DOWNLOAD PDF NUCLEAR DESALINATION OF SEA WATER

Chapter 1 : Desalination - Wikipedia

This is the largest nuclear desalination plant based on hybrid MSF-RO technology using low-pressure steam and seawater from a nuclear power station. They incur a 4 MWe loss in power from the plant. In a 10, m 3 /d MVCplant was set up at Kudankulam to supply fresh water for the new plant.

Water scarcity is one of the most important issues to be confronted by global communities in the years aheadâ€"already an increasingly vast number of regions worldwide face chronic water shortages , and with demand projected to grow an additional 40 percent by , the threat of violence over access to clean drinking water is both a real and urgent one. With shifting climate patterns further exacerbating the problem, investing in economically-efficient and sustainable water utilization tactics immediately is crucial. Accelerated urban development and agricultural intensification has brought social and economic benefits, but our ecosystems have paid the price. Groundwater systems that constitute the predominant reserves of freshwater on Earth are threatened by contaminants and pollution, the effects of hydraulic fracking, and a lack of effective management strategies. While better water conservation and pollutant monitoring can help control the issue, now sources of freshwaterâ€"such as seawater desalinationâ€"will also assist in alleviating current and projected water stress. Based on current statistics, only 1 percent of the global population receives water from desalination. However, the United Nations expects 14 percent of the global population to receive water from desalination by The desalination of water has been practiced for years, but until recent years high economic and energy costs have made it a largely prohibitive solution. On paper, desalination sounds straightforwardâ€"essentially there are two main methods through which the process is completed. In a membrane desalination process, saltwater is pumped through pipes and then through specially designed membranes that allow the water molecules to pass through but trap the bigger salt molecules. There are several kinds of membrane desalination processes with the most common type using reverse osmosis to filter out the salt. In a thermal process, the saltwater is boiled and the vapor condenses as freshwater. According to Direct Energy , it is still almost always cheaper to use local freshwater than to desalinate seawater. And desalination, as with nearly all industrial processes, typically sources its energy from dirty carbon-based resources. Nuclear power therefore offers an appealing solutionâ€"in terms of availability and reliability it is competitive with fossil fuels , and meets all the essential requirements in order to feed a desalination plant. Because nuclear energy seawater desalination creates minimal environmental pollution and greenhouse gas emissions, it holds tremendous potential for the future production of freshwater. Today, California is in the midst of a persistent, worsening drought. Groundwater is a vital resource in a time of drought, but it takes decades or even centuries for the aquifer to replenish itself. People in California have usually depended on groundwater for 40 percent of their water supply; since the drought, however, that number has jumped to over 60 percent. The state of California has already implemented conservation measures, but with the aquifers depleted and groundwater disappearing, the land itself has begun to collapse. Desalinating ocean water using reverse osmosis and ultrafiltration, the plant sells back fresh water to the local community. Many other countries worldwideâ€" South Korea, Pakistan, Japan, China, and Argentinaâ€"also have nuclear power plants that desalinate seawater. In Russia, the only large nuclear facility with a water desalination facility was located in Aktau in the former Soviet Union, now Kazakhstan. At one time it delivered over , cubic metres of fresh water per day, but it was shut down in April and is now being decommissioned. More recently, however, the country announced its plans to work with foreign partners to both finance and construct a new nuclear plant with a desalination facility. The new plant hopes to provide , cubic metres of fresh water a day from one nuclear power unit. Nuclear desalination is not a new technology, and desalination methods date back millennia. Furthermore, the need for water and sources of water is only going to increase. Beth Kelly is a freelance science writer with a strong interest in nuclear power and its potential as a clean energy source. This entry was posted in News by ansnuclearcafe.

Chapter 2 : Nuclear Desalination and the Economics of Nuclear Power | ANS Nuclear Cafe

Desalination Thermodynamic Optimization Program (DE-TOP) DE-TOP has been developed by the International Atomic Energy Agency as a tool for the thermodynamic analysis and optimization of nuclear cogeneration systems (currently with options for nuclear desalination and district heating applications).

