DOWNLOAD PDF ENERGY FROM EARTH

Chapter 1 : rotational dynamics - Can we get energy from the Earth's rotation? - Physics Stack Exchange

We have found that the earth is loaded with electricity! As a matter of fact we think that the earth's core is radio active. This radioactivity generates heat and electrical currents through out the earth's plates.

The development of binary cycle power plants and improvements in drilling and extraction technology enable enhanced geothermal systems over a much greater geographical range. Other demonstration projects are under construction in Australia , the United Kingdom , and the United States of America. The laws of thermodynamics limits the efficiency of heat engines in extracting useful energy. Exhaust heat is wasted, unless it can be used directly and locally, for example in greenhouses, timber mills, and district heating. System efficiency does not materially affect operational costs as it would for plants that use fuel, but it does affect return on the capital used to build the plant. In order to produce more energy than the pumps consume, electricity generation requires relatively hot fields and specialized heat cycles. Types Geothermal energy comes in either vapor-dominated or liquid-dominated forms. Larderello and The Geysers are vapor-dominated. Flash plants are the common way to generate electricity from these sources. Pumps are generally not required, powered instead when the water turns to steam. Most wells generate MWe. They are common in extensional terrains, where heating takes place via deep circulation along faults, such as in the Western US and Turkey. Water passes through a heat exchanger in a Rankine cycle binary plant. The water vaporizes an organic working fluid that drives a turbine. These binary plants originated in the Soviet Union in the late s and predominate in new US plants. Binary plants have no emissions. Geothermal heating and geothermal heat pump Lower temperature sources produce the energy equivalent of M BBL per year. More than half went for space heating, and another third for heated pools. The remainder supported industrial and agricultural applications. Heating is cost-effective at many more sites than electricity generation. At natural hot springs or geysers , water can be piped directly into radiators. In hot, dry ground, earth tubes or downhole heat exchangers can collect the heat. However, even in areas where the ground is colder than room temperature, heat can often be extracted with a geothermal heat pump more cost-effectively and cleanly than by conventional furnaces. They frequently combine functions, including air conditioning , seasonal thermal energy storage , solar energy collection, and electric heating. Heat pumps can be used for space heating essentially anywhere. Iceland is the world leader in direct applications. Enhanced geothermal system Enhanced geothermal systems EGS actively inject water into wells to be heated and pumped back out. The water is injected under high pressure to expand existing rock fissures to enable the water to freely flow in and out. The technique was adapted from oil and gas extraction techniques. However, the geologic formations are deeper and no toxic chemicals are used, reducing the possibility of environmental damage. Drillers can employ directional drilling to expand the size of the reservoir. However, capital costs are significant. Drilling accounts for over half the costs, and exploration of deep resources entails significant risks. A typical well doublet extraction and injection wells in Nevada can support 4. District heating systems may benefit from economies of scale if demand is geographically dense, as in cities and greenhouses, but otherwise piping installation dominates capital costs. Some governments subsidize geothermal projects. Geothermal power is highly scalable: Each phase has associated risks. At the early stages of reconnaissance and geophysical surveys, many projects are cancelled, making that phase unsuitable for traditional lending. Projects moving forward from the identification, exploration and exploratory drilling often trade equity for financing. Hot water to district heating 8: The conductive heat flux averages 0. These values are much higher near tectonic plate boundaries where the crust is thinner. They may be further augmented by fluid circulation, either through magma conduits , hot springs , hydrothermal circulation or a combination of these. A geothermal heat pump can extract enough heat from shallow ground anywhere in the world to provide home heating, but industrial applications need the higher temperatures of deep resources. The most demanding applications receive the greatest benefit from a high natural heat flux, ideally from using a hot spring. The next best option is to drill a well into a hot aquifer. If no adequate aquifer is available, an artificial one may be built by injecting water to hydraulically fracture the bedrock. This last approach is called hot dry rock geothermal energy in Europe, or

