Nuplex City-Building Will Transform the Third World

Detailed plans to build nuclear-powered agro-industrial complexes date back to the Eisenhower Administration, but were never implemented. It's high time to revive them, as Marsha Freeman reports.

Numerous countries in the developing world are poised to finally begin the nuclear-energy-based transformation of their economies that has been on the planning books since the 1950s. Indonesia, Turkey, Venezuela, Vietnam, and many others are carrying out feasibility studies, and contacting international suppliers, to plan their first nuclear-power reactors.

More than 50 years ago, President Dwight Eisenhower boldly announced that the United States would embark on a program of sharing civilian nuclear-power technology with the rest of the world, which he described as "Atoms for Peace." At the first international conference on the Peaceful Uses of Atomic Energy, in 1955, dozens of nations presented their optimistic plans for introducing this revolutionary technology.

From the beginning of the atomic age, President Eisenhower, and like-minded thinkers in the emerging nuclear scientific and technical communities in the United States, saw nuclear power not only as a source of inexpensive and virtually unlimited supply of electricity, which could be available to all nations regardless of their endowment of natural carbon-based resources, but also as the organizing principle for new cities, new industries, improved agriculture, and the road to peace.

Just as Lyndon LaRouche is stressing today, the nuclear pioneers recognized that as the world depletes its supplies of both fossil fuels and fossil water, technologies must be deployed to create a new base of resources. Since the 1950s, it has been clear that nuclear fission would provide the foundation for such a transformation of the world economy. President Eisenhower wisely stressed that such a long-range, multi-generational program for nuclear-power development would be the most effective policy to avoid war.

With an international nuclear renaissance now under way, it is time to bring to fruition the concepts and possibilities for nuclear-centered, agro-industrial complexes, or nuplexes, to start rebuilding the world economy on the basis of the most advanced technologies.

Middle East: Water or War?

In the mid-1950s, it was clear to President Eisenhower that the continuing political volatility in the Middle East could again erupt into war. Recognizing the critical nature of the limited water resources of the region, he dispatched diplomat Eric Johnson as his personal representative to attempt to persuade the Arabs and Israelis to work on an agreement to share the water of the Jordan River. The 1956 war temporarily dashed hopes for such an economic reshaping of the Middle East.

Water development was also the basis for the studies carried out by the Roosevelt-era Tennessee Valley Authority in the post-war period, for a "TVA on the Jordan," based on the experience of the miraculous transformation in the 1930s of the southeastern United States, through the building of two dozen dams.

But, by the early 1960s, the accumulated experience with

Atomic Energy Commission

Nuclear-centered agro-industrial complexes, or nuplexes, were designed at Oak Ridge National Laboratory to bring the most advanced technologies to developing nations. In this 1969 concept, two nuclear reactors would produce more than 2,000 megawatts of electricity and up to 1 billion gallons of fresh water per day from the sea. Adjacent is a 300,000-acre "food factory," to feed up to 6 million people. Fertilizer and other manufacturing facilities are powered by the nuclear plant, with residential areas to the far right, in a new city.

operating power-producing nuclear plants convinced scientists at the TVA-region's Oak Ridge National Laboratory, former President Eisenhower, President Lyndon Johnson, and other political leaders in Washington, that the solution to the crisis in the Middle East was to use this new resource of nuclear power, not only for energy—since much of the region is rich in petroleum—but to create more of a resource that is scarcer there than energy: water.

In 1963, Oak Ridge National Laboratory scientist Philip Hammond suggested that fresh water could be produced economically by desalting seawater, using the excess heat from large nuclear-power plants. Alvin Weinberg, the director of the Laboratory, and a member of President Kennedy's Science Advisory Committee, promoted the idea that this application of nuclear energy could make the "deserts bloom." In fact, understanding the critical nature of freshwater shortages worldwide, President Kennedy had considered desalination as the major research and development project for international outreach for his Administration. Fast-paced advances in the Soviet space program led the President to focus more intensely on his Apollo program to land a man on the Moon.

Dr. Glen Seaborg, chairman of the Atomic Energy Commission, is credited with coining the term "nuplex" in 1964, to describe the unique multi-purpose potential of nuclear power. Philip Hammond's desalination-nuplex concept was featured at the 1964 United Nations conference on Peaceful Uses of Atomic Energy in Geneva, and adopted in President Johnson's Middle East "Water for Peace" proposal.

In 1964, Oak Ridge Laboratory staff travelled to Israel, India, Puerto Rico, Pakistan, Mexico, and the Soviet Union, to help develop plans for desalination plants. When President Johnson adopted his plan in 1965, 100 researchers at Oak Ridge, including chemists, were studying how to apply new techniques to nuclear desalination.

