**Our Energy Future**

**Additional Resources - Glossary**

**Abiotic stress genes**: Caused by drought, salinity, toxic metals, temperature extremes, and nutrient poor soils are among the major constraints to plant growth and crop production worldwide

**ATP (Adenosine Triphosphate)**: Considered by biologists to be the energy currency of life. It is the high-energy molecule that stores the energy we need to do just about everything we do.

**Artificial Photosynthesis**: The chemical process that replicates the natural process of photosynthesis whereby sunlight, water, and carbon dioxide are used to convert into carbohydrates and oxygen.

**ABC (Atmospheric Brown Clouds)**: Observed as widespread layers of brownish haze, are regional scale plumes of air pollutants, consisting of mainly aerosol particles, such as black carbon (BC), and precursor gases which produce aerosols and ozone

**Bbls**: A barrel of 42 U.S. gallons of oil

**Biochar**: Charcoal produced from plant matter and stored in the soil as a means of removing carbon dioxide from the atmosphere.

**Biogas**: Gaseous fuel, esp. methane, produced by the fermentation of organic matter.

**Black Carbon**: The most strongly light-absorbing component of particulate matter (PM), and is formed by the incomplete combustion of fossil fuels, biofuels, and biomass.

**BTU (British Thermal Unit)**: A basic measure of thermal (heat) energy.

**Calvin Cycle**: A cyclical series of biochemical reactions that occur in the stroma of chloroplasts during photosynthesis.

**Chemical Fertilizers**: Any inorganic material of wholly or partially synthetic origin that is added to the soil to sustain plant growth.

**Chloroplast**: In green plant cells, a plastid that contains chlorophyll and in which photosynthesis takes place.

**CFC (Chlorofluorocarbons)**: A gas that was once commonly used in various products (such as aerosols) but that is believed to cause damage to the ozone layer in the Earth's atmosphere.

**CSM (Clear Sky Model)**: A broadband algorithm which produces estimates of clear sky direct beam, hemispherical diffuse, and total hemispherical solar radiation on a horizontal surface.

**CMW (Concentrated Municipal Wastewater)**:

**CSP (Concentrated Solar Power)**: Produce electric power by converting the sun's energy into high-temperature heat using various mirror configurations. The heat is then channeled through a conventional generator.

**CPV (Concentrated Photovoltaics)**: One of the newest players on the solar energy scene. These systems are unique because sunlight is concentrated through a lens onto high performance solar cells, thus increasing the electricity generated.

**ControlDesk NG**: The dSPACE experiment software for seamless ECU development. It performs all the necessary tasks and gives you a single working environment, from the start of experimentation right to the end.

**CMIP5 (Coupled Model Intercomparison Project Phase 5)**: Provides a framework for coordinated climate change experiments for the next five years and thus includes simulations for assessment in the AR5 as well as others that extend beyond the AR5.

**Cyanobacteria**: Predominantly photosynthetic prokaryotic organisms containing a blue pigment in addition to chlorophyll; occur singly or in colonies in diverse habitats; important as phytoplankton

**Deforestation**: The loss or destruction of naturally occurring forests, primarily due to human activities such as logging, cutting trees for fuel, slash-and-burn agriculture, clearing land for livestock grazing, mining operations, oil extraction, etc.

**Dehydrogenase**: An enzyme that catalyzes the removal of hydrogen atoms from a particular molecule, particularly in the electron transport chain reactions of cell respiration in conjunction with the coenzymes NAD and FAD.

**Diatoms**: Single-celled algae that have cell walls of silica. Many kinds are planktonic, and extensive fossil deposits have been found.

**DIC (Differential Interference Contrast)**: Another method of deriving contrast in an unstained specimen from differences in index of refraction of specimen components.

**DME (Dimethyl Ether)**: A clean and colorless fuel that can be derived from renewable material and fossil fuel sources

**DNI (Direct Normal Irradiance)**: The amount of solar radiation received per unit area by a surface that is always held perpendicular (or normal) to the rays that come in a straight line from the direction of the sun at its current position in the sky.

**DOC (Dissolved Organic Carbon)**: The organic matter that is able to pass through a filter (filters generally range in size between 0.7 and 0.22 um).

**DOE (U.S. Department of Energy)**: The Energy Department is to ensure America’s security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions.

**DDGS (Dried Distillers Grains and Soluble)**: A co-product of the ethanol production process is a high nutrient feed valued by the livestock industry.

**EIA (U.S. Energy Information Administration)**: Official Energy Statistics from the U.S Government

**EROI (Energy Return On Investment)**: The amount of energy that has to be expended in order to produce a certain amount of energy and EROI is a key determinant of the price of energy.

**Environmental Kuznets Curve**: postulates an inverted-U-shaped relationship between different pollutants and per capita income

**Epigenetics**: "Above" or "on top of" genetics. It refers to external modifications to DNA that turn genes "on" or "off." These modifications do not change the DNA sequence, but instead, they affect how cells "read" genes.