enhanced geothermal systems in North America. Much greater potential may be available from this approach than from conventional tapping of natural aquifers. This increase came from seven geothermal projects that began production in GEA also revised its estimate of installed capacity upward by MW, bringing current installed U. Human extraction taps a minute fraction of the natural outflow, often without accelerating it. By using geothermal sources of energy present generations of humans will not endanger the capability of future generations to use their own resources to the same amount that those energy sources are presently used. Even though geothermal power is globally sustainable, extraction must still be monitored to avoid local depletion. The three oldest sites, at Larderello , Wairakei , and the Geysers have experienced reduced output because of local depletion. Heat and water, in uncertain proportions, were extracted faster than they were replenished. If production is reduced and water is reinjected, these wells could theoretically recover their full potential. Such mitigation strategies have already been implemented at some sites. The long-term sustainability of geothermal energy has been demonstrated at the Lardarello field in Italy since , at the Wairakei field in New Zealand since , [52] and at The Geysers field in California since The Wairakei power station has been running much longer, with its first unit commissioned in November , and it attained its peak generation of MW in , but already the supply of high-pressure steam was faltering, in being derated to intermediate pressure and the station managing MW. Detailed data are unavailable, being lost due to re-organisations. These pollutants contribute to global warming , acid rain , and noxious smells if released. In addition to dissolved gases, hot water from geothermal sources may hold in solution trace amounts of toxic elements such as mercury , arsenic , boron , and antimony. The modern practice of injecting cooled geothermal fluids back into the Earth to stimulate production has the side benefit of reducing this environmental risk. Direct geothermal heating systems contain pumps and compressors, which may consume energy from a polluting source. This parasitic load is normally a fraction of the heat output, so it is always less polluting than electric heating. However, if the electricity is produced by burning fossil fuels, then the net emissions of geothermal heating may be comparable to directly burning the fuel for heat. For example, a geothermal heat pump powered by electricity from a combined cycle natural gas plant would produce about as much pollution as a natural gas condensing furnace of the same size. Plant construction can adversely affect land stability. Subsidence has occurred in the Wairakei field in New Zealand. The project in Basel , Switzerland was suspended because more than 10, seismic events measuring up to 3. Geothermal plants use 3. Other questions concern overlap between geothermal and mineral or petroleum tenements. Broader issues concern the extent to which the legal framework for encouragement of renewable energy assists in encouraging geothermal industry innovation and development.

Chapter 2 : Our Energy Sources, The Sun â€" The National Academies

Founded in , EnergyEarth is a company of innovators committed to our partners, customers and the protection of the Earth's natural resources. We provide a wide variety of products and incentive services to businesses and consumers to help achieve this mission.

You and your friends are using the fire to heat soup in a pot. As the sun goes down, the air gets chilly. You move closer to the fire. Heat from the fire warms you. Light from the fire allows you to see your friends. These campers can feel and see the energy of their campfire. What explains all of these events? The answer can be summed up in one word: Energy is defined as the ability to do work. Doing anything takes energy. A campfire obviously has energy. You can feel its heat and see its light. Forms of Energy Heat and light are forms of energy. Other forms are chemical and electrical energy. It can change form. For example, a piece of wood has chemical energy stored in its molecules. When the wood burns, the chemical energy changes to heat and light energy. Movement of Energy Energy can move from one place to another. It can travel through space or matter. These forms of energy travel from the campfire to you. Energy from the Sun Almost all energy on Earth comes from the sun. Sunlight also powers photosynthesis and life on Earth. Photons of Energy The sun gives off energy in tiny packets called photons. Photons travel in waves. Figure below models a wave of light. Notice the wavelength in the figure. Waves with shorter wavelengths have more energy. This curve models a wave. Based on this figure, how would you define wavelength? Electromagnetic Spectrum Energy from the sun has a wide range of wavelengths. The total range of energy is called the electromagnetic spectrum. You can see it in Figure below. Compare the wavelengths of radio waves and gamma rays. Which type of wave has more energy? Visible light is the only light that humans can see. Different wavelengths of visible light appear as different colors. Radio waves have the longest wavelengths. They also have the least amount of energy. Infrared light has wavelengths too long for humans to see, but we can feel them as heat. The atmosphere absorbs the infrared light. Ultraviolet UV light is in wavelengths too short for humans to see. The most energetic UV light is harmful to life. The atmosphere absorbs most of this UV light from the sun. Gamma rays have the highest energy and they are the most damaging rays. Heat energy is transferred in three ways: Radiation Radiation is the transfer of energy by waves. Energy can travel as waves through air or empty space. Conduction In conduction, heat is transferred from molecule to molecule by contact. Warmer molecules vibrate faster than cooler ones. They bump into the cooler molecules. When they do they transfer some of their energy. Conduction happens mainly in the lower atmosphere. Can you explain why? Convection Convection is the transfer of heat by a current. Convection happens in a liquid or a gas. The warm air is less dense, so it rises. As it rises, it cools. The cool air is dense, so it sinks to the surface. This creates a convection current, like the one in Figure below. Convection is the most important way that heat travels in the atmosphere. Convection currents are the main way that heat moves through the atmosphere. Why does warm air rise? You can see this in Figure below. This focuses the rays on a small area. This spreads the rays over a wide area. The more focused the rays are, the more energy an area receives and the warmer it is. The lowest latitudes get the most energy from the sun. The highest latitudes get the least. How do the differences in energy striking different latitudes affect Earth? The planet is much warmer at the equator than at the poles. In the atmosphere, the differences in heat energy cause winds and weather. On the surface, the differences cause ocean currents. Can you explain how? Some of this heat is absorbed by gases in the atmosphere. This is the greenhouse effect, and it helps to keep Earth warm. The greenhouse effect allows Earth to have temperatures that can support life. Gases that absorb heat in the atmosphere are called greenhouse gases. They include carbon dioxide and water vapor. Human actions have increased the levels of greenhouse gases in the atmosphere. This is shown in Figure below. The added gases have caused a greater greenhouse effect. Human actions have increased the natural greenhouse effect. Lesson Summary Energy is the ability to do work. Heat and light are forms of energy. Energy can change form. It can also move from place to place. Earth gets its energy from the sun. The sun gives off photons of energy that travel in waves. Energy moves in three ways. By radiation, it travels in waves across space. By conduction, it moves between molecules that are in contact. By convection, it moves