Taking Eisenhower's lead, Johnson had established a bilateral commission with Israel to study nuclear desalination, while Oak Ridge was tasked to develop a detailed feasibility study of how nuclear-power plants could become the center of complexes to power cities, produce potable water, provide process heat for home heating and industry, and revolutionize agriculture. Just days before the June 1967 Six-Day Middle East War, an international conference in Washington, organized around Johnson's "Water for Peace" program, drew thousands of participants.

The 1967 Middle East War did not end the organizing initiative for the nuclear-desalination proposal. The details of the program were spelled out by Rear Adm. Lewis L. Strauss (ret.), who had been AEC Chairman under President Eisenhower, in an Aug. 7, 1967 article in *U.S. News & World Report.*

Admiral Strauss proposed the construction of three nuclear plants to desalt water and provide cheap electrical energy. One plant might be built on the Mediterranean coast of Israel, he proposed, from which the desalted water would flow to Israel, Jordan, and Syria. Another plant, on the Gaza Strip, could pipe water under the Suez Canal to eastern Egypt, to be

used for irrigation. And a third, on Jordanian territory at the head of the Gulf of Aqaba, could transform what is otherwise a wasteland.

Under Strauss's proposal, the first plant "would be designed to produce daily the equivalent of some 450 million galllons of fresh water—incidentally, more than the combined flow of the three main tributaries which make up the Jordan River." The power from the plant would provide the electricity to pump fresh water to water-starved areas. The three plants together will "have the effect of opening to settlement many hundred square miles which heretofore have never supported human life . . . and the controversy over the division of the Jordan River would be minimized," he wrote. This opening of new lands would provide a solution to the Palestinian refugee problem, with formerly barren land now open for settlement for perhaps 1 million refugees.

Strauss concluded that while "some observers" doubt that the Arabs and Israelis could agree on such a program, their choice is between "devastating war, and an atomic-age pathway to peace."

Other farsighted and experienced political forces joined the fight for nuclear-powered Middle East development. On Aug. 14, just two months after the June 1967 War, Sen. Howard Baker (R), from the TVA state of Tennessee, introduced Senate Resolution 155. Among the motivating clauses, the resolution stated:

"Whereas the greatest bar to a long term settlement of the differences between the Arab and Israeli people is the adequate food supply;

and Whereas the United States now has available the technology and the resources to alleviate these shortages and to provide a base for the peaceful cooperation between the countries involved:

"Now, therefore, be it Resolved, That it is the sense of the Senate that the prompt design, construction, and operation of nuclear desalting plants will provide large quantities of fresh water to both Arab and Israeli territories." Such a program would also increase agricultural productivity, the Resolution stated, and create new jobs for refugees. The Resolution was adopted unanimously by the Senate in December.

Feasibility studies for nuclear-powered desalination began under the auspices of the International Atomic Energy Agency (IAEA) in Vienna, in cooperation with governments in the region.

Meanwhile, at Oak Ridge National Laboratory, the first major detailed report, begun in 1966, on how to design multipurpose nuclear plants to power nuplexes, was being prepared.

Nuplex City-Building

Nuclear-powered agro-industrial complexes were developed to answer the question posed by Oak Ridge National Laboratory Director Dr. Alvin Weinberg: "How can we most quickly bring the developing countries up to the standard of living of the advanced sector?" Nuplexes, he proposed, would solve the immediate problems of shortage of food and water, but, most importantly, they would allow nations to "leapfrog" to new technologies, in the course of their development.

As an example of the potential of nuplexes, a 1968 Oak Ridge report stated that "the time has come when the energy derived from nuclear energy can be looked upon very seriously as a key for releasing indigenous agriculture from the bondage imposed by the necessity of securing fuel, fertilizer, and power for tillage all directly from the land without energy resources from outside. . . . Such [nuclear energy] inputs could free these people from Malthusian limitations hitherto imposed upon their indigenous food supply. . . ."

