# DOWNLOAD PDF ECONOMICS OF POWER

## Chapter 1 : Economics of Power Generation - Part 2 | calendrierdelascience.com

*The economics of central station generation is largely a matter of costing. As with any other production technology, central station generation entails fixed and variable costs. The fixed costs are relatively straightforward, but the variable cost of power generation is remarkably complex.*

Tweet this Share this on LinkedIn Share this on Facebook Email this Print this Understanding solar demand requires a framework that incorporates local regulatory dynamics, installation costs and operating conditions into a global map of specific conditions and variations on the ground. Morgan Stanley Blue Papers, a product of our Research Division, involve collaboration from analysts, economists and strategists across the globe and address long-term, structural business changes that are reshaping the fundamentals of entire economies and industries around the globe. For the first time, the cost of generating electricity from the sun can compete with traditional sources of power in a number of key markets. Add to this equation breakthrough advances in battery technology, and sustainable, clean and dependable solar power can increasingly become a practical, cost-effective way to meet the ever-growing global demand for more energy. The sector naturally favors sun-drenched regions with less volatile weather, but over the years, the biggest key to growth has been regulatory and financial incentives, such as favorable tax policies. Building a framework that incorporates local regulatory dynamics, installation costs and operating conditions into a global map of specific conditions and variations on the ground can shed light on sustainability trends, energy policies and markets, and investment strategies. Demand for solar power is expected to grow by an average of 47 gigawatts per year from through  This same group saw demand grow by 36 GW in , while globally, demand grew by 40 GW. Indeed, the factors that affect solar power growth remain in flux from nation to nation. For example, Japan is currently reviewing its solar subsidies, with potential downside for solar, while the limited availability of suitable land for solar generation could curb growth in India. In Europe, a slowdown in Germany is expected to offset solar growth in other countries in the region. US demand for solar power is a bright spot. He cites strong and improving rooftop solar economics and the likely continuation of key tax breaks. Rooftops and Batteries The growth of the solar rooftop market, not just in the US, but all over the world, should become a major driver of demand and hold out the biggest promise for solar growth. Seeing neighbors with solar panels on their rooftops and knowing what that means to energy bills, home values and social values shifts the conversation about solar from abstract and inaccessible to concrete and practical. Substantial advances to energy storage technology is helping to make rooftop solar that much more attractive. Fittingly, the advances have emerged from the fuel-hungry auto industry. Innovations in hybrid and electric vehicles over the past decade have had to contend with the battery problem: It turns out that what works for fast cars may be perfect for power-hungry homes and offices. The power-storage solution resolves a nagging issue with many renewable energy sources: Generated power usually flows right into the grid, but when you most need it, consumers have to draw down from some upstream power plant that burns coal or natural gas. Cheaper, more convenient, high-capacity batteries allow renewable power to go completely off-grid. This development is radical enough that it could eventually disrupt utilities in both the US and Europe, says Byrd. Explore more Ideas and Research , or contact your Morgan Stanley representative for the full report. Find a Financial Advisor to discuss your investment goals and strategy.

## Chapter 2 : Economic power - Wikipedia

*Economics of Power Generation In all new engineering enterprises of this era, the question of cost is of utmost importance. It is the role played by an engineer to achieve the desired technical result, with minimum cost that distinguishes him from a non engineer who can also possibly attain the same result, but at what cost?*