in a current through a liquid or gas. Energy from the sun is more focused at the equator than the poles. Differences in energy by latitude cause winds and weather. Greenhouse gases in the atmosphere absorb heat. This is called the greenhouse effect and it makes the planet warmer. Human actions have increased the greenhouse effect. Lesson Review Questions 1. List three forms of energy.

Chapter 3 : Earth's energy budget - Wikipedia

Start getting free energy from the earth in less than one hour! You can now use less earth space and get 10 times more power! Using our New Nano Flux EECC Technology!

It exists not only as an energy field around every living thing, but also circulates through the earth, through the atmosphere around us and throughout nature. The flow of this energy connects everything that exists, and you, as a living being, are taking in this energy at every moment. You are always drawing this life energy into your own energy field, and it is this energy that supports your life, as well as the life of all you seek to heal. In order to practice energy channelingâ€"conducting a greater measure of this energy into your patient for the purposes of performing healing workâ€"you must first learn to bring a greater measure of the energy into your own energy field. The technique you will use to do this is referred to as Calling in the Energy. You call in the energy by using your power of Visualization. Visualization will be one of your most important tools as an energy healer because it allows you to direct the energy with your effortless intention alone. You will also "see" this energy, as it flows into you, move through your body towards your shoulders, down your arms, and collect in your hands, so that you may then channel it into your patient. Calling in the energy, using this visualization, will start the energy flowing through you in this manner when it is time for you to begin a healing treatment. The following exercise will help you in becoming practiced and comfortable in calling in the energy: Each day, for three times or more at various times during the day, summon the energy. Stand with your feet about shoulders-width apart, close your eyes and place your arms at your sides but with your hands not touching your body. Really see and feel the energy coming into you, from all around. You may feel a slight tingling beginning, throughout your body, as the energy comes into you. Then "see" the energy moving through your shoulders, down your arms and into your hands. As you hold your hands at your sides, really see and feel this energy coming into you from all around, through your body, down your arms, and then filling up your hands like water filling a glove. You should feel a tingling, or even a sensation of heat, as the energy flows to and collects in your hands. This tingling you feel in your body and hands, when you call in the energy, is not just a physical sensation, but is similar to the sensation you experience when emotions flow through you. You can practice calling in the energy anywhere, at various times throughout the day. Each time you practice this should only take a minute or two. Calling In the Energy After you have had a little practice calling in the energy, and have begun to feel it in your hands, you can proceed to channel the energy into a "live" patient. The chakras are the primary energy centers or energy junctions within the energy fieldâ€"the primary points at which energy enters the body, as well as the points within the energy field where important life-supporting energetic operations take place. As an energy healer you will often be working with the chakras of your patient, so this is a good place to start. When you channel energy into a chakra you will place your hands gently, palms down, on the chakra, and then simply allow the energy to flow through you and into that chakra. This is a very simple thing, and you have the innate ability to do this, so do not doubt! As you begin this process of channeling energy into your patient, it is best to follow these important guidelines: Remove all rings, watches and jewelry from your hands before beginning a treatment. It is also a very good idea, as a courtesy, to wash your hands. Do not let doubt interfere. Trust, expect and believe that the energy is flowing. Do not worryâ€"the energy does exist and will flow, if only you allow it. Do not press too hard with your hands. Use zero pressure with the hands to maximize the energy flow. Be open to the energy flow. Energy channeling is not a practice of the intellect; it is a practice of opening and release to the energy. Just imagine the energy flowing through you and out of your hands, and you will feel a sense of openness to the energy. You will find, if you simply release yourself to its flow, that it comes easily. Effortless intention alone is sufficient to call in and conduct the energy. Now that you are ready to begin energy channeling, proceed as follows: Have your patient lie flat on your treatment table, arms at his or her sides. Now, call in the energy as you have learned to do, in steps 1 to 3 of the calling in the energy exercise above, until you feel the energy tingling in your hands. If you are a male healer treating a woman, you may need to take special care, and vary hand positions somewhat to show courtesy, but try to keep your right palm centered over the chakra. As you