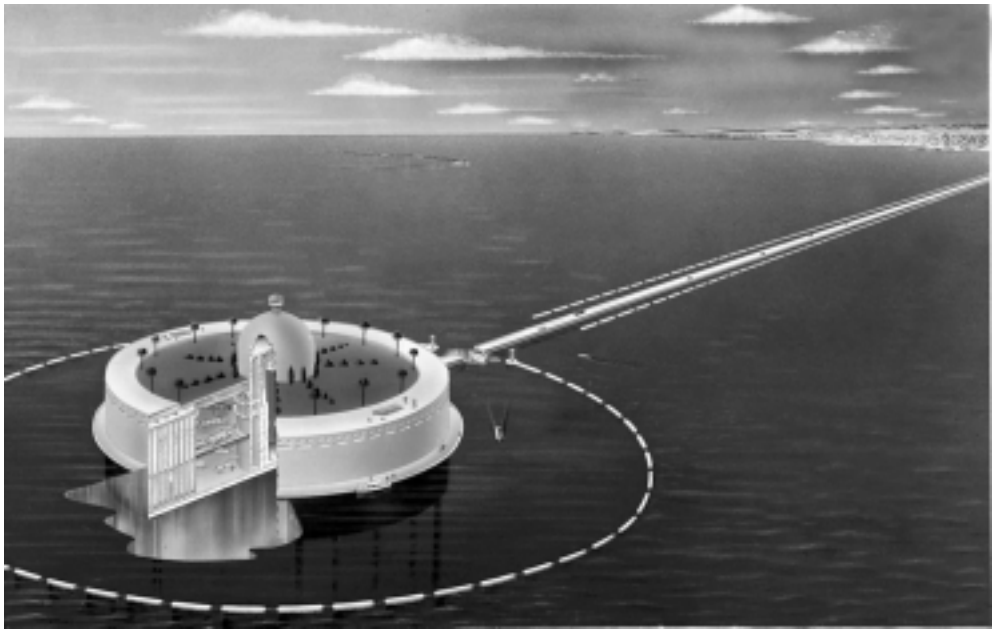
A team of 16 scientists, engineers, economists, and agricultural experts worked on the series of Oak Ridge nuplex studies, in close collaboration with the IAEA, the governments of Mexico and other nations.

The heart of the nuplex is the nuclear-power plant. The concept is to use an array of nuclear technologies, each optimized for a particular function—such as the production of electricity, process heat, or nuclear fuel—and to tailor the design of each nuplex with regard to the natural resources and specific needs of each geographic location. Modular production of nuclear plants was envisioned, with clusters of reactors in each nuplex. For example, ten reactors, of different types, could produce up to 15 gigawatts (GW) of electricity. This energy could power an industrial base and support a new city of at least 5 million people.

The general idea is to have pairs of nuclear-power plants to produce electricity and process heat. Surrounding the plants would be the industrial facilities they would energize. Where appropriate, these could include minerals- and raw materials-processing, equipment and machinery manufacture, and chemical industries. Where needed, the nuplex would be sited where desalination of seawater would make deserts bloom, and open new lands for cultivation. A new, modern city, complete with all required transportation, communications, educational, cultural, medical, and other infrastructure, would be built from the underground up.

In a policy statement released on June 26, 1978, and published in the August issue of *Fusion* magazine, Lyndon LaRouche explained the relationship of nuclear technology to city building. The nuplex will require a "four-to-six-year construction period, during which period many engineering and other skills are employed on the site. In a developing nation (especially) . . . the construction period is a period of education and other training. . . . On-the-site training, including schools for technicians, workers and their families, cultural programs, and so forth, is indispensable.

"So, to build an agroindustrial nuplex means to build an entire new city, to build structures and facilities to last as quality structures for a coming period of 50 to 100 years. . . . These nuplexes serve not only as self-contained concentrations of high technology, but as the hub of radiation of high-



Oak Ridge National Laboratory

An ample supply of water is a critical element in creating a stable Middle East. This artist's concept illustrates an offshore nuclear-powered desalination plant, with fresh water transported by pipeline to where it will make the "deserts bloom."

technology services to agriculture and other developments over areas of wide radius surrounding.

"A network of such nuplexes throughout continents such as Africa transforms the Sahara and Sahel into a vast new habitable and fruitful region, and establishes a continental grid-system of centers of high technology through which to transform the entire continent."

The nuplex designers began with the nuclear technology most readily available in the 1960s, the light-water reactor. Coupled with industrial facilities, even the 220-280°F waste heat from such power plants, available after the steam-turbine production of electricity, could be used to provide process steam for the paper, chemical, rubber, and agricultural industries. District heating of homes and aquaculture facilities to raise the intake of protein for the population, also can benefit from this temperature range.

Breeder reactors, which can ensure the ready supply of nuclear fuel for a growing world nuclear industry by creating fuel, were also envisioned by the Oak Ridge designers. They could deliver process heat between 900-1,100°F, extending the range of industrial applications. These higher-temperature nuclear reactors can be applied to the direct reduction of ores, the processing of raw materials, and thermally enhanced electrolytic production of hydrogen from water, creating new resources.

Nuclear-powered desalination can not only create fresh water from brackish or salt water, they proposed, but also minerals and metals that are largely unused by-products of the desalination process can be the raw-material feedstock for a variety of chemical industries, as in the extraction of potassium and chlorine.

The gas-cooled high-temperature reactors can boost process heat quality to the 1,700-2,000°F range, approaching the possibility to thermally crack water to more cheaply produce hydrogen. It was estimated by the Oak Ridge team that one 1,000 megawatt (MW) high-temperature reactor could supply the electrical and process heat requirements of the largest existing chemical plants, including factories that produce ammonia for fertilizers, or a petroleum refinery with a 500,000-barrel-per-day capacity.