Overview[ edit ] Olkiluoto 3 under construction in  It is the first EPR design, but problems with workmanship and supervision have created costly delays which led to an inquiry by the Finnish nuclear regulator STUK. Utility-scale solar electricity generation newly contracted by Palo Alto in costs 2. Many countries, including Russia, South Korea, India, and China, have continued to pursue new builds. Globally, 71 nuclear power plants were under construction in 15 countries as of January , according to the IAEA. In the United States, nuclear power faces competition from the low natural gas prices in North America. These reactors are extremely expensive to build. It can sometimes take decades to recoup initial costs. Timothy Stone , businessman and nuclear expert, stated in "It has long been recognised that the only two numbers which matter in [new] nuclear power are the capital cost and the cost of capital. The recent liberalization of the electricity market in many countries has made the economics of nuclear power generation less attractive, [57] [58] and no new nuclear power plants have been built in a liberalized electricity market. Private generating companies now have to accept shorter output contracts and the risks of future lower-cost competition from subsidised energy sources, so they desire a shorter return on investment period. This favours generation plant types with lower capital costs or high subsidies, even if associated fuel costs are higher. Profundo added up investments in eighty companies in over financial relationships with banks in the following sectors: Because a power plant does not earn income and currencies can inflate during construction, longer construction times translate directly into higher finance charges. The NRC has new regulations in place now see Combined Construction and Operating License , and the next plants will have NRC Final Design Approval before the customer buys them, and a Combined Construction and Operating License will be issued before construction starts, guaranteeing that if the plant is built as designed then it will be allowed to operateâ€”thus avoiding lengthy hearings after completion. In Japan and France , construction costs and delays are significantly diminished because of streamlined government licensing and certification procedures. In France, one model of reactor was type-certified, using a safety engineering process similar to the process used to certify aircraft models for safety. That is, rather than licensing individual reactors, the regulatory agency certified a particular design and its construction process to produce safe reactors. In the United Kingdom and the United States cost overruns on nuclear plants contributed to the bankruptcies of several utility companies. In the United States these losses helped usher in energy deregulation in the mids that saw rising electricity rates and power blackouts in California. When the UK began privatizing utilities, its nuclear reactors "were so unprofitable they could not be sold. But the company that took them over, British Energy, had to be bailed out in to the extent of 3. However, nuclear has lower fuel costs but higher operating and maintenance costs. Generally, the fuel used is uranium , although other materials may be used See MOX fuel. This represents a higher level of assured resources than is normal for most minerals. Further exploration and higher prices will certainly, on the basis of present geological knowledge, yield further resources as present ones are used up. Fuel efficiency in conventional reactors has increased over time. Similar efforts have been utilizing weapons-grade plutonium to produce mixed oxide MOX fuel, which is also produced from reprocessing used fuel. Other components of used fuel are currently less commonly utilized, but have a substantial capacity for reuse, especially so in next-generation fast neutron reactors. Radioactive waste All nuclear plants produce radioactive waste. To pay for the cost of storing, transporting and disposing these wastes in a permanent location, in the United States a surcharge of a tenth of a cent per kilowatt-hour is added to electricity bills. Currently, there is no plan for disposing of the waste and plants will be required to keep the waste on the plant premises indefinitely. Long term management is subject to change based on technology and public opinion, but currently largely follows the recommendations for a centralized repository as first extensively outlined in by AECL in  It was determined after extensive review that following these recommendations would safely isolate the waste from