do this, try not to be self-conscious or wonder if you are "doing it correctly. All you need do is open yourself to being a channel for it. The energy, as a manifestation of consciousness, already knows how to move and where to go. Focus instead on opening yourself to feeling and sensing the energy flow in your patientâ€”being aware of the energy as it moves through you and into the body of your patient. You can begin to sense how much energy is flowing: After a few moments, or when you have sensed the energy flow diminish, remove your hands. Do you feel any difference in the energy flow, as you channel the energy into this new chakra? As you learn this new skill of energy channeling, do not be too concerned with whatever sensations you may feel or not feel as the energy flows through you. For different healers, and with different patients, there will be times when you definitely sense the energy flow as you channel the energy, and also times when you do not sense it as much or may just barely sense it. The degree to which you sense the energy flow as you channel it into your patient is not necessarily related to the amount or kind of energy you are conducting or the effectiveness of the treatment you provide. You will find, when you gain a good deal of experience in energy channeling, that you will become "transparent," in a sense. You may sense the flow of energy through you, but you will also sense a freedom from your body and mind, a simple awareness of acting as a channel for the energy, as though you were witnessing your own body and the energy transfer. Right now, from the very beginning of your energy healing work, start moving away from worrying about yourself, and instead begin to become aware of the energy, and the energy field of your patient. In energy healing, you must "forget yourself" and instead seek to become one with your patient and the energy, as you work.

Chapter 4 : Earth Bite â€“ Positive Energy from Nature

The energy that cycles through the systems of Earth comes from two locations. The Sun radiates huge amounts of energy. Only a small portion of that energy hits the Earth, but it is enough to light our days, heat our air and land, and create weather systems over the oceans.

Earth emits via atmospheric and terrestrial radiation shifted to longer electromagnetic wavelengths to space about the same amount of energy as it receives via insolation all forms of electromagnetic radiation. Called the albedo of Earth, around 35 units are reflected back to space: The 65 remaining units are absorbed: These 51 units are radiated to space in the form of terrestrial radiation: The 48 units absorbed by the atmosphere 34 units from terrestrial radiation and 14 from insolation are finally radiated back to space. These 65 units 17 from the ground and 48 from the atmosphere balance the 65 units absorbed from the sun in order to maintain zero net gain of energy by the Earth. Because the surface area of a sphere is four times the cross-sectional surface area of a sphere i. This gives the earth a mean net albedo of 0. Earlier, Joseph Fourier had claimed that deep space radiation was significant in a paper often cited as the first on the greenhouse effect. Outgoing longwave radiation Longwave radiation is usually defined as outgoing infrared energy leaving the planet. However, the atmosphere absorbs parts initially, or cloud cover can reflect radiation. Recent satellite observations indicate additional precipitation, which is sustained by increased energy leaving the surface through evaporation the latent heat flux , offsetting increases in longwave flux to the surface. Indirect measurement[edit] An imbalance must show in something on Earth warming or cooling depending on the direction of the imbalance , and the ocean being the larger thermal reservoir on Earth, is a prime candidate for measurements. The estimated imbalance was measured during a deep solar minimum of â€” to be 0. Greenhouse effect The major atmospheric gases oxygen and nitrogen are transparent to incoming sunlight but are also transparent to outgoing thermal infrared radiation. However, water vapor , carbon dioxide , methane and other trace gases are opaque to many wavelengths of thermal radiation. However, the amount that directly escapes to space is only about 12 percent of incoming solar energy. The remaining fraction, 5 to 6 percent, is absorbed by the atmosphere by greenhouse gas molecules. The absorption patterns of water vapor blue peaks and carbon dioxide pink peaks overlap in some wavelengths. Carbon dioxide is not as strong a greenhouse gas as water vapor, but it absorbs energy in wavelengths 12â€”15 micrometres that water vapor does not, partially closing the "window" through which heat radiated by the surface would normally escape to space. Those gases then radiate an increased amount of thermal infrared energy in all directions. Heat radiated upward continues to encounter greenhouse gas molecules; those molecules also absorb the heat, and their temperature rises and the amount of heat they radiate increases. This supplemental heating is the natural greenhouse effect. Radiative forcing A change in the incident radiated portion of the energy budget is referred to as a radiative forcing. Climate sensitivity is the steady state change in the equilibrium temperature as a result of changes in the energy budget. Climate forcings and global warming[edit] Expected Earth energy imbalance for three choices of aerosol climate forcing. Measured imbalance, close to 0. Man-made forcings include particle pollution aerosols that absorb and reflect incoming sunlight; deforestation , which changes how the surface reflects and absorbs sunlight; and the rising concentration of atmospheric carbon dioxide and other greenhouse gases, which decreases the rate at which heat is radiated to space. A forcing can trigger feedbacks that intensify positive feedback or weaken negative feedback the original forcing. For example, loss of ice at the poles, which makes them less reflective, causes greater absorption of energy and so increases the rate at which the ice melts, is an example of a positive feedback. The impact of anthropogenic aerosols has not been quantified, but individual aerosol types are thought to have substantial heating and cooling effects.