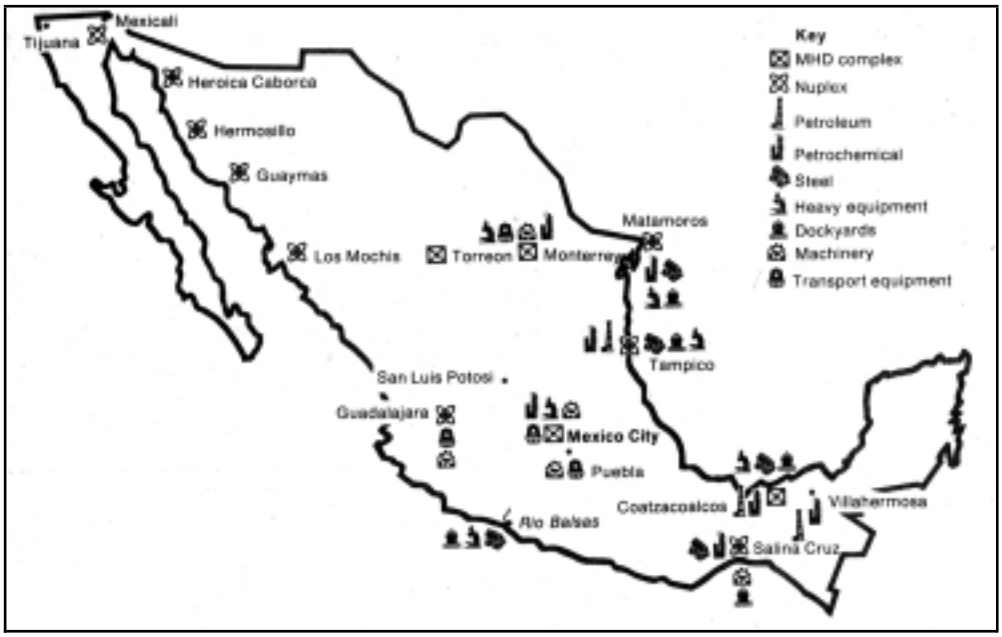
As nuclear technology advanced, existing plants would be replaced with the latest, most efficient reactors, possibly every 15 years, they projected. This rapid turnover of technology would continuously extend the range of applications for nuclear power.

Later, thermonuclear-fusion energy would become available, where making use of not only heat, but high-temperature plasmas and a variety of radiation outputs would redefine the base of raw materials, and even open up the rest of the Solar System to the exploitation of new resources.

Global Nuplex Plans

As the potential for nuplex development became known, it did not take long for numbers of developing nations to begin their own studies of how to use nuclear energy in city-building nuplexes. In 1968, the Government of India Atomic Energy Commission released its Preliminary Report on the Nuclear-Powered Agro-Industrial Complex, drafted by the Bhabha Atomic Research Centre in Bombay.

In 1965, the governments of Mexico and the United States, and the IAEA agreed to carry out a preliminary assessment of the applicability of dual-purpose nuclear plants to produce fresh water and electricity in the region bordering the southern portion of the Colorado River. Their report, "Nu-



Fusion magazine

Lyndon LaRouche's 1981 plan for the development of Mexcio centered on the creation of agricultural and industrial nuplexes, projected to be in place by the year 2000.

clear Power and Water Desalting Plants for Southwest United States and Northwest Mexico," was completed in September 1968.

In the United States, the Oak Ridge team developed detailed economic nuplex blueprints for 26 sites around the world. Central to many was the application of nuclear energy to agriculture.

The Strauss-Eisenhower proposal for the Sinai-Negev desert site, for example, included a "food factory," which depended upon a mixture of crops, and could support up to 6 million people. Water usage was estimated to be equivalent to that per person in New York City. An extremely detailed study completed by the Oak Ridge group in 1970 described the feasibility of using nuclear-power waste heat for aquaculture, or fish farming.

Not satisfied with just paper studies, Oak Ridge National Lab embarked upon a joint program with the Agriculture Department of the Tennessee Valley Authority to test the feasibility of using nuclear-reactor waste heat in enclosed structures devoted to agriculture and aquaculture. A small pilot greenhouse began construction in 1971, and was run successfully for one year by the Lab. It was then decided to develop a demonstration greenhouse to use the heat from TVA's Brown's Ferry Nuclear Power Plant, then under construction. Similar demonstrations of the use of rejected nuclear-power-plant heat were carried out by Oak Ridge and the TVA.