the biosphere. Very long term monitoring requires less staff since high-level waste is less toxic than naturally occurring uranium ore deposits within a few centuries. Depleted uranium DU waste can also be used as fuel in fast reactors. Waste produced by a fast-neutron reactor and a pyroelectric refiner would consist only of fission products, which are produced at a rate of about one tonne per GWe-year. This entails either dismantling, safe storage or entombment. Vulnerability of nuclear plants to attack A report for the Union of Concerned Scientists stated that "the costs of preventing nuclear proliferation and terrorism should be recognized as negative externalities of civilian nuclear power, thoroughly evaluated, and integrated into economic assessmentsâ€”just as global warming emissions are increasingly identified as a cost in the economics of coal-fired electricity". In when North Korea turned on a "power" reactor, there was uncertainty in defense circles whether it was for power use or plutonium production: Lists of nuclear disasters and radioactive incidents candles in memory of the Chernobyl disaster in , at a commemoration 25 years after the nuclear accident, as well as for the Fukushima nuclear disaster of  Nuclear safety and security is a chief goal of the nuclear industry. Great care is taken so that accidents are avoided, and if unpreventable, have limited consequences. Accidents could stem from system failures related to faulty construction or pressure vessel embrittlement due to prolonged radiation exposure. Many more recent reactor designs have been proposed, most of which include passive safety systems. These design considerations serve to significantly mitigate or totally prevent major accidents from occurring, even in the event of a system failure. Still, reactors must be designed, built, and operated properly to minimize accident risks. The report that UNSCEAR presented to the UN General Assembly in states that 29 plant workers and emergency responders died from effects of radiation exposure, two died from causes related to the incident but unrelated to radiation, and one died from coronary thrombosis. It attributed fifteen cases of fatal thyroid cancer to the incident. It said there is no evidence the incident caused an ongoing increase in incidence of solid tumors or blood cancers in Eastern Europe. With 46 deaths in its entire six-decade worldwide history, nuclear power remains the safest-ever way to make electricity, by a very wide margin. Instead, the public faces the prospect of severe losses in the event of any number of potential adverse scenarios, while private investors reap the rewards if nuclear plants are economically successful. Because of the high profiles of the Three Mile Island accident and Chernobyl disaster , relatively few municipalities welcome a new nuclear reactor, processing plant, transportation route, or deep geological repository within their borders, and some have issued local ordinances prohibiting the locating of such facilities there. Nancy Folbre , an economics professor at the University of Massachusetts, has questioned the economic viability of nuclear power following the Japanese nuclear accidents: The proven dangers of nuclear power amplify the economic risks of expanding reliance on it. Indeed, the stronger regulation and improved safety features for nuclear reactors called for in the wake of the Japanese disaster will almost certainly require costly provisions that may price it out of the market. Safety interlocks were turned off. Coolant circulation was turned off. Core temperature rose from the usual degrees Fahrenheit to degrees within 20 seconds. The boiling temperature of the sodium coolant is degrees. Within seven minutes the reactor had shut itself down without action from the operators, without valves, pumps, computers, auxiliary power, or any moving parts. The temperature was below the operating temperature. The reactor was not damaged. The operators were not injured. There was no release of radioactive material. The reactor was restarted with coolant circulation but the steam generator disconnected. The same scenario recurred. Three weeks later, the operators at Chernobyl repeated the latter experiment, ironically in a rush to complete a safety test, using a very different reactor, with tragic consequences. Safety of the Integral Fast Reactor depends on the composition and geometry of the core, not efforts by operators or computer algorithms. The worst case nuclear accident costs are so large that it would be difficult for the private insurance industry to carry the size of the risk, and the premium cost of full insurance would make nuclear energy uneconomic. It is often argued that this potential shortfall in liability represents an external cost not included in the cost of nuclear electricity. However, the problem of insurance costs for worst-case scenarios is not unique to nuclear power: If 15 percent of these funds are expended, prioritization of the remaining amount would be left to a federal district court. If the second tier is depleted, Congress is committed to determine whether additional disaster relief is required. Please update this article to reflect recent events or newly available information. August The cost per unit of

