diego, California on a mission to catalyze environmental justice through education and engagement. IGC works to reduce harmful emissions and increase quality of life indicators for overburdened communities through accessible climate education programs including Carbon Literacy certificates and Climate Fresk workshops. Learn more at www.IGC.earth

FUNDERS & PARTNERS

Ms. Tanisha Jean Martin of **San Diego Urban Sustainability Coalition** (SDUSC) provided significant contributions to this course. SDUSC's mission is to inform policy, drive equitable processes, and improve quality of life by expanding opportunities for Southeast San Diego and other historically resilient communities.

Energy Equity 101 and the Community Clean Energy Microcredential (CCEM) is funded by San Diego Community Power with additional support from San Diego Foundation and Calpine Energy Solutions. This program is administered by San Diego Foundation.

San Diego Community Power is a community-driven, not-for-profit public agency providing cleaner energy to the San Diego region.

San Diego Foundation inspires enduring philanthropy and enables community solutions to improve the quality of life in our region.

KEY TERMS

Biofuels - Fuels that are produced from biomass. They can be produced from plants, animal waste, or from other sources of bio waste.

British Thermal Unit (BTU) - A unit of energy used to measure heat - the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit at a specified temperature.

California Energy Commission (CEC) - California's primary energy policy and planning agency. The CEC is responsible for developing state energy policy, advancing renewable energy and energy efficiency, and ensuring the reliability and affordability of the state's energy system.

California Independent System Operator (CAISO) - A nonprofit Independent System Operator serving California. CAISO oversees the operation of the state's bulk electric power system, transmission lines, and electricity market.

California Public Utilities Commission (CPUC) - An agency that regulates privately owned public utilities in California.

Chemical Energy - Energy that is stored in the bonds of molecules. Food contains chemical energy.

Climate Justice - Remediation of the impacts of climate change on poor people and people of color, and compensation for harms suffered by such communities due to climate change (IEJ).

Cogeneration - Also known as combined heat and power (CHP). It's a process where a single fuel source is used to produce both electricity and useful heat at the same time.

Commercial Energy - Energy that is bought and sold in the marketplace.

Community Choice Aggregator (CCA) - Public agencies that aggregate (or pool) the buying power of individual customers within a defined area to secure alternative energy supply contracts.

Decarbonization - The process of reducing carbon emissions, particularly through transitioning to renewable energy and sustainable practices across industries.

Demand-side Management - The use of programs and strategies to encourage consumers to use electricity more efficiently or shift usage to off-peak times.

Demand Curve (Electricity Demand Curve or Electric Load Curve) - A graph that shows the total amount of electricity demanded by consumers over a given period of time.

Demand Response - When electricity users reduce or shift their power use during peak times in response to price signals or incentives, helping balance supply and demand on the grid.

Department of Energy (DOE) - An executive department of the U.S. federal government that oversees national energy policy and production.

Distributed Energy Resources (DER) - Small-scale energy resources usually situated near sites of electricity use, such as rooftop solar panels and battery storage (IEA.org). DER can be connected to electric grids or isolated, with energy flowing only to specific sites or functions. DER includes energy generation technologies and energy storage systems. When energy generation occurs through distributed energy resources, it's referred to as distributed generation (IBM.com).

Duck Curve - The drop in net electricity demand midday because of high solar generation, followed by a steep rise in the evening. Graphically, this curve resembles a duck.

Electric Service Provider (ESP) - A non-utility entity that offers "Direct Access" electric service to customers located within the service territory of an investor-owned utility. ESPs are required to register with the California Public Utilities Commission (see energy.ca.gov).

Electric Vehicle (EV) - A vehicle that uses electricity stored in a battery rather than a combustion engine.

Electrical Energy - Energy that flows as charged particles.

Electrical Grid - An interconnected network for electricity delivery from producers to consumers.

Electricity - A form of energy resulting from charged particles (electrons and protons).

Energy - The capacity or ability to do work or transfer heat. In scientific terms, work is done when any object is moved a certain distance.

Energy Burden - The percent of a household's median annual income that is used to pay for electricity and gas bills.

Energy Conservation - The effort to reduce wasteful energy consumption by using fewer energy services.

Energy Democracy - The notion that communities should have a say and agency in shaping and participating in their energy future (IEJ).

Energy Density - The amount of energy contained within a given volume of an energy source.

Energy Efficiency - Using less energy to accomplish a given task - the process of reducing the amount of energy required to provide products and services.

Energy Insecurity - The inability to meet basic household energy needs due to the high cost of energy (IEJ).