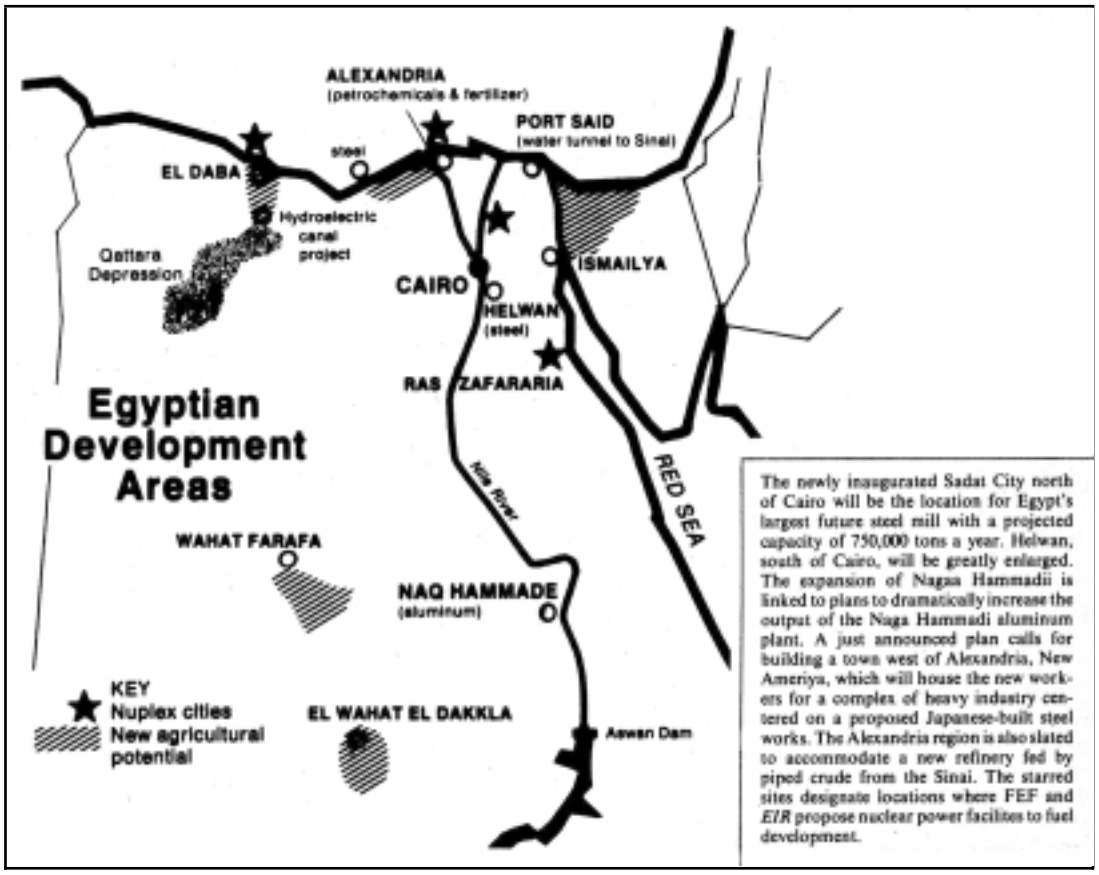
The nuplex idea gained widespread support. Graduate student John M. Holmes submitted to the University of Tennessee a doctoral dissertation titled, "The Impact of Nuclear Energy Centers on the Economy of Puerto Rico" in August 1970.

The following year, Oak Ridge completed its study on several possible locales for nuplexes. These in-depth studies included sites in Western Australia, India, Northwest Mexico (Baja California), Peru, and the Sinai-Negev in the Southeastern Mediterranean, encompassing the United Arab Emirates, Israel, and Egypt. The areas studied were limited to those where land was not then under active intensive cultivation, due to desert and semi-desert conditions, or received less than 15 inches of rain per year. They were considered typical arid coastal regions, close enough to the sea to provide cooling water for the nuclear reactors, and feedstock for desalination plants. All were seen as potential nuplex sites.

Through the early 1970s, nuplex studies continued, as nuclear-power-plant construction in the United States accelerated. Various U.S. sites were under study for nuplexes. The Industrial Economics Research Division of Texas A&M University produced a report in May 1973 titled, "Nuplex Siting on the Texas Coast." The preface states that although the study is "based largely on present reactor capabilities, the realization of the full potential advantages of a nuplex will be enhanced by the utilization of commerical breeder reactors scheduled to become operative about 1985."

But the Henry Kissinger-organized 1973 war in the Middle East quadrupled energy prices. Billions of dollars were stolen from industrial and developing nations that were dependent upon imported energy. Visionary economic investment plans were shelved.

Two years earlier, President Nixon's destruction of Franklin Roosevelt's Bretton Woods system had wrecked any hope of nuclear or any high-technology transfer to developing nations. The increasingly anti-nuclear "West" by and large abandoned its own nuclear construction programs.



New Solidarity

As an intervention into an unstable region, Lyndon LaRouche proposed in 1981 that a string of nuclear-centered cities be created in Egypt, complementing his broader Oasis Plan, which encompasses all of the nations of the Middle East. This graphic appeared in EIR*, Dec. 8, 1981.*

But by the late-1970s, LaRouche and the Fusion Energy Foundation were on the scene, working with many of those scientists and engineers who had developed the nuplex plans, with an organizing perspective to put them back on the agenda.