What is nuclear desalination? Depending on energy from fossil fuels is both unsustainable and detrimental to the environment. Using nuclear power is a viable alternative energy resource, but it comes with its own set of problems. As it becomes increasingly obvious that more power is needed to run desalination plants to provide potable water, and that traditional methods of vacuum distillation and reverse osmosis are not sustainable or environmentally friendly, we must explore the opportunity to take advantage of nuclear power. Nuclear power is created by splitting the nuclei of Uranium atoms. An incredible amount of heat energy is released from this action, which then heats water into steam. Plants generate a great deal of electricity and emit negligible quantities of greenhouse gases; however, since the invention of nuclear reactors in the early s, for World War II, storage and treatment of waste from nuclear power plants has been a largely unsolved problem. The waste is radioactive, and therefore extremely dangerous. It can be stored underground, but the half-life for thematerials used is often even longer than any human civilization has survived. Underground storage depends greatly on geographical and climatic factors, and makes the area above ground unsuitable for human use. Read more about the U. Despite these issues briefly introduced, nuclear energy can be used to power desalination plants. It is most commonly used in cogeneration facilities, where nuclear power is being used both to provide electricity and to treat water. Cogeneration is a wonderful way to solve two issues at once, but the problems of waste and inherent danger still exist. Read more about it at: Photo courtesy of http: Construction begins on the BN fast reactor in Kazakhstan. In operation from , this successful cogeneration facility produced MW of electric power and 80, m3 of fresh water per day! India, Japan, Saudi Arabia, and China begin seriously researching and building nuclear desalination plants. Southeast India invests in the construction of a hybrid multi-stage flash distillation and reverse osmosis desalination plant, aimed to produce m3 of water per day. Global Water Summit meets in Paris, France, to discuss the future of desalination technologies. The construction of desalination plants at cogeneration nuclear power plants is heavily supported by leading international experts on water. Where are current nuclear desalination plants? To give a better sense of where nuclear desalination plants are currently located, we developed the map, below, where countries in red are currently practicing nuclear desalination. For more details on specific projects, see http: But is this really a good idea? What are the economic considerations for building nuclear desalination plants? Should everyone have access, or can we not trust certain countries in the world to use it for positive purposes, such as desalination? Should the United States government have the final say? What do we think? Using nuclear power as an energy has undeniable economical benefits, given the cost comparison discussed above, to traditional methods. These attributes are all well and good, but the problems that we currently face associated with nuclear energy are too great to consider nuclear energy the best possible energy solution for desalination. Until we have a safe, sustainable way to treat radioactive waste, it is short-sighted and irresponsible to rely on nuclear power. We must think of the future of our planet when we implement technological solutions to social problems, and right now nuclear energy is too risky. Besides the waste problem, the high complexity of the system is not well enough understood and too susceptible to accidents. If we develop safer practices for nuclear plants, then it would certainly be beneficial to use nuclear energy to power desalination plants; but until that happens, we cannot responsibly and safely rely on it. Beyond the waste and operation risks, there is far too much political involvement in nuclear technology for it to be a viable solution. Desalination is a problem that must be addressed now. That means that we have to come up with a practical solution for now. Our solution to the problem should change over time, as technology advances and as social problems develop in different directions. External Links on this Page 8:

Chapter 3 : Nuclear Desalination: Technology for a Thirsty Planet | ANS Nuclear Cafe

Nuclear desalination uses the excess heat from a nuclear power plant to evaporate sea water and to condense the pure water. A research team from India and Italy argues that despite public concerns.