Energy Justice (and Energy Equity) - The goal of achieving equity in both the social and economic participation in the energy system, while also remediating social, economic, and health burdens on those by the energy system (IEJ).

Energy Poverty - A lack of access to basic, life-sustaining energy (IEJ).

Energy Service Provider (ESP) - A non-utility entity that offers direct access to customers in the service territory of an Investor-owned Utility.

Energy Services - the functions and benefits derived from energy use, such as the light from a lamp or mobility from a train.

Energy Vampires - appliances and devices that draw electricity even when they're not in use.

Environmental Justice - Recognition and remediation of the disproportionately high and adverse human health or environmental effects on communities of color and low-income communities (IEJ).

Federal Energy Regulatory Commission (FERC) - An independent agency of the U.S. government that regulates the interstate transmission and wholesale sale of electricity and gas and regulates the prices of interstate transport of petroleum by pipeline.

Fossil Fuels - Fuels containing carbon - coal, oil and gas - that were formed over millions of years through the decay, burial and compaction of rotting vegetation on land, and of marine organisms on the seafloor. Burning fossil fuels is the major way in which humans add to the greenhouse gases in the atmosphere.

Geothermal Energy - thermal energy that is extracted from the Earth's crust.

Gigawatt (GW) - Equal to one billion (1,000,000,000) watts

Gigawatt Hour (Gwh) - The use or generation of one gigawatt over the course of one hour.

Green Jobs - Jobs that contribute to environmental sustainability, such as in renewable energy, conservation, or low-carbon technologies.

Greenhouse Gas (GHG) - Gases such as carbon dioxide and methane that trap heat in Earth's atmosphere, causing global warming.

Investor-owned Utility (IOU) - Utility companies that work like for-profit corporations and are publicly or privately owned by shareholders. Common IOUs include electricity, gas, water, and sewage companies.

Joule - The amount of energy required to accelerate a still 1kg object to a speed of 1 meter per second in one second or to lift a 1kg object about 10 centimeters vertically.

Just Transition - A transition away from the fossil-fuel economy to a new green economy that provides dignified, productive, and ecologically sustainable livelihoods; democratic governance; and ecological resilience (IEJ).

Kilocalory (kcal) - One kilocalory is the energy required to raise the temperature of 1 kg of water by 1^0C. The kcal is the unit used to express the energy content of food.

Kilogram (kg) - A unit of measuring weight equal to 1,000 grams.

Kilowatt (kW) - Equal to one thousand (1,000) watts.

Kilowatt Hour (kWh) - A unit of energy equal to 3.6 megajoules (MJ), which is the energy delivered by one kilowatt of power for one hour.

Kinetic Energy - A form of energy of an object in motion. For example, a ball rolling down a hill has kinetic energy.

Load Serving Entity (LSE) - An entity responsible for managing and distributing electricity to customers within a specific service area. These entities can be utilities, power marketers, or other authorized entities providing energy services.

Matter - Any substance that has mass and takes up space by having volume. Anything that can be touched.

Mechanical Energy - Mechanical energy is energy involved in the movement of matter. Think of a gear or a moving wind turbine.

Megawatt (MW) - Equal to one million (1,000,000) watts.

Natural Gas - A naturally occurring compound of gaseous hydrocarbons, primarily methane. Methane is a colorless and odorless combustible gas.

Net Demand - The total electricity demand minus the demand met by renewable sources.

Net Energy - The amount of energy available after subtracting the energy spent to extract, process, and transport it to its end user.

Net Energy Metering (NEM) - A policy framework originally designed to incentivize the adoption of rooftop solar by allowing customers to offset their energy usage with the electricity they generate. Under NEM, customers can send excess energy back to the grid in exchange for bill credits.

Net Zero - A target of completely negating the amount of greenhouse gases produced by human activity, to be achieved by reducing emissions and implementing methods of absorbing carbon dioxide from the atmosphere.

Nuclear Energy - The energy released during nuclear fission or fusion, especially when used to generate electricity.

Photosynthesis - A biological process by which most plants (and some algae and cyanobacteria) convert light energy into chemical energy to fuel their metabolism.

Photovoltaics (PV) - The conversion of light into electricity using semiconducting materials that exhibit the photovoltaic effect, a phenomenon studied in physics, photochemistry, and electrochemistry. The photovoltaic effect is commercially used for electricity generation and as photosensors.

Potential Energy - Stored energy that depends on the relative position of various parts of a system. A ball sitting at the top of a hill, for example, has potential energy.