**EtOH**: Ethanol, or ethyl alcohol.

**EU (European Union)**: An economic and political union made up of member states in Europe.

**Expert Assessments**: Reviews of current weather and climate information issued on a routine basis.

**FAME (Fatty Acid Methyl Ester)**: A type of fatty acid that can be used to create diesel fuel by transesterification.

**FAS (Fatty Acid Synthase)**: The input to fatty acid synthesis is acetyl-CoA, which is carboxylated to malonyl-CoA.

**Fracking**: Or hydraulic fracturing, is the process of extracting natural gas from shale rock layers deep within the earth. Fracking makes it possible to produce natural gas extraction in shale plays that were once unreachable with conventional technologies

**Fungible Fuels**: Fuels such as ethanol, butanol etc. made from biomass which has chemical similarities with conventional fuels such as gasoline and can be blended and used in the existing engines.

**GTL**: Gas To Liquid

**GCMS**: The GCMS instrument is made up of two parts. The gas chromatography (GC) portion separates the chemical mixture into pulses of pure chemicals and the mass spectrometer (MS) identifies and quantifies the chemicals.

**GDP (Gross Domestic Product)**: One of the primary indicators used to gauge the health of a country's economy. It represents the total dollar value of all goods and services produced over a specific time period.

**Genome**: The genetic material of an organism. Each of cell has a complete set of instructions about how to make your cells, their components and their components' components. These instructions are in the form of DNA or RNA.

**GEO**: Genetically Engineered Organism

**GJ (Gigajoule)**: An energy measurement unit equal to one billion joules.

**GHI (Global Horizontal Irradiance)**: Also called Global Horizontal Radiation, which is the total solar radiation or the sum of Direct Normal Irradiance

**GMO (Genetically Modified Organisms)**: Plants or animals that have been genetically engineered with DNA from bacteria, viruses or other plants and animals.

**GTC**: Gigaton of carbon

**GHG (Greenhouse Gases)**: gases that emit and absorb radiation in the atmosphere that war the globe (global warming)

**Green Revolution**: A large increase in crop production in developing countries achieved by the use of fertilizers, pesticides, and high-yield crop varieties.

**Hectare**: A metric unit of square measure, equal to 100 ares (2.471 acres or 10,000 square meters).

**Heliostat**: An instrument in which a mirror is automatically moved so that it reflects sunlight in a constant direction. It is used with a pyrheliometer to make continuous measurements of solar radiation.

**Herbicide**: A substance that is toxic to plants and is used to destroy unwanted vegetation.

**HTS (High Throughput Screening)**: A drug-discovery process widely used in the pharmaceutical industry. It leverages automation to quickly assay the biological or biochemical activity of a large number of drug-like compounds.

**Hydro+**: Hydropower plus other renewables besides biomass.

**Incomplete Combustion**: Burning in a lack of air (not enough oxygen). If there is not enough oxygen available for all the carbon to turn into carbon dioxide, then some or all of the carbon turns to carbon monoxide.

**Insecticide**: A substance used for killing insects.

**ILUC (Indirect Land Use Change)**: When biofuels are produced on existing agricultural land, the demand for food and feed crops remains, and may lead to someone producing more food and feed somewhere else.

**IPCC (Intergovernmental Panel on Climate Change)**: Leading international body for the assessment of climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO).

**Intellectual Property**: A work or invention that is the result of creativity, such as a manuscript or a design, to which one has rights and for which one may apply for a patent, copyright, trademark, etc.

**kWh (Kilowatt Hour)**: A measure of energy

**LCA (Life Cycle Assessment)**: A technique to assess the environmental aspects and potential impacts associated with a product, process, or service by compiling an inventory of relevant energy and material inputs and environmental releases, evaluating the potential environmental impacts associated with identified inputs and releases, and interpreting the results to help you make a more informed decision.

**LDCs**: Least Developed Countries

**Li-ion battery**: Lithium-Ion Battery

**LWRS (Light Water Reactor Sustainability)**: The prudent use of resources – in this case, our nation’s commercial nuclear power plants.

**LNG (Liquefied Natural Gas)**: Natural gas in a liquid form that is clear, colorless, odorless, non-corrosive, and non-toxic.

**Mbtu**: Also abbreviated as BTU, British Thermal Unit. It is a standard unit of measurement used to denote both the amount of heat energy in fuels and the ability of appliances and air conditioning systems to produce heating or cooling.

**MCFAs**: Medium Chain Fatty Acids

**MPPT (Maximum Power Point Tracking)**: An electronic DC to DC converter that optimizes the match between the solar array (PV panels), and the battery bank or utility grid. They convert a higher voltage DC output from solar panels (and a few wind generators) down to the lower voltage needed to charge batteries.