There are numerous benefits to integrating a desalination plant with a nuclear power plant such as carbon-free electricity, low-marginal cost of generating electricity compared to fossil fuels, and a consistent power supply, unlike intermittent renewable electricity sources like wind and solar. Thus, for locales with existing nuclear power plants and sufficient demand for desalinated water, nuclear desalination is an attractive option. Nuclear desalination also has the potential to improve the economics of nuclear power. For example, nuclear desalination could help shield nuclear power plants from low electricity prices because some of the power generating capacity could be used for running the desalination plant instead of being sold into the electricity market below cost. Another possible benefit of nuclear desalination is that uranium could be extracted from concentrated brine more cost-effectively than extracting uranium from seawater, reducing the cost of nuclear fuel. First-order estimates of these benefits, however, suggest that they are likely to be marginal at best. Regarding the extent to which nuclear plants can be shielded from low electricity prices, even the largest desalination plants in the world do not use enough electricity to make much of a difference. For example, the average power-generating capacity of nuclear power plants within fifty miles of a coast is approximately MWe, but the largest seawater reverse osmosis plant in the world, the Sorek plant in Israel, only requires around 75 MW to operate at full capacity assuming a specific energy consumption of 3. In addition to high-purity water, another output of a desalination plant is concentrated brine. Extracting uranium from concentrated brine would likely be more cost effective than extracting uranium from seawater, but it would still be more expensive than conventional uranium production or importing uranium from abroad. Thus, extracting uranium from concentrated brine might only appeal to countries that are intent on having more direct control over their nuclear fuel cycle. For example, seven out of twenty-one countries with nuclear power plants near the coast have to import at least a fraction of their uranium. Even if uranium extraction from concentrated brine were more cost effective than conventional uranium production or importing uranium, this strategy would have a limited impact on the overall economics of running a nuclear power plant. Nuclear fuel is already a relatively minute percentage of the cost of nuclear power compared to other power generation technologies, and raw uranium is only a fraction of the cost of nuclear fuel. Researchers should continue to investigate nuclear desalination as an economic means of augmenting global water supplies with minimal environmental impact. Nuclear desalination is a particularly attractive concept compared to powering desalination plants with fossil fuel or intermittent electricity sources. Even so, a summary analysis of some of the proposed ways in which nuclear desalination could improve the economics of nuclear power indicates that such benefits are likely to be marginal at best. Andrew Reimers is a Ph. His research focuses on thermodynamic and economic analysis of power generation and water treatment systems. Andrew blogs about current events related to energy and water at andrewreimersblog. Brittany Speetles is a mechanical engineering student at the University of Texas at Austin and a researcher in the Webber Energy Group. Her research involves solar energy, desalination, and food waste management. This entry was posted in News by ansnuclearcafe. It would have to be a very big distillery to consume gigawatts of thermal power. You could use fresh seawater in combination with electric cooling to condense the distillery steam and let the hot brine leave. September 13, at Future potential high temperature reactor designs would have an advantage over other technologies because the heat would be high quality and you could use heat-driven desalination efficiently. For current reactors, though, a watt is indeed a watt! Nuclear is increasingly competing with load-following peaking generation sources which are more adaptable to the penetration of renewables into the grid. That is, nuclear plants could avoid charges for overgeneration. But using desalination to avoid putting electricity on the grid when the sun is outâ€¦ that could help nuclear fit better on the gird. Steve Nesbit September 12, at If we are talking about providing the electricity that powers the pumps, valves, etc. You would make the same choice to provide 75 MWe for desalination as you would to provide 75 MWe for anything else. Once it hits the grid, a watt is a watt. Am I missing something? Jerry Nolan September 8, at

Chapter 4 : Nuclear Desalination - World Nuclear Association

Desalination is a process that takes away mineral components from saline blog.quintoapp.com generally, desalination refers to the removal of salts and minerals from a target substance, as in soil desalination, which is an issue for agriculture.