Power - The rate of energy transfer. Power is measured in Joules per second, or watts.

Radiant Energy - Energy that is transmitted as electromagnetic waves. Radio waves, visible light, and X-rays are forms of radiant energy.

Reach Code - Local building code that goes beyond the minimum requirements set by the state for energy efficiency and energy performance of buildings.

Redlining - A practice in the 1930s where banks in the U.S. were encouraged by the federal government to deny mortgage loans to residents in predominantly Black and Brown neighborhoods, which were outlined in red on maps.

Renewable Energy - Energy from sources that are replenished naturally, such as wind, solar, and hydropower, offering a cleaner alternative to fossil fuels.

Smart Grid - The two-way flow of electricity and information between consumers and their utilities that reduces waste by actively monitoring and adjusting electricity use.

Solar Cells - An electronic device that converts the energy of light directly into electricity by means of the photovoltaic effect. Also known as a photovoltaic cell (PV cell).

Solar Energy - The Sun's rays, or sunlight, is the electromagnetic radiation emitted by the sun. It includes ultraviolet radiation, visible light, and infrared radiation.

Thermal Energy - Thermal energy is heat. Heat flows from an object with higher temperature to one with lower temperature.

Thermodynamics - The study of energy and its transformations.

First Law of Thermodynamics - Energy cannot be created or destroyed; it can change from one form to another.

Second Law of Thermodynamics - When energy is converted from one form to another, the result is lower-quality or less-usable energy - some of it is degraded to heat.

Time-of-Use (TOU) - A pricing structure commonly used by utility companies for electricity, where the cost of the service varies based on the time of day, day of the week, and the season it is consumed.

Transmission and Distribution - The long-distance route high-voltage electricity takes from a generating site to an electrical substation (transmission) plus the wiring from the substation to homes and businesses (distribution).

Urban Heat Island - Urban areas with limited greenery become "islands" of higher temperatures relative to outlying areas.

Utility Distribution Company - Electric utility or subsidiary of an electric utility that distributes electricity to customers.

Watt - A unit of power equal to 1 joule per second.

RESOURCE LIST

Resource	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
5 Calls app		X			X
Beal, S., LISC San Diego, Redlining in San Diego		X			
Bullard Center for Environmental Justice		X			
California Coast Credit Union, Financial Fitness & Coaching				X	
California Energy Commission (CEC)		X			X
California Independent Systems Operator (CAISO)					X
California Independent Systems Operator (CAISO), Today's Outlook				X	
California Public Utilities Commission (CPUC)		X			

Resource	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
California Public Utilities Commission (CPUC), Rate Comparison Tool		X			
Carbon Literacy Project (CLP)		X			
Climate Action Campaign (CAC)		X			
Climate Action Now app		X			
Climate Reality Project, Climate Reality Leader Training		X			
County of San Diego, Health and Human Services Agency, 2022 Map Atlas, Asthma		X			
Energy Information Administration (EIA)	X				
Energy Information Administration (EIA), Average Price of Electricity		X			
Energy Information Administration (EIA), U.S. Energy Facts Explained				X	
Farm Bureau San Diego County, Farmers Markets				X	
Green Student Guide				X	
GRID Alternatives		X			
Hassenzahl, D., Hager, M., Gift, N., Berg, L., Raven, P., Environment, 10th Edition, 10th Edition	X		X	X	
In Good Company (IGC), Carbon Literacy Certification		X			
Initiative for Energy Justice (IEJ)		X			
International Center for Technology Assessment (ICTA)				X	
Lawrence Livermore National Laboratory				X	
Lawrence Livermore National Laboratory, Energy Flow Charts				X	

Resource	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
Miller, G.T., Spoolman, S.E., Andrews-Brown, D.M., Environmental Science, 17th Edition	X		X	X	X
Our World in Data			X		
Our World in Data, Safest Sources of Energy					X
Project Drawdown			X		
Public Advocates Office				X	
Public Power San Diego		X			
Robinson, D., BBC. '3.5% rule': How a small minority can change the world		X			X
Rocky Mountain Institute		X			
Rosenow, J., Energy Institute Knowledge, What is the primary energy fallacy?				X	
San Diego 350		X			
San Diego Urban Sustainability Coalition (SDUSC)		X			
San Diego Gas & Electric (SDGE) Assistance Programs - CARE & FERA		X			
United States Department of Energy (DOE), Energy Literacy	X				
University of San Diego, Quality of Life Dashboard, Residential Energy Use		X			