**MSW (Municipal Solid Waste)**: More commonly known as trash or garbage—consists of everyday items we use and then throw away, such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries.

**MTBE (Methyl Tertiary Butyl Ether)**: A chemical compound that is manufactured by the chemical reaction of methanol and isobutylene. MTBE is produced in very large quantities (over 200,000 barrels per day in the U.S. in 1999) and is almost exclusively used as a fuel additive in motor gasoline. It is one of a group of chemicals commonly known as "oxygenates" because they raise the oxygen content of gasoline. At room temperature, MTBE is a volatile, flammable and colorless liquid that dissolves rather easily in water.

**Multilateral Development Banks**: Institutions that provide financial support and professional advice for economic and social development activities in developing countries.

**Negawatts**: Unused electrical watt due to energy-efficient living.

**NMR (Nuclear Magnetic Resonance)**: Analytical chemistry technique used in quality control and research for determining the content and purity of a sample as well as its molecular structure.

**Nox (Nitrogen Oxides)**:Consist of nitric oxide (NO), nitrogen dioxide (NO2) and nitrous oxide (N2O) and are formed when nitrogen (N2) combines with oxygen (O2).

**PG&E (Pacific Gas and Electric Company)**: One of the largest combination natural gas and electric utilities in the United States.

**PAHs (Polycyclic Aromatic Hydrocarbons)**: A group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

**Par**: Apparent worth or the nominal value shown on the principal ('face' or 'head') side of a bill of exchange, currency, security (stock/share, bond), or other type of financial instrument.

**Particulate Matter**: A small discrete mass of solid or liquid matter that remains individually dispersed in gas or liquid emissions. It is usually considered to be an atmospheric pollutant.

**Phosphate rock**: Formed in oceans in the form of calcium phosphate, called phosphorite. It is deposited in extensive layers that cover thousands of square miles.

**PV (Photovoltaic)**: Generate electricity directly from sunlight via an electronic process that occurs naturally in certain types of material, called semiconductors. Electrons in these materials are freed by solar energy and can be induced to travel through an electrical circuit, powering electrical devices or sending electricity to the grid.

**PMS (Power Monitor Sensor)**: Specially designed to be used with AKCP’s security Probe units. Combining the Power Meter Sensor and security Probe creates a fully IP enabled power monitoring product.

**PFD (Process Flow Diagram)**: Shows the relationships between the major components in the system. PFD also tabulate process design values for the components in different operating modes, typical minimum, normal and maximum. A PFD does not show minor components, piping systems, piping ratings and designations.

**Proteomics**: A large-scale comprehensive study of a specific proteome, including information on protein abundances, their variations and modifications, along with their interacting partners and networks, in order to understand cellular processes.

**ppm (Parts Per Million)**: Or ppm means out of a million. Usually describes the concentration of something in water or soil. One ppm is equivalent to 1 milligram of something per liter of water (mg/l) or 1 milligram of something per kilogram soil (mg/kg).

**Price volatility**: It is a measure of fluctuations or deviations in the commodity prices.

**Pulmonary Function**: The measure of how well your lungs are functioning and are used to help diagnose certain lung disorders.

**Pyrolysis**: The heating of an organic material, such as biomass, in the absence of oxygen.

**RCP Database**: Aims at documenting the emissions, concentrations, and land-cover change projections of the so-called "Representative Concentration Pathways" (RCPs).

**Regressivity**: Tax rate decreasing proportionately with an increase in the tax base.

**ROI (Return On Investment)**: A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments.

**Shale gas wells**: Natural gas that is trapped within shale formations. Shales are fine-grained sedimentary rocks that can be rich sources of petroleum and natural gas.

**Simulink**: An add-on product to MATLAB, provides an interactive, graphical environment for modeling, simulating, and analyzing of dynamic systems.

**SWH (Solar Water Heaters)**: Also called Domestic hot water systems, solar water heating systems include storage tanks and solar collectors. There are two types of solar water heating systems: active, which have circulating pumps and controls, and passive, which don't.

**Sub National Action**: The strength and flexibility of states in implementing action on climate change across sectors and scales. It offers state-level policymakers ideas for drafting regulations aimed at curbing global climate change.

**TAG (Triacylglycerol)**: An ester composed of a glycerol bound to three fatty acids. It is the main constituent of vegetable oil and animal fats.

**Terrestrial plants**: A plant that grows on, in, or from land.

**Tokamak Fusion**: A torus-shaped vacuum chamber surrounded by magnetic coils, which create a toroidal magnetic field.

**TSP (Total Suspended Particulates)**: Airborne particles or aerosols that are less than 100 micrometers are collectively referred to as total suspended particulate matter (TSP).

**VOCs (Volatile Organic Compounds)**: Emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.

**Volatility**: The property of changing readily from a solid or liquid to a vapor.