Chapter 5 : Harvesting Energy from the Earth with Quantum Tunneling | Hackaday

Flows on the Earths Surface. Although the solar energy flow is the most dominant flow, it is not the only source of energy on the Earth. Energy from the use of nuclear fuels, as well as energy due to the tides and the thermal energy from the centre of the Earth all contribute to the total energy on the Earth.

Energy makes it all happen. The energy that cycles through the systems of Earth comes from two locations. The Sun radiates huge amounts of energy. Only a small portion of that energy hits the Earth, but it is enough to light our days, heat our air and land, and create weather systems over the oceans. Most of the energy you will learn about comes from the Sun. The Earth also gives off energy. There is a molten outer core of iron Fe and nickel Ni that radiates heat and creates a magnetic field that surrounds the planet. Current evidence suggests that the inner core is 6, degrees Celsius 10, degrees Fahrenheit. The asthenosphere and upper mantle also radiate heat from the interior of the planet. Even without the heat of the Sun, the Earth would be warmer than space or a planet with no molten core. Where Do You Find Energy? You can find energy in electricity, magnetism, kinetic energy, potential energy, springs and different states of matter. Energy is not something you can hold or touch. Geographers look at general ideas of energy circulating through systems. The main energy for geographers affects the living organisms of Earth. They examine amounts and types of electromagnetic radiation that include infrared heat , visible, and ultraviolet light. Energy descriptions and measurements change a little when physicists start looking at the world. Energy is a property that can be transferred and changed, but never created or destroyed. Physicists often see things in very specific quantities, not always in systems as large as the Earth. They also look at mechanical energy in addition to thermodynamics and electromagnetism. As the temperature rises, the molecules become more active and begin to rise. The activity of the molecules also increases the pressure. When the pressure of a system increases, the amount of stored energy also increases. Those molecules want to move to a location with a lower pressure. Wind is created by those pressure differences in the atmosphere. When the wind blows, the energy can be transferred to other systems: Sometimes we will use the word radiation. When you think of radiation you probably think about nuclear power plants, bombs, and X-rays. Those are all types of radiation but more important to physical geography is the idea that all light is considered radiation. Electromagnetic radiation includes everything from television and radio waves to something called gamma rays. The R stands for radiation; however, a laser is bascially an energized flashlight. Most heat or "emitted thermal radiation" of an object is actually infrared light. Or search the sites for a specific topic.

Chapter 6 : Free Energy from the Earth Plans

Written during the OPEC oil/energy crisis of the 's, the book takes all known forms of energy, from fossil fuels to solar and nuclear power, and explains the.

Maybe that is why many animals become very disturbed and frightened before and during earth quakes. Are they sensing these electrical currents which are being generated by the high voltages from the moving plates within the earth? These plans are loaded with information that you may not find anywhere in the world! When you receive these plans you will be able to quickly build a homemade device or devices that will produce electricity or electrical currents that can charge batteries, capacitors or light small white LED light bulbs. It is very possiable to get enough current to run a small garage or home, but, it would take a little more time to build and construct. The information in these plans are intended to educate everyone in planning for emergancies. You can cheaply use the earth as a generator to light your entire home with multiable super bright LED white light bulbs. These bulbs are not as bright as a 60 watt bulb, but just one bulb is bright enough to light up an entire room during emerganies. LED bulbs can last up to 70 years and only use small milliamps of power to run. Most of these bulbs will run on 5 volts or less. To much voltage can burn them out. But the earth can be made to output a steady 5 volt DC current. You can purchase these bulbs anywhere, Electronic supply stores, hardware stores, Walmarts, Sears etc It is much easier to use them already manufactured in a flashlight container and is more attractive for your home. They are also being widley used as yard landscaping lights because they are so bright and high efficiant. Start getting free energy from the earth in less than one hour! You can now use less earth space and get 10 times more power! It may also be possible to collect some high voltage RF spikes from far distant lightning strikes as well! Of course it is to dangerous to try and collect a direct lightning strike. It is best to always use a 8 foot ground wire to guide the energy pulse away from your project. There is a large amount of unlimited power down in the earth just waiting to be used by anyone who needs it. This is also great as a science fair project as well as an emergancy backup lighting system for your home, garage or basment. Thank you Free energy from the earth plans Very simple and very easy. You will need an analog volt meter, do not use digital Objective: To prove that it is possible to get free energy from the earth. Try this small but simple experiment in your own backyard. Now place the Zinc or aluminum rod about 7" away from the copper and hammer it into the ground as well leaving about 1" at the top. Now get a volt meter and set it on the lowest DC amperage setting or voltage setting and place the Positive wire onto the copper and the negative onto the zinc or aluminum and watch the voltmeter needle jump! You can space these 2 metals very far apart and they will still generate voltage. Try 14 feet away from each other. Try feet away from each other. Try this small but simple experiment in your backyard, using 2 aluminum disks. Do not use a digital meter. Best to use 2 wires with alligator clips on the ends to make your connections. You will get an electrical current from the earth flowing into the meter Current only flows when you move one of the disks.