Unfortunately, most of it is salt water, and not fresh. Now, one particular solution to such a problem is desalination, which is the process of removing salt and other particles from seawater and other waste water. This is most probably a necessary method in case of population increase and drought, but surprisingly, it has also become a very controversial issue, where people seemingly have very strong opposing opinions about its purpose. That is why, on our end, it is important to look at the pros and cons of desalination in order to come up with a well-informed insight about such a technology. List of Pros of Desalination 1. Its method is proven and effective. Reverse osmosis, a method of removing salt from seawater has been proven effective in creating fresh sources of drinking water that can deliver the health benefits people need. When properly designed, desalination plants can then create drinkable water that is of high quality. Its method is highly understood. Such a method of desalination is backed up by scientific data and is highly understood. The technology used is also reliable that it allows for high-quality water, which means that using such method should allow for great results and could help eliminate water shortage crisis that the world might face in the future. It would preserve current freshwater supplies. This would secure more resources to be used where conservation efforts are currently placed, as there is scarcity of water that is available these days. It has the massive amount of ocean water as source. Even if all water is produced through desalination, sea water would provide an almost inexhaustible supply, which means that even in times of drought, people would have sufficient access to fresh water supply needed for growing crops, for daily living and for a lot of other needs. Simply put, it brings an end to water crisis. It is not dependent on changing factors. One huge problem with many proposed solutions to the ever-increasing water demand is that they heavily rely on uncontrollable factors. For example, more water reservoirs would presuppose that they need rain or snowfall to be filled up. However, desalination does not rely on anything aside from the ocean. With concerns surrounding the melting of the polar ice caps and the rise of the sea levels, nobody would be worried about the ocean disappearing anytime soon. Its plants are safely located. Desalination plants are located away from large residential areas. Though there are large facilities, they are located in industrial zones, so they would not put residential areas at risk. People just have to put a plan in place for the location of desalination plants to make such a technology safer in the long term. With this incredible amount of water, we could change the way we get water. List of Cons of Desalination 1. Its plants are expensive to build. Building desalination plants is not always feasible for a country or a community, with construction costs that are high enough to prevent the development of the technology, as many people just cannot afford the initial price tagâ€”and there are not enough returns to justify the investments made. It can be a very costly process. For the average desalination plant these days, it takes 2 kilowatt hours of energy in order to produce 1 cubic meter of fresh water. Though this would translate to a cost of just under 2 dollars on a lot of power grids, the real production cost comes from the expenditure of fossil fuels that are needed to create electricity for its process. It requires a lot of energy to process. As previously mentioned, more electricity and energy is required to produce water from desalination than any other water supply or demand-management options around the globe, which implies a concern of further dependence on fossil fuels. Nevertheless, it should be noted that the use of fossil fuels has been reduced in many facilities worldwide by using wave, wind and solar energy to power facilities up. Opponents of desalination argue their concern that its plants could produce high amounts of greenhouse gas emissions, which means that that the process of removing salt from seawater can be very harmful to the environment and can have a negative impact on the air that we breathe. Its resulting brine can have a dramatic environmental impact. In creating fresh water out of seawater, salt in the water is needed to be removedâ€”a process that produces brine that is so rich in salt that it can contaminate any environment where it is placed. The brine is very strong that it can kill wildlife and vegetation should it comes into contact with them. Aside from this, there are usually anti-scaling agents and chlorine-removing chemicals in the brine as well. It might risk producing contaminated water. Final Thought By weighing the pros and cons that are listed above, each of us will be able to come together to make a final decision whether the costs of desalination are worth the gains that we might see.

Chapter 5 : Nuclear desalination

By Andrew Reimers and Brittany Speetles. Concerns about global warming and water scarcity have motivated many researchers to consider the potential for nuclear desalination, i.e., integrating a desalination plant with a nuclear power plant, as a means of producing drinkable water.

A Year That the U. Congress passed legislation to build a massive nuclear-power-desalination plant off the coast of Orange County, California. Had that authorized program been acted upon in subsequent years the present water crisis in the state would not exist today. The following excerpts are from the Congressional Record from September 13, through October 4, It can be found in Legislative history: Saline water conversion act, Volume 6, Parts , page Here is the description of the House bill as printed in the Congressional Record for September 13, A bill to amend Public Law to authorize the Atomic Energy Commission to enter into a cooperative arrangement for a large-scale for a large-scale combination nuclear-power-desalting project, and appropriations therefor, in accordance with section of the Atomic Energy Act of , as amended; to the joint committee on atomic energy. Then the Vietnam war exploded, environmentalism began taking over the nation, and the economy was transformed into a gambling casino. And like the North American Water and Power Project, which was also moving through the Congress at that time, after the assassination of President Kennedy the nation changed, for the worse. Introducing the Senate bill on September 13, , was Thomas H. Kuchel, a Republican from California. On August 18, , these agencies signed a contract authorizing a wide study of a huge nuclear fueled sea water conversion plant which would provide large quantities of electric power. The objective was a plant capable of producing million gallons of water per day, enough to supply a city the size of Boston or San Francisco. Udall, which included the following: The first phase will develop 50 million gallons per day of fresh waterâ€" the second will produce another million gallons per dayâ€¦. We consider this proposal to be of paramount importance in the effort to find new ways and means of conserving and increasing the water resources of the Nation. We recommend its immediate consideration and approval. Massive as the plant will be, it will provide only , acre-feet of water annually to a State which now draws more than 5 million acre-feet of water from the Colorado River each year. However, our planning for the next increment of water to meet the needs after must begin immediately, as experience has demonstrated it takes at least 25 years to move a new major water development from the initial planning state to the operating stage. Hanna, California Democrat introducing the House bill H. One of the main points in favor of the project is that it is a water source independent of the flow of river and aqueduct systems, and, in an emergency, it might well prove more valuable than any of us are now predicting. It will be a show-place of great interest to the people of the many areas around the world, and in our own country, who are in need of water and power, and to those who see the day rapidly approaching when this need will arise. The distinguished chairman of the committee on Interior and Insular Affairs has agreed to introduce a companion measure. It is my hope that we can act with dispatch and thereby assure the earliest possible completion of this most worthy project. Senate on September 21, The amended bill S. And on October 3, the House passed the Senate version S. The House vote was yes; 1 no; and not voting. President Lyndon Johnson signed the bill into law in May, It is further anticipated that light water reactor nuclear-steam supply systems will be utilized in plants built in the s. Breeder reactors will begin to take over power production from water reactors in the late s, and by the mids, dual-purpose plants will more likely be supplied with energy more from breeder reactors. While we do not know today the role, if any, fusion will play in supplying energy tomorrow, its role should be clear before the Twenty-first Century arrives. The odds for the economic success of fusion by the year are often Judged as about even. The year , in terms of technological developments, is really a long distance away. There is certainly time for some so-called far-out predictions to materialize and for new or unexpected developments to take place. The three-fourths of us living today who will still be alive then must be prepared for the vast technological, medical, and sociological changes that most surely will take place. It is time to restore it. Part II First published, April 30, https: Congress to pass legislation in partnership with the State of California for an aggressive development program to build nuclear-powered-desalination plants on the coast of California. Part