The Middle East continued to be a necessary focus of attention. In October 1981, following the assassination of Egyptian President Anwar Sadat, LaRouche commissioned a study to develop an economic-development program based on U.S. cooperation with Egypt, in order to counter the potential for political chaos in the region.

The plan proposed the creation of four new agricultural and industrial nuplex cities, with the goal of increasing the per-capita consumption of electricity in Egypt 20-fold, over a two-decade period.

LaRouche in Mexico

In the early 1980s, Mexican President José López Portillo was developing a strategy to free his nation from the colonial grip of the International Monetary Fund, and place it firmly on the path of economic development.

In February 1981, the Fusion Energy Foundation and its affiliated Mexican Association for Fusion Energy presented a 20-year program for Mexican development, at a conference in Mexico City, which was attended by representatives of eight Mexican government ministries and other national institutions.

The following month, LaRouche made a ten-day visit to Mexico to present the framework for his "oil-for-technology" development program. The results of that trip were discussed in Washington, D.C. at a conference sponsored by *EIR* on March 26-27, and were summarized in the July 1981 issue of *Fusion* magazine.

The program to transform Mexico was centered around the use of a portion of the revenues from the sale of that nation's petroleum production to finance $100 billion of capital-goods imports, over 20 years. These imports would include not only nuclear plants, but also farm tractors and equipment, transportation equipment, port construction machinery, steel-making capacity, and other capital goods. By 1995, Mexico was projected to be producing more than half of its own capital-goods requirements.

The plan proposed that by the year 2000, more than 60 GW of nuclear power (equivalent to sixty 1,000 MW nuclear reactors) should be in operation in Mexico. This would signify more than simply a transition to a new source of energy, but the transition to a modern economy, including the transformation of education, infrastructure, and overall standard of living and culture, through agro-industrial city-building.

Lack of support among Mexico's neighbors for López

Portillo's bold move to take back sovereign control of his nation's economy, and a frontal assault from the international financial oligarchy, delayed, but has not doomed, his efforts.

Today's growing, continent-wide movement for an economic revolution south of the U.S. border, exemplified by the actions of Argentine President Néstor Kirchner, has placed nuclear power and new cities back on the agenda.

In March of this year, Lyndon LaRouche returned to Mexico, to restate the American System economic approach that that nation, in concert with its neighbors, must take at this time of a collapsing world financial system, to fulfill López Portillo's promise of economic development. The LaRouche Youth Movement in Mexico will be holding a seminar on June 7, on "Oil for Nuclear Technology," in Mexico City, to organize the support needed to finally bring this program into being.

Nuplexes for Tomorrow

Beginning in the late 1970s, LaRouche and his affiliated organizations intervened to place the nuplex pathway to economic development before many nations. By that time, it was clear that the continent of Africa was dying. The suffering caused by a century of direct colonial bondage, and decades of International Monetary Fund financial strangulation, had led to the emergence of new diseases, and the devastating lack of medical, nutritional, or any other infrastructure to save Africa was dooming the continent.

In June 1979, the Fusion Energy Foundation held a conference in Paris, titled "The Industrialization of Africa," and the following year, a book of the proceedings was published. The chapter titled, "The Role of Agronuplexes in African Development," described why only the introduction of the most advanced technologies, to supersede subsistence agriculture in Africa, can create the required accelerated rates of growth. Such an approach, based on the upgraded educational and skill level of the population, must replace the IMF-dictated labor-intensive farming then prevalent on the "dark continent," the report stated. The upgrading of nutrition and health care are primary, in order to rescue a population so economically depressed, that it has become the breeding ground for new, emerging diseases. The goal was to use nuclear power to create a modern standard of living for every African by the turn of the 21st Century.

The Middle East has continued to be a theater of war, thanks to the continued intervention by the old British colonial masterminds, and two generations of Bush Administration collaborators,

In 1990, as President George H.W. Bush was amassing, in the Middle East, the largest military force outside the United States since the Vietnam War, LaRouche reissued the Middle East water development "Oasis Plan" he had first introduced in 1975. On July 12, 1990, LaRouche stated: "To avoid a conflict which would be ruinous for all people and nations of the Middle East, an effective series of common interest proposals must be made in accord with the rights of all parties. . . . Although to some, an Oasis Plan seems an unlikely proposition under the present circumstances, the price of failing to implement such a program will be staggering. Therefore, there is no obstacle so great, nor so difficult, that we should not seek to overcome it in order to further economic cooperation." Unfortunately, for failing to heed LaRouche's warning, we have witnessed since then the consequences of not one, but two, Iraq wars.

Today, we have progressed no further toward peace than when Lewis Strauss and President Eisenhower proposed their nuclear-desalination plan as a war-avoidance policy in the 1950s. Rather, the region is embroiled in what could easily become endless wars.

The solution today is the same as it was a half century ago: Deploy the most advanced technologies, clustered around the placement of a succession of advancing nuclear capabilities at the center of new cities and agricultural and industrial complexes. Make educational, medical, cultural, modern transport and communications, housing, and other infrastructure available to each citizen.

Prepare the nations of Asia, Africa, and Ibero-America to participate in a 21st Century that sees the fulfillment of the potential of each individual. And rebuild the decrepit industrial and capital-goods-producing sectors of what have historically been the industrialized nations, to make that a reality.

Nuclear Desalination: A Proven Technology Whose Time Has Come

by Christine Craig

Early in the 1960s, foreseeing a time when freshwater needs would outstrip available supplies, the United States Department of the Interior's Office of Saline Water (OSW) authorized funding for five research facilities to study and develop various desalination technologies for the country. These facilities were strategically placed in Freeport, Tex.; Roswell, N.M.; Webster, S.D.; Wrightsville Beach, N.C.; and San Diego, Calif.

The Wrightsville Beach facility on Harbor Island, set up in the early 1960s, was dubbed the "world center for experimental development in saline water conversion," by the director of the OSW at that time, C.F. McGowan. Its mission was to study and assess the feasiblity of a variety of possible desalination technologies—freezing, reverse osmosis (RO), electrodialysis, and distillation—of which the most promising were RO and distillation. While the lab was still in operation during the 1960s and 1970s, a huge sign covered the three freshwater storage tanks for the research station, proclaiming mysteriously: "Fresh Water from the Sea."

Desalination is by no means a modern concept. The importance of fresh water would be inescapable to any long-distance seafaring people. As Samuel Coleridge's ancient mariner lamented: "Water, water, everywhere, nor any drop to drink." Japanese (and undoubtedly many other) early mariners used heat evaporation and cooling condensation to provide emergency fresh water on voyages. Thomas Jefferson even wrote a technical paper in 1791 on an improved form of distillation process for desalination aboard ships. And with the advent of sea-going steam ships, desalination became absolutely necessary to provide the relatively pure water necessary for the steam process. Nowadays, regardless of what powers an ocean-going vessel, desalination of potable water is the norm, and eminently more sensible than trying to carry a hold-full of drinking water across the wide ocean.

Nuclear: Perfect To Power Desalination

Modern desalination techniques require large amounts of electricity or process heat for large-scale production of fresh water, and nuclear power is the perfect candidate to supply it.

Nuclear desalination seemed a natural outgrowth of the potential envisioned for nuclear power by the Atoms for Peace Project initiated by President Dwight D. Eisenhower after World War II. In fact, in 1967, just days after the Six Day War, former President Eisenhower and Adm. Lewis L. Strauss, former chairman of the Atomic Energy Commission, proposed an ambitious program for development in the Middle East, which was an extension of Eisenhower's 1953 Atoms for Peace program. This program, called "A Proposal for Our Time," aimed at promoting peace and stability in a war-torn region by priming the pump with a massive infrastructure project to bring cheap fresh water to the region—a nuclear water-desalination project.

Eisenhower Library

President Eisenhower (left) and Lewis Strauss, just days after the 1967 Six Day War, proposed a huge nuclear desalination project for the Middle East, to promote peace and stability, by providing adequate power and fresh water for economic development.

This proposal envisioned the construction of three huge, multi-purpose nuclear plants, two on the Mediterranean and one on the Gulf of Aqaba, which would be capable of generating more than a billion gallons of fresh water per day, using the well-studied distillation technique. At the same time, the plants could be used for electricity production in the region. Based on studies done by the Oak Ridge National Labs, Eisenhower was confident that the price of water generated at these facilities could be made cheap enough for agricultural use, making possible an agro-industrial oasis in the desert.

As early as 1964, an announcement was made of a partnership among the Department of the Interior, the Atomic Energy Commission (AEC), and the Metropolitan Water District of California to study the construction of a 150-million-gallon per day desalination distillation plant near the OSW test facility in San Diego. According to then Secretary of the Interior Stewart Udall, "Preliminary reports indicate that a well-designed plant using nuclear energy can produce fresh water at seaside for 22 cents a thousand gallons and generate electric power for as little as 3 mills per kilowatt hour."

The project was to be powered by a 1,800-megawatt-electric nuclear plant, coupled to an multi-stage-flash distilla-

IAEA

Ohi Nuclear Power Generating Station, run by Kansai Electric, was Japan's first nuclear desalination project.

tion desalination plant, supplying up to 750,000 people with fresh water and electricity in the arid southern California desert.

By the 89th Congress, in September of 1966, the Metropolitan Water District project was well along, and was touted as "the first dual-purpose desalting application of its kind and size in the world" in the Joint Committee on Atomic Energy hearings on the project.

The project was never completed. Unfortunately, Eisenhower's "Proposal for Our Time" was never implemented, as the nation's optimism for nuclear power was manipulated and transformed into fear and pessimism by nuclear nonproliferation fanatics and their puppets in the environmental movement.

Other Nations Move Ahead

While nuclear desalination has languished in our country, other nations have amassed decades of experience coupling the two technologies. The first large-scale nuclear production of fresh water was at a Soviet-era 150-MWe liquid-sodium-cooled fast breeder reactor in Aktau, Kazakstan—the BN-350. From 1973 until its decommissioning in 1999, the BN-350 reliably and safely produced 80,000 cubic meters per day of fresh water by Multi-Stage Flash Distillation and Multiple-Effect Distillation (MED). The water was used in plant operations and for municipal water consumption in the arid Mangyshlak peninsula on the east coast of the Caspian Sea.

Japan first harnessed nuclear power for desalination back in 1978, with its Ohi Nuclear Power Station's 1,175-MWe Pressurized Water Reactors. Since then, 10 of Japan's 53 electricity-producing nuclear plants have used waste heat or electricity to desalinate water on a small scale—100 to 3,900 cubic meters per day—mostly for in-plant use for steam generators and potable water. The desalination technologies used by these plants have included all of the major types.

More recently, Pakistan hooked up its KANUPP 137-MWe Pressurized Water Reactor to an RO desalination system, producing 454 cubic meters per day of water as an emergency source of feed water to the steam generator. In the last few months, the reactor staff has also installed a larger demonstration MED unit capable of producing 4,500 cubic meters per day. India has done the same with its Kalpakkam PHWR in the southern state of Tamil Nadu (see *EIR,* March 31, 2006, p. 38).

Even in the United States, which long ago turned its back on nuclear desalination, the Diablo Canyon Nuclear Power Station, owned by Pacific Gas & Electric, quietly has operated a desalination unit powered by its two 1,100-MWe Pressurized Water Reactors, which produces 4,500 cubic gallons per day by RO for in-plant use. The desalination plant was originally conceived as a joint project of the California State Department of Resources and the OSW.

So, nuclear desalination is not a radical untested idea. It is a mature technology which has been waiting in the wings, perfecting itself for the call to action by a world (including the United States) waking up to the nuclear power imperative.

U.S. Maritime Administration

The NS Savannah *was the first nuclear-powered cargo/passenger ship. She was a product of Atoms for Peace optimism, designed to demonstrate the technical feasibility of nuclear merchant ships.* NS Savannah *could circle the globe 14 times at 20 knots without refueling. Nuclear surface ships, submarines, and icebreakers all use nuclear desalination for their plant and potable freshwater needs.*

From Promethean Fire To Nuclear Energy

by Manuel Romero Lozano

The author is a LaRouche Youth Movement member from Mexico.

There can be no doubt that these are times in which the moral and historic quality of individuals is being put to the test, as modern civilization faces the worst economic, financial, and existential crisis ever. Now, as in other historic periods, civilization needs extraordinary individuals to serve as leadership to guide humanity in a good direction, just as Prometheus did in giving fire to humankind.

In this sense, the LaRouche Youth Movement throughout the continent has taken up Lyndon LaRouche's challenge, as posed to us during his mid-March visit to Monterrey, Mexico. Said LaRouche: "Unity between Central and South America must be achieved, from Mexico down to Argentina. The potential to do this exists. You must provide the population with the politics of ideas. You must become giants and fill that vacuum that now exists among nations; that is your mission."

One week after this challenge was posed, members of the LYM from Mexico, Argentina, Colombia, and Peru released the first edition of the Ibero-American LYM's weekly Internet publication *Prometeo* (Prometheus), designed to provide the "politics of ideas" to the population of Ibero-America, but especially to its youth (www.wlym.com/~spanish).

On to Laguna Verde

After the successful completion of this publication mission, and with the takeoff of the nuclear campaign in Mexico, the LYM refined its high-energy isotopes towards achieving a "fusion reaction" in the organizing, by visiting Laguna Verde, Mexico's sole nuclear energy plant.

And thus began our voyage to the center of the atomic nucleus. Right away, we were asked by our guide to talk more about the LaRouche political movement. Afterwards, we watched a video on how the reactor is refueled. Then, an engineer took us to see life-size pedagogical models of various parts of the reactor, such as the fuel rods, control rods, fuel assembly, and so forth. It is worth noting that the visit to this section was initially planned to last 45 minutes, but given the dialogue that naturally ensued with our pro-nuclear group, it lasted nearly two hours.

We were all awed by a scale model of a cross-section of the boiling water BWR-5 nuclear reactor. Questions to our