Chapter 7 : Chios Energy Healing (Aura and Chakra Healing) - Alternative Medicine / Holistic Health

Earth's energy budget accounts for the balance between the energy Earth receives from the Sun, the energy Earth radiates back into outer space after having been distributed throughout the five components of Earth's climate system and having thus powered the so-called Earth's heat engine.

Regions of the entire electromagnetic spectrum and general applications. Note that the regions are not strictly delineated. We have specialized sensory organs that only detect some parts of the spectrum. For example, the eye detects visible light, and even distinguishes different wavelengths within the spectrum of visible light as color! The skin perceives radiation from the infrared region of the spectrum as heat. Note that sound is not a form of electromagnetic energy. Because sound is really the energy of the motion of molecules through a medium mechanical energy , it cannot travel through a vacuum. As we already noted, electromagnetic energy has no need for a medium through which to travel, and can therefore travel through space from the sun to reach the Earth. Different molecules absorb different regions of electromagnetic energy preferentially. For example, the water molecule preferentially absorbs certain wavelengths in the microwave region of the electromagnetic spectrum. This preference is the basis of the efficient cooking of food by microwave ovens. Calcium, a primary constituent of bones, absorbs energy in the x-ray region more strongly than do the water or carbon in the cells of ordinary tissue, allowing for the use of x-rays to generate images that show unevenness such as broken bones or tumors. The chlorophyll molecule in green plants absorbs mostly ultraviolet and also some blue violet, and red light and uses this energy for photosynthesis. Most of the green light in sunlight is reflected by leaves, making them appear green to our eyes. Solar Spectrum The range of electromagnetic energy emitted by the sun is known as the solar spectrum, and lies mainly in three regions: The solar spectrum extends from about 0. Small amounts of radio waves are also given off by the sun and other stars. There are some "cooler" stars that give off mostly radio waves and no visible radiation. The range of energy given off by a star depends upon the temperature and size of the star. Smaller, hotter stars called "white dwarfs" give off more energy in the blue region and appear "whiter" than our yellow sun. Rigel, a star in the constellation Sirius, is a white dwarf. Larger, cooler stars, called "red giants," emit more light in the red region, and are exemplified by Antares and Betelgeuse. Note that even a "cool" star still has a temperature of a million degrees or so. While the sun does emit ultraviolet radiation, the majority of solar energy comes in the form of "light" and "heat," in the visible and infrared regions of the electromagnetic spectrum. As shown in Table 2, visible light spans the relatively narrow range of 0. Light is special to humans and many other animals due to the evolution of the eye, a sensory organ that detects this part of the solar spectrum. As noted earlier, our eyes even recognize parts of the visible light spectrum as the sensations of color. Thus nm radiation is perceived by the eye as violet, and nm radiation is perceived as red. We are all familiar with the rainbow of colors--the range of different wavelengths that make up sunlight. The best way to visualize this concept, and the most common scientific demonstration, is the image of a glass prism splitting up white light into the colors. When raindrops act as prisms, we see a rainbow. Often, when the sun is bright, various transparent objects such as beveled edges of glass windows or glass pieces of a chandelier transmit light as a spectrum. This phenomenon occurs because different wavelengths of light or different colors travel through glass at different speeds, causing them to bend at different angles. Figure 3 shows the spectrum violet, blue, green, yellow, orange, and red going from the shortest wavelengths highest frequency to the longest wavelengths lowest frequency. On either side of the visible spectrum are the ultraviolet shorter wavelength than violet and infrared longer wavelength than red. These wavelengths are mostly absorbed by the glass and are, of course, outside the range of wavelengths that our vision can detect. White light falling on a glass prism, dispersed into its constituent colors. Infrared plays an important role in the temperature of the Earth and its atmosphere, and in turn, the climate of the Earth. We will discuss this role in more detail in the section pertaining to the interaction solar energy with the atmosphere. We will now discuss how much energy is available in the different wavelength regions of the solar spectrum. Energy Distribution in the Solar Spectrum Electromagnetic energy can be discussed in terms of its energy distribution, or the spread of energy over a range of wavelengths. This