II is the follow-up under the question: And although the MWD had plans to proceed on its own, the environment for great infrastructure projects was rapidly changing. While the Congress continued some authorizations for further research and development, the Nixon Administration failed to play its necessary role. Still, the MWD was committed to proceed on its own. What happened with that? Hopefully, I can answer that question in a future report. Two bills were before the Congress in Early in the meeting a letter read to the committee from the Department of the Interior, January 17, , signed by Stuart Udall, Secretary of the Interior, included the following: It is very questionable whether this project can proceed at this time. The utilities have withdrawn their support and WMD has decided to proceed on the project at a latter time. The previous timetable had called for the start of construction in , initial operation in and expansion of the plant to a capacity of gpd by We are investigating other opportunities for reaching this historical milestone in the application of desalting technology. The study team considered for the first time the total water needs of a vast arid region and the potential of desalting to provide fresh water on such a scale. The study firmly established the technical feasibility of nuclear power and desalting plants for the arid regions of California and Arizona in the U. The first plant could be on-stream in the s at a site such as the El Golfo de Santa Clara area, near Riito, or on the U. The construction of a series of these plants would produce a new river of fresh water to satisfy the needs of one of the fast growing regions of the United States. Here are some excerpts from Mr. The Southwestern United States already suffers serious shortagesâ€¦. Because cost estimates had risen, the utilities also in that agreement withdrew from it. The document then went on to discuss how the MWD, on its own planned to go ahead with the planning of the first facility, with construction to begin in , and for it to be on-line by That contract had thus been extended to The study was established in as a result of an agreement between the U. The first phase of this effort was the preliminary assessment of the technical feasibility of large dual-purpose plants using nuclear energy to provide power and fresh water for that areaâ€¦. This report was completed in and is now available for distribution. The report considered a single plant producing 1 billion gpd and mw of electricity and recommended that a comprehensive follow-on program be initiated immediate determine the economic feasibility of constructing this plantâ€¦. As stated above, the contract expired in March, Though the project was terminated, the work that had been done on it accomplished results that would be useful in the future. This lengthy letter includes the following: To adequately meet the future water requirements of a steadily growing Southern California economy, the respective merits of additional long distance importation from new surface sources, local waste water reclamation, ground-water storage management, and sea water desalting processes require constant review and evaluation. Sea water desalting, singly or in combination with one or more of the above possibilities, needs to be considered by Metropolitan. Looking ahead to the year or or beyond, it is essential that Metropolitan have a large demonstration sea water desalting plant in operationâ€¦. Now that we have chosen to delay moving forward with an immediate demonstration of large plant technology and economics, we are hopeful that the intervening period will be a highly productive one through the various OSW the Federal Office of Saline Water research and development programs, and that when we are able to proceed with a project, a considerably enhanced technology will be availableâ€¦. As we face mounting population pressures, we must be ready to provide this growing number of people with waterâ€¦. Note the sense of urgency and mission that the following excerpts communicate and the content of the bill from the State Assembly: But over the next few years, under President Richard Nixon, and with the rise of environmentalism, the aggressive Apollo-type program required was never adopted. It was in the midst of the paradigm shift that began transforming the nation from its commitment to the general welfare to the irrational and destructive policies of financial speculation, anti-industry and anti-nuclear environmentalism, and an imperial empire that would bring a future characterized by the wars of the last 40 years. State water planners were already thinking about what the next years would require. The population of the state was growing rapidly, and it was often stated that the California Water Project would provide enough water for that population until about The reports by the California Department of Water Resources for and reflect the above cited ambiguity, as they report on the potential sources for new water, but in a toned-down manner, reflecting the onset of the cultural pessimism that has increasingly dominated our society since. What follows are excerpts from, first the California Department of Water Resources report of , then of It reads, in part: Only in recent times has the need stimulated commercial development of desalting processes and studies of the economics of large-capacity desalting plants utilizing the energy from the atom. The Legislature authorized a departmental program in desalting in I have excerpted one section here: This economic incentive can be very compelling. In addition, especially where nuclear reactors are involved, advantage of building a larger steam supply system can be substantial. The plant was to be placed on line In and produce million gallons per day of desalted water and about Mwe gross of electrical power. But then it looks to the future seeing a real role for nuclear-powered desalination: Breeder reactors will begin to take over power production from water reactors in the late s, and by the mids, dual-purpose plants will more likely be supplied with energy more economically from breeder reactors. A substantial reduction in the cost of desalted water is expected to result from the availability in the future of relatively low-cost energy from breeder-type nuclear reactors. The availability of such low-cost energy will also be of economic benefit to water supply projects Involving inter-basin transfer of water and, possibly, in the construction of civil works for water projects. Nuclear desalters will encounter the same licensing and safety problems as will nuclear power-only plants. A satisfactory solution to siting on the California coast will not be easy. It hpg been assumed that in the future such problems will be reasonably well solved so that undue delays and unexpected increase in costs will not be encountered. Failure to achieve resolution of the siting problem may add materially to the cost of desalting and could seriously restrict the applicability of desalting as an alternative source of supply to meet future needs in California. First, it reports a little more detail on what has happened to the Bolsa Island project in the section titled: Office of Saline Water, and the U. This project did not proceed largely because of escalation and the cost and uncertainties associated with licensing of the nuclear reactors. However, nuclear desalters will encounter the same licensing and safety problems as will nuclear power-only plants. Failure to achieve resolution of the siting problems may add materially to the cost of desalting as an alternative source of supply to meet future needs in California.