electricity produced kWh will vary according to country, depending on costs in the area, the regulatory regime and consequent financial and other risks, and the availability and cost of finance. Costs will also depend on geographic factors such as availability of cooling water, earthquake likelihood, and availability of suitable power grid connections. So it is not possible to accurately estimate costs on a global basis. Commodity prices rose in , and so all types of plants became more expensive than previously calculated. A study by former utility staffperson Craig A. Sovacool , the marginal levelized cost for "a 1,MWe facility built in would be Cost of electricity by source Generally, a nuclear power plant is significantly more expensive to build than an equivalent coal-fueled or gas-fueled plant. If natural gas is plentiful and cheap operating costs of conventional power plants is less. A comparison of the "real" cost of various energy sources is complicated by a number of uncertainties: The cost of climate change through emissions of greenhouse gases is hard to estimate. Carbon taxes may be enacted, or carbon capture and storage may become mandatory. The cost of environmental damage caused by any energy source through land use whether for mining fuels or for power generation , air and water pollution, solid waste production, manufacturing-related damages such as from mining and processing ores or rare earth elements , etc. The cost and political feasibility of disposal of the waste from reprocessed spent nuclear fuel is still not fully resolved. In the United States, the ultimate disposal costs of spent nuclear fuel are assumed by the U. Operating reserve requirements are different for different generation methods. When nuclear units shut down unexpectedly they tend to do so independently, so the "hot spinning reserve" must be at least the size of the largest unit. Over 87 reactors in the United States have been granted extended operating licenses to 60 years of operation by the NRC as of December [update] , and subsequent license renewals could extend that to 80 years. Due to the dominant role of initial construction costs and the multi-year construction time, the interest rate for the capital required as well as the timeline that the plant is completed in has a major impact on the total cost of building a new nuclear plant. In particular it aimed to develop "a robust approach to compare directly the costs of intermittent generation with more dependable sources of generation". Wind power was calculated to be more than twice as expensive as nuclear power. Nuclear figures included estimated decommissioning costs. An overview can be found here Table 2: However, the most important subsidies to the nuclear industry do not involve cash payments. Rather, they shift construction costs and operating risks from investors to taxpayers and ratepayers, burdening them with an array of risks including cost overruns, defaults to accidents, and nuclear waste management.

## Chapter 3 : Economic Power vs. Political Power â€”Ayn Rand Lexicon

*Monopoly power is a strong form of market power - the ability to set prices or wages unilaterally. This is the opposite of the situation in a perfectly competitive market, in which supply and demand set prices.*

But it is in the economics where his political philosophy begins to take on real form. There is not space enough here to cover the enormous range of his economics but there are a few basics which need to be dealt with in this slightly longer piece and which can be fought out below the line as usual. Alan Budd, who was an economic adviser to Margaret Thatcher in the s once made an interesting point about Marxist economic theory and government policy on the fight against inflation at the time: In all previous epochs, human labour had been used to create a surplus product, usually subsistence farming and a surplus used for first bartering and then trading. Under the ancient mode and slavery through to feudalism, the product and the means of producing it was clear; food, clothing, the means of life. You worked for the master and you belonged to the master in one way or another. The German word for serf, for example, is Leibeigener; your body literally belongs to the master. Capitalism liberates you from that and turns you into a free agent, apparently able to enter into a free contract to sell your labour to whomsoever you see fit. You are cast out of your old existence and are set on the route to making your own. Whereas before you were a bondsman, now you are a journeyman and you can set off to make your own fortune, as the fairy tales have it. In economic terms, what before was a tangible surplus product is now transformed into intangible surplus value. You enter into this apparently free contract with an employer but the wage you draw from that employment is only a part of the value you create. Just as before a portion of the cabbages and linen you made belonged to the master, now a proportion of the monetary value you make through the production process belongs to the employer and you will only be employed if a competitive rate of surplus value can be generated through your labour. The employer will provide the machines or tools for the completion of the task constant capital while the worker provides the labour power variable capital. The employer will always be trying to improve labour productivity and can do so in various ways, but all of them boil down to improving the gap between your wage and the amount of value created by your labour power. This means that for Marx the commodity labour power has a special character in that it is the only commodity which can be employed to increase value, while all the others are merely reified forms of dead human labour, useless without labour input. In theory there is no difference here to previous epochs where we accept the labour theory of value because it is measured in tons of cabbages and yards of linen but now that it becomes a commodified and monetarised relationship it also becomes a quasi-mystical one, with value apparently emerging mysteriously out of all sorts of transactions and technologies and with market mechanisms and competition wiping out and obfuscating the distinction between what it costs to produce something and its price. Under capitalism labour productivity may improve massively, but it can never be reduced to zero because that would remove all demand for the goods produced. You would then have to distribute commodities or vouchers to the entire population based on some sort of criteria not linked to labour input and then where do we end up? Oh, of course, at communism, in which each gives according to their ability and receives according to their need. Capitalist competition over labour productivity thus not only produces its own gravediggers but also provides the shovels or robots to finish the job. Labour productivity can be increased in all sorts of traditional ways such as making workers work harder for less money, speeding up the production lines, extending the working day, getting people to work longer for the same or even less money, seeking out newer, cheaper labour sources through globalisation etc and, as Alan Budd points out, all of the above are regularly used, but for Marx they all only put off the dread day of collapse in which the workers realise that the harder and more productively they work, the smaller the proportion of the surplus value they create comes to them. Since the mids the common way to put this off has been through enormous levels of debt, either by the state or the private individual. It is that tendency which both brought about the collapse of the Soviet Union â€” which over-borrowed in order to maintain full employment as a political necessity without raising productivity â€” and the current crisis in the west where a debt-fuelled asset price bubble in order to artificially stimulate demand has created the greatest economic

crisis in a century. But for Marx, at the root of it all is the question of how surplus value is created and distributed and, most of all, what this does to human relations and desires. The commodification of labour power also brings with it the commodification of humans and their alienation from both themselves and the products of their labour power. The final two columns in this series will go on to discuss how this process of economic alienation feeds through into religion and ideology and the means by which people manage to cope with being mere playthings of larger forces; how a sense of autonomy, faith and hope are maintained in an apparently constrained, rationalistic and futureless world. This will bring us right back to where we started:

## Chapter 4 : Economics of Power Generation - Part 1 | calendrierdelascience.com

*The study undertaken for this purpose is termed as 'Economics of Power Generation' and it is, by definition, chiefly concerned with the cost of production per unit (1 kWh) of electrical energy.*

Concepts Introduction to Economics of Power Generation: The function of a power station is to deliver power at the lowest possible cost per kilo watt hour. This total cost is made up of fixed charges consisting of interest on the capital, taxes, insurance, depreciation and salary of managerial staff, the operating expenses such as cost of fuels, water, oil, labor, repairs and maintenance etc. The cost of power generation can be minimized by: Reducing the amount of investment in the plant. Operation through fewer men. Having uniform design 5. Selecting the station as to reduce cost of fuel, labor, etc. All the electrical energy generated in a power station must be consumed immediately as it cannot be stored. So the electrical energy generated in a power station must be regulated according to the demand. The demand of electrical energy or load will also vary with the time and a power station must be capable of meeting the maximum load at any time. Certain definitions related to power station practice are given below: Load curve is plot of load in kilowatts versus time usually for a day or a year. Load duration curve is the plot of load in kilowatts versus time duration for which it occurs. Maximum demand is the greatest of all demands which have occurred during a given period of time. Connected load of a system is the sum of the continuous ratings of the load consuming apparatus connected to the system. Peak load is the maximum load consumed or produced by a unit or group of units in a stated period of time. It may be the maximum instantaneous load or the maximum average load over a designated interval of time. Demand factor is the ratio of maximum demand to the connected load of a consumer. Diversity factor is the ratio of sum of individual maximum demands to the combined maximum demand on power stations Load factor: Load factor is the ratio of average load during a specified period to the maximum load occurring during the period. Station load factor is the ratio of net power generated to the net maximum demand on a power station. Plant factor is the ratio of the average load on the plant for the period of time considered, to the aggregate rating of the generating equipment installed in the plant. Capacity factor is the ratio of the average load on the machine for a period of time considered, to the rating of the machine. Demand factor is the ratio of maximum demand of system or part of system, to the total connected load of the system, or part of system, under consideration.

## Chapter 5 : What is economic power? definition and meaning - calendrierdelascience.com

*The economics of any power generation depends primarily on what each unit (kWh, MWh) costs to produce and get to the consumer who creates the demand for that power. This is the LCOE as outlined above.*

Tweet Power plants generate electrical energy in hundreds and sometimes even thousands of Mega Watts. Extensive usage of the equipment in power plants take its toll over time. They undergo wear and tear and hence require maintenance, repair and replacement. Hence, over time, the value of the power plant equipment as well as the building decreases. Ideally, the power plant equipment work at their rated capacities and at the efficiencies they are designed for. However, practically, it is not possible. Over time, wear and tear affects the efficiency as well as the life of a power plant. We have to keep in mind that any plant will have a large capital installation cost. Such a huge sum of money is generally loaned. Interest is also charged upon this amount. Combining the above mentioned points, the suppliers have to pay for: Interest on the amount. Depreciation in value of the plant The suppliers, of course, charge the consumers for these and such charges are included in the fixed and semi - fixed costs of electrical energy. The planning and management section of the plant sets aside some amount of money every year. It is calculated by the following methods: This value remains fixed for every year and depends upon the useful lifespan of the plant. It can be given as, total depreciation value divided by the useful life of the plant. It does not consider the amount of interest earned by the annual depreciation amount set aside annually. Graphically, it can be expressed as follows: Diminishing Value Method In this method, a fixed rate of depreciation value is set. This rate is first applied to the capital cost P and then to the diminishing value. The rate is decided according to the useful lifespan of the plant. Yearly depreciation value can be calculated as follows: Advantage Better distribution of charges: In the early years, depreciation charges are more while maintenance and repair charges are less. In the later years, depreciation charges are less while maintenance and repair charges are higher. Disadvantage In the early years, the plant is supposed to collect money and then collect interest on it as time passes. But in this method, the amount of interest is not taken into account. Sinking Fund Method In this method, the arrangement is made such that a fixed amount is set aside annually and then invested at a certain interest rate which is compounded yearly. This fixed depreciation charges will be such that sum of these charges and the interest collected must be equal to the cost of replacement of the equipment. Also, after n years, the total amount must be equal to the cost of replacement i. Hence, it will collect interest only for n-1 years. Therefore, This method is not widely used in practice. However, it does find application in economic assessments. Why not share it?

## Chapter 6 : The Economics of Solar Power Are on the Rise | Morgan Stanley

*Introduction to Economics of Power Generation: The function of a power station is to deliver power at the lowest possible cost per kilo watt hour.*

Despite being a non-renewable source , there is still a high demand for fossil fuels due to their affordability and reliability. From heating and lighting homes to fueling vehicles, fossil fuels play an integral role in energy production and the global economy. Even with the massive strides made in technological innovation, sustainable energy has failed to usurp traditional fossil fuels. However, due to increased production, government subsidies and mounting environmental concerns, the costs of solar and wind production have decreased. In fact, some markets generate renewable energy more cheaply than fossil fuels. While wind energy is predominantly used for commercial means, such as wind farms, solar energy has both commercial and residential uses. Fossil Fuels Although an exact date is difficult to determine, many estimates suggest that fossil fuels will be depleted within the next years. While sources of coal, natural gas and crude oil continue to deteriorate, consumption of fossil fuels has not. Amongst all energy sources, fossil fuels trump both renewable energy and nuclear power. Not only are fossil fuels nonrenewable, they are also a cause of various adverse environmental effects. Burning fossil fuels is the leading producer of anthropogenic CO2, which has contributed significantly to climate change. Notable effects include global warming, melting ice in the Arctic, rising sea levels and poor crop yields. In , it was estimated that the costs of burning fossil fuels in the U. Solar Power Though renewable energy represents a fraction of total energy consumed, the U. Yet, despite the increase of available solar energy over the past 10 years, solar still only accounts for 0. Photovoltaic devices use sunlight to replace or supplement the electricity provided on the utility grid. Solar Power Adoption Until recently, solar energy systems were only accessible to the wealthy or fanatical. However, due to sharply declining costs, universal access to solar paneling systems is becoming a reality. In the early s, the average U. As a result, the number of photovoltaic systems installed in the U. Solar energy has seen a global increase in consumption as more countries recognize the harmful effects of burning fossil fuels. Increased competition within the solar power industry has resulted in sharp declines in installation costs. Many of the largest economies, including the U. In an effort to combat pollution, China has made the biggest push into renewable energy and installed the most photovoltaics in  Big businesses are also investing in reusable solar systems. Although solar power continues to account for a small share of overall energy supply, the residential and commercial sectors are slowly embracing renewable energy. As prices continue to decline, it is expected that solar energy systems become more prevalent. In Europe, the price per kilowatt hour is expected to decline to between 4 and 6 cents in and further decrease to as low as 2 cents in  Assuming forecasts are correct, solar photovoltaics will be amongst the cheapest sources of energy. Achieving this vision would require increasing the global capacity of solar energy from gigawatts in to gigawatts by  As a result, this would avoid the emission of 4 Gt of carbon dioxide annually. Many cities and countries around the world have committed to cutting greenhouse gas emissions 80 percent by , including New York City. Tax Credits Even though solar energy systems are more cost-effective today, residential and commercial usage still receive government subsidies. Many European countries impose a Feed-In-Tariff scheme to increase the appeal of renewable energy systems. Under a feed-in-tariff scheme, renewable energy system owners can collect money from the government. Costs are based on per kilowatt-hour kWh , with prices varying between countries. The Bottom Line For the most part, the commitment to renewable resources has come from individuals, big businesses and countries. With big businesses, individuals and countries continuing to transition to renewable energy sources, adverse environmental effects from burning fossil fuels can hopefully be moderated. Trading Center Want to learn how to invest? Get a free 10 week email series that will teach you how to start investing. Delivered twice a week, straight to your inbox.

## Chapter 7 : Economics of Power Generation

*Definition of economic power: Condition of having sufficient productive resources at command that give the capacity to make and enforce economic decisions, such as allocation of resources and apportioning of goods and services.*

It is the role played by an engineer to achieve the desired technical result, with minimum cost that distinguishes him from a non engineer who can also possibly attain the same result, but at what cost? In a power generation industry we are usually confronted with a situation where we have to make a choice between equipment of high cost with high efficiency and their low cost counterpart with lower efficiency. In the first case, the charges due to interest and depreciation will be higher with lower energy bill as compared to the corresponding figures in the second case. Here the role of the Electrical Engineer comes into play, where he has to balance the situation in such a way that the total expenditure of the plant is minimum, and thus the study of economics of power generation is of prime importance, taking all practical purposes into consideration. To deduce the power generation economics effectively we should know the structure of annual expenditure of the plant and the factors affecting them. The total annual expenditure of the plant can be classified into several subheadings namely, Fixed Charges Semi fixed Charges Running Charges These are all important parameters pertaining to the Economics of power generation and are considered in details below. Fixed Charges of Power Generation Fixed charges, as the name suggest does not vary either with the capacity of the plant or with plant operation. These costs remain fixed under all circumstances. These mainly include the salaries of higher officials of the central organization and the rent of the land reserved for future expansion. Semi Fixed Charges of Power Generation These charges mainly depend on the installed capacity of the plant and are independent of the electrical energy output of the plant. These charges include the following: Interest and depreciation on the capital cost of the generating plant, transmission and distribution network, buildings and other civil engineering works etc. Capital cost of the plant also includes the interest paid during the construction of the plant, salaries of engineers and other employees, development and construction of the power station. It also includes cost incurred on account of transportation, labor etc. It is particularly note worthy, that in nuclear stations the capital cost of the station also includes the cost of initial charges of the nuclear fuel minus the salvage value paid at the end of its useful life. It also includes all types of taxes, insurance premiums pain on policies to cover the risk of accidental breakdown. Rent paid for the land being actually used for the construction purpose. The cost due to starting and shutting down of plants are also included in this category, when the power plant operates on one or two shift basis. Running Charges of Power Generation The running charges or running cost of a power plant , is probably one of the most important parameters while considering the economics of power generation as it depends upon the number of hours the plant is operated or upon the number of units of electrical energy generated. It essentially comprises of the following costs incurred mentioned below. Cost of the fuel delivered coupled with the fuel handling cost in the plant. Coal is the fuel used in a thermal power plant , and diesel oil in case of a diesel station. In case of a hydro-electric plant there is no fuel cost as water is the free gift of nature. But a hydro-plant requires higher installation cost and their mega Watt output of power generation is also lower compared to the thermal power plants. Wastage of the operational and maintenance stuff and salaries of supervisor staffs engaged in running the plant. In case of a thermal power plant, power generation economics includes the cost of feed water for the boiler, like the cost of water treatment and conditioning. As the amount of wear and tear of the equipment depends on the extent to which the plant is being used, so the lubricating oil cost and repair and maintenance charges of the equipment are also included in the running charges. Its unit is given in K-Watt-Hr.

## Chapter 8 : Economics of Power Generation : Load curve, station load factor,capacity factor

*Fossil fuels, namely crude oil, natural gas and coal, are the world's number one source of energy. Despite being a non-renewable source, there is still a high demand for fossil fuels due to.*

Print In most industrialized countries, electric power is provided by generating facilities that serve a large number of customers. These generating facilities, known as central station generators, are often located in remote areas, far from the point of consumption. The economics of central station generation is largely a matter of costing. As with any other production technology, central station generation entails fixed and variable costs. The fixed costs are relatively straightforward, but the variable cost of power generation is remarkably complex. We will examine each of these in turn. The fixed costs of power generation are essentially capital costs and land. The capital cost of building central station generators vary from region to region, largely as a function of labor costs and "regulatory costs," which include things like obtaining siting permits, environmental approvals, and so on. It is important to realize that building central station generation takes an enormous amount of time. In a state such as Texas where building power plants is relatively easy , the time-to-build can be as short as two years. In California, where bringing new energy infrastructure to fruition is much more difficult due to higher regulatory costs , the time-to-build can exceed ten years. Although the ranges in Table 5. Operating costs for power plants include fuel, labor and maintenance costs. The operating cost required to produce each MWh of electric energy is referred to as the "marginal cost. For renewables, fuel is generally free perhaps with the exception of biomass power plants in some scenarios ; and the fuel costs for nuclear power plants are actually very low. For these types of power plants, labor and maintenance costs dominate total operating costs. In general, central station generators face a tradeoff between capital and operating costs. Those types of plants that have higher capital costs tend to have lower operating costs. Further, generators which run on fossil fuels tend to have operating costs that are extremely sensitive to changes in the underlying fuel price. The right-most column of Table 5. Typical capital and operating costs for power plants. Note that these costs do not include subsidies, incentives, or any "social costs" e.

## Chapter 9 : Nuclear Power Economics | Nuclear Energy Costs - World Nuclear Association

*New nuclear power plants typically have high capital costs for building the first several plants, after which costs tend to fall for each additional plant built as the supply chains develop and the regulatory processes improve.*

Search Economic Power vs. Political Power A disastrous intellectual package-deal, put over on us by the theoreticians of statism, is the equation of economic power with political power. You have heard it expressed in such bromides as: What is the basic, the essential, the crucial principle that differentiates freedom from slavery? It is the principle of voluntary action versus physical coercion or compulsion. The Unknown Ideal , 46 What is economic power? It is the power to produce and to trade what one has produced. In a free economy, where no man or group of men can use physical coercion against anyone, economic power can be achieved only by voluntary means: The mechanism of a free market reflects and sums up all the economic choices and decisions made by all the participants. Men trade their goods or services by mutual consent to mutual advantage, according to their own independent, uncoerced judgment. A man can grow rich only if he is able to offer better valuesâ€"better products or services, at a lower priceâ€"than others are able to offer. Whenever you buy one product rather than another, you are voting for the success of some manufacturer. And, in this type of voting, every man votes only on those matters which he is qualified to judge: Now let me define the difference between economic power and political power: The Unknown Ideal , 47 Evading the difference between production and looting, they called the businessman a robber. Evading the difference between freedom and compulsion, they called him a slave driver. Evading the difference between reward and terror, they called him an exploiter. Evading the difference between pay checks and guns, they called him an autocrat. Evading the difference between trade and force, they called him a tyrant. The most crucial issue they had to evade was the difference between the earned and the unearned. You are learning the difference now. For information address New American Library. Reprinted with permission of Stein and Day Publishers. Excerpts from Atlas Shrugged.