distribution of energy is also known as the spectral distribution. The sun provides a broad range of energy, primarily concentrated around the visible and infrared regions. This energy is an important feature of the background conditions that led to the evolution of our life forms on Earth, and continue to support this life. In the ultraviolet region of the solar spectrum around 0. This relatively low level of energy persists far into the infrared region. This figure shows that most of the energy coming from the sun is in the visible region of the electromagnetic spectrum, making up what we call sunlight white light. Solar spectral distribution entering the lower parts of the atmosphere. Reflection and Absorption Spectra - Basic Science When light falls on a surface, it can either be reflected, transmitted, absorbed, or varying degrees of all three. Different colored surfaces appear different to the eye because of differences in the way they reflect and absorb light. Stars are sources of radiation, giving off their own energy. Their color appears to us through the light they emit. So, a bluish star gives off more blue light than a yellow star like the sun. To see non-luminous objects, we need light from some other source to fall on them, and the reflected light reaches our eye. The colors of non-luminous objects are thus dependent on what wavelengths of energy they reflect and what wavelengths they absorb. If white light falls on a "perfectly" white surface, all of the light is reflected -causing all colors to reach the eye - and the reflecting surface is perceived as white. On the other hand, the perception of black is the absence of any color reaching the eye, meaning that all light is absorbed. In any case, the incident amount of energy I , or the amount of energy falling on a particular surface, is equal to the sum of the amount reflected r and the amount absorbed a. The following figures show schematically what happens when white light falls on a perfectly white surface, on a perfectly black surface, and on a green surface. In each case, Part A of the figure represents what happens when a ray or beam of white light falls on the surface. Part B of all the diagrams shows the spectrum of incident radiation and the spectrum of reflected radiation, with the x-axis representing wavelength and the y-axis representing energy intensity. The third part of each diagram set, labeled C, shows what is known as the absorption spectrum, showing what wavelengths are absorbed. Note that in part C, while the x-axis still represents wavelength, the y-axis is now a measure of absorption and not energy. For simplicity we assume that all light not reflected is absorbed, although some might be transmitted. Thus the incident spectrum I and the reflected spectrum r are the same. Because none of the light is absorbed, the absorption spectrum a may be shown as a flat line close to zero. Incident and reflected beams. Energy distribution in incident and reflected beams. When white light falls on a perfectly black surface, none of the incident light is reflected. Thus the same incident spectrum gives no reflected spectrum, represented by a flat line of almost zero energy. Because all incident light is absorbed, the absorption spectrum is the same as the incident spectrum. In the example of a white light falling on a green surface, only green light is reflected. Once again using the same incident spectrum, the reflected spectrum this time centers around the wavelengths of green. The green surface also has a more complicated absorption spectrum: Leaves appear green in sunlight white light because the chlorophyll molecules in the leaves preferentially absorb blue, violet, and red. Light from the green wavelengths is not absorbed; rather it is reflected and perceived by our eyes. The representation of this absorption is shown in Figures 6. It shows that chlorophyll of plants has high absorption at nm violet and blue , low at to nm green and yellow , and high again at around nm red. The absorption is a measure of the "appetite" of the chlorophyll for the ranges of wavelengths to which it is exposed. Absorption spectrum of chlorophyll. This figure demonstrates that when solar energy falls on leaves, the chlorophyll will absorb violet, blue, and red. The reflected spectrum therefore will have lost large portions of its energy around nm and nm, retaining energy mostly in the nm green range, and in the infrared. The Ecological System describes photosynthesis in much greater detail. Solar spectrum of visible region juxtaposed with the absorption spectrum of chlorophyll. This "reflected spectrum," then, actually represents the light mostly green and yellow that is reflected off the leaf. This is the detailed explanation of why leaves appear green in white light. The violet light absorbed by the chlorophyll is responsible for photosynthesis. Reflected spectrum, or what is left of the solar spectrum after absorption by chlorophyll in a leaf. Our eyes register this as the leaf surface being green. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Chapter 8 : Environmental Decision Making, Science, and Technology

More energy hits the earth in sunlight every day than humanity could use in about 16, years or so, but that hasn't stopped us from trying to tap into other sources of energy too. One source.

Where does the heating energy come from for this home? Undergroundâ€”where the constant temperature of the earth is absorbed and transferred to heat or cool the home. Drilling vertical wells for heat pump systems takes little room and has little impact on the landscaping. Ground-Source Heat Pumps The ground loop, exiting the basement and entering the ground. Notice the snowâ€”ground-source heat pump systems can be installed in almost any climate. In-ground view of a copper tubing ground loop. The inner components of a groundsource heat pump. An air handler for a GSHP can be added to an existing central heating system. Two of four hot water exchangers and a water storage tank make up this hydronic heating system. Beginner Ground-source heat pumps use the stable temperature of the ground to heat, cool, and provide hot water for homes and businesses. Gary Prior, an avid follower of renewable energy, decided to tap into this source for both philosophical and economic reasons. The 3-ton system also provides central air-conditioning and dehumidification that the home did not have previously. No matter if you are in Alaska or Arizona, the temperature 6 feet underground remains fairly constant. When the weather is cool, that same cave would be warmer than the outside air. Pipes called a loop drilled or buried in the ground circulate the refrigerants to transfer the heat in the ground to the heat pump. This process is reversed to cool the house, dumping excess interior heat into the ground. In extreme weatherâ€”either very hot or very coldâ€”a backup system may be needed to supplement the heating or cooling. However, with a properly sized system, most owners of GSHPs rarely turn to supplemental heating or cooling. Heat Pump Variations GSHPs use fluids to either directly or indirectly cause a refrigerant to change its stateâ€”that is, change from a liquid to a gas taking on heat from the earth or from a gas to a liquid giving heat back to the earth â€”similar to how a refrigerator works. These heat-transfer fluids refrigerants have low boiling temperatures. GSHP systems are either closed- or open-loop. Closed-loop systems typically circulate a propylene glycol and water solution through pipes in the ground and to the heat exchanger. There are several variations of closed-loop systems which differ in the orientation of pipes to the ground: One type of open-loop system is the standing column well, where cold water is pumped from the bottom of a deep rock well into a heat pump, and then returned warmer to the top of the well, where, as it diffuses, the water returns to its original temperature. Open-loop systems tend to be more complicated than closed loops. One perception about open-loop systems is that they increase the temperature of the water source, affecting plant and animal life. A bigger concern is the plants and animals themselvesâ€”open-loop systems often have maintenance issues with biologic and particulate infiltration. Open-loop systems are more regulated and often require extensive permitting. The digging and drilling process depends on the type of system installed. Many closed-loop systems only disturb an 8- to foot-square parcel of land. Other types of systems vary in the amount of disturbed yard. With the exception of extremely sandy soil conditions poor heat conductivity , the type of soil is not a consideration for the effectiveness of a system. However, some soil types such as extremely rocky can affect the drilling process. How It Compares When deciding on space and water heating systems, homeowners must weigh the cost and energy usage. The actual savings from switching to a GSHP depends on the type of fuel previously used, the location, the weather, and the price of electricity. Heating oil is most common in the Northeastâ€”the U. Besides being a non-renewable fuel, heating oil emissions are linked to poor air quality and resulting health issues, according to an Environmental Defense Fund study. Heating oil systems make heat pumps a very attractive alternative, but how do they compare to cleaner, cheaper natural gas? Slightly more than half of the homes in the United States use natural gas as their heating fuel. When compared to electricity, the prices of both fuel oil and natural gas are more volatile, so knowing annual averages can help predict an accurate payback to see if the investment is worthwhile financially. Heat pumps run on electricity only and can increase electric bills when switching from fossil fuel. Heat pump systems are easily mixed with other energy solutions hybrid systems. Heat pump and solar hot water systems complement each other. The GSHP can augment water heating, while also heating or cooling

the home. Alternatively, one could route the solar-heated hot water from the roof to the ground loop to increase the thermal conductivity factor aka, k-factor of the looped system. GSHPs compare favorably to traditional heating systems, especially in terms of system durability and longevity, and maintenance. A typical heat pump system lasts about 25 years and requires minimal maintenance. The relatively stable energy costs of a GSHP offered the Priors, who are near retirement age, some economic peace of mind. These systems typically have lower operational costs than most. Johnston has more than 30 years of experience in data acquisition and control, and energy management systems, including GSHPs. He works for Terraclime Geothermal, determining the marketability of ground-source heat pumps. He performs energy analyses to assess, design, and optimize the performance of energy systems.

Chapter 9 : Where does the earth's energy come from? | Yahoo Answers

the direct transfer of energy by electromagnetic waves. What kind of energy do we receive from the sun? Most of the energy from the sun travels to Earth in the form of visible light and infrared radiation.

We have found that the earth is loaded with electricity! Maybe that is why many animals become very disturbed and frightened before and during earth quakes. Are they sensing these electrical currents which are being generated by the high voltages from the moving plates within the earth? These plans are loaded with information that you may not find anywhere in the world! When you receive these plans you will be able to quickly build a homemade device or devices that will produce electricity or electrical currents that can charge batteries, capacitors or light small white LED light bulbs. It is very possible to get enough current to run a small garage or home, but, it would take a little more time to build and construct. The information in these plans are intended to educate everyone in planning for emergencies. They are great for low lighting during long blackouts. You can cheaply use the earth as a generator to light your entire home with multiple super bright LED white light bulbs. These bulbs are not as bright as a 60 watt bulb, but just one bulb is bright enough to light up an entire room during emergencies. LED bulbs can last up to 70 years and only use small milliamps of power to run. Most of these bulbs will run on 5 volts or less. To much voltage can burn them out. But the earth can be made to output a steady 5 volt DC current. You can purchase these bulbs anywhere, Electronic supply stores, hardware stores, Walmart stores etc. You can also buy small LED white flash lights just about anywhere. It is much easier to use them already manufactured in a flashlight container and is more attractive for your home. They are also being widely used as yard landscaping lights because they are so bright and high efficient. After you purchase our plans, you can start getting free energy from the earth in less than one hour! You can now use less earth space and get 10 times more power output! It may also be possible to collect some high voltage RF spikes from far distant lightning strikes as well! Of course it is to dangerous to try and collect a direct lightning strike. It is best to always use a 8 foot ground wire to guide the energy pulse away from your project. There is a large amount of unlimited power down in the earth just waiting to be used by anyone who needs it. This is also great as a science fair project as well as an emergency backup lighting system for your home, garage or basement.