Chapter 6 : Nuclear Desalination: Could Nuclear Power Be The Answer To Fresh Water?

"Nuclear energy seawater desalination has a tremendous potential for the production of freshwater," Jain adds. The development of a floating nuclear plant is one of the more surprising solutions.

News November 26, Nuclear Desalination: New solutions to the ancient problem of maintaining a fresh water supply is discussed in a special issue of the Inderscience publication International Journal of Nuclear Desalination. With predictions that more than 3. Global climate change, desertification, and over-population are already taking their toll on fresh water supplies. In coming years, fresh water could become a rare and expensive commodity. In the latest issue of the journal IJND, research results presented at the Trombay Symposium on Desalination and Water Reuse offer a new perspective on desalination and describe alternatives to the current expensive and inefficient methods. Pradip Tewari of the Desalination Division at Bhabha Atomic Research Centre, in Mumbai, India, discusses the increasing demand for water in India driven not only by growing population and expectancies rapid agricultural and industrial expansion. He suggests that a holistic approach is needed to cope with freshwater needs, which include primarily seawater desalination in coastal areas and brackish water desalination as well as rainwater harvesting, particularly during the monsoon season. Over the long term, desalination with fossil energy sources would not be compatible with sustainable development; fossil fuel reserves are finite and must be conserved for other essential uses, whereas demands for desalted water would continue to increase. Renewable energy sources, such as wind, solar, and wave power, may be used in conjunction to generate electricity and to carry out desalination, which could have a significant impact on reducing potential increased greenhouse gas emissions. The development of a floating nuclear plant is one of the more surprising solutions to the desalination problem. Verma of the Department of Physics at SLIET in Punjab, points out that small floating nuclear power plants represent a way to produce electrical energy with minimal environmental pollution and greenhouse gas emissions. Such plants could be sited offshore anywhere there is dense coastal population and not only provide cheap electricity but be used to power a desalination plant with their excess heat. Raha and colleagues at the Desalination Division of the Bhabha Atomic Research Centre, in Trombay, point out that Low-Temperature Evaporation LTE desalination technology utilizing low-quality waste heat in the form of hot water as low as 50 Celsius or low-pressure steam from a nuclear power plant has been developed to produce high-purity water directly from seawater. Safety, reliability, viable economics, have already been demonstrated. BARC itself has recently commissioned a 50 tons per day low-temperature desalination plant. Co-editor of the journal, B. Misra, formerly head of BARC, suggests that solar, wind, and wave power, while seemingly cost effective approaches to desalination, are not viable for the kind of large-scale fresh water production that an increasingly industrial and growing population needs. India already has plans for the rapid expansion of its nuclear power industry. Misra suggests that large-scale desalination plants could readily be incorporated into those plans. Inderscience Publishers Like what you are reading? Sign up for our free newsletter I agree to the Terms and Privacy Statement.

Chapter 7 : Energy Alternative I: Nuclear Desalination - Desalination

List of Pros of Desalination. 1. Its method is proven and effective. Reverse osmosis, a method of removing salt from seawater has been proven effective in creating fresh sources of drinking water that can deliver the health benefits people need.

Desalination stills control pressure, temperature and brine concentrations to optimize efficiency. Nuclear-powered desalination might be economical on a large scale. Unfortunately, that includes some of the places with biggest water problems. Thus, it may be more economical to transport fresh water from somewhere else than to desalinate it. In places far from the sea, like New Delhi , or in high places, like Mexico City , transport costs could match desalination costs. Desalinated water is also expensive in places that are both somewhat far from the sea and somewhat high, such as Riyadh and Harare. By contrast in other locations transport costs are much less, such as Beijing , Bangkok , Zaragoza , Phoenix , and, of course, coastal cities like Tripoli. In December , the South Australian government announced it would build a seawater desalination plant for the city of Adelaide, Australia, located at Port Stanvac. The desalination plant was to be funded by raising water rates to achieve full cost recovery. The facility would produce , cubic metres of drinking water per day, enough to supply about , homes. The board of directors of Tampa Bay Water was forced to buy the plant from Poseidon in to prevent a third failure of the project. The facility reached capacity only in These structures can have the same impacts to the environment as desalination facility intakes[according to whom? According to EPA, water intake structures cause adverse environmental impact by sucking fish and shellfish or their eggs into an industrial system. There, the organisms may be killed or injured by heat, physical stress, or chemicals. Larger organisms may be killed or injured when they become trapped against screens at the front of an intake structure. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. January Learn how and when to remove this template message Desalination processes produce large quantities of brine , possibly at above ambient temperature, and contain residues of pretreatment and cleaning chemicals, their reaction byproducts and heavy metals due to corrosion. Another method to dilute the brine is to mix it via a diffuser in a mixing zone. For example, once a pipeline containing the brine reaches the sea floor, it can split into many branches, each releasing brine gradually through small holes along its length. Mixing can be combined with power plant or wastewater plant dilution. Brine is denser than seawater and therefore sinks to the ocean bottom and can damage the ecosystem. Careful reintroduction can minimize this problem. Typical ocean conditions allow for rapid dilution, thereby minimizing harm. Alternatives without pollution[edit] Some methods of desalination, particularly in combination with evaporation ponds , solar stills , and condensation trap solar desalination , do not discharge brine. They do not use chemicals or burn fossil fuels. They do not work with membranes or other critical parts, such as components that include heavy metals, thus do not produce toxic waste and high maintenance. A new approach that works like a solar still, but on the scale of industrial evaporation ponds is the integrated biotectural system. One of the advantages of this system is the feasibility for inland operation. Standard advantages also include no air pollution and no temperature increase of endangered natural water bodies from power plant cooling-water discharge. Another important advantage is the production of sea salt for industrial and other uses.

Chapter 8 : 12 Biggest Pros and Cons of Desalination | Green Garage

"Nuclear energy seawater desalination has a tremendous potential for the production of freshwater," Jain adds. The development of a floating nuclear plant is one of the more surprising solutions to the desalination problem.

Chapter 9 : Nuclear-Powered Desalination in Californiaâ€“ Parts I-IV â€“ blog.quintoapp.com

Nuclear power plants (NPPs) can supply either thermal or electrical energy, or both, to respective desalination *processes, at varying scales. Though the process is not widespread, successful examples of nuclear-powered desalination in operation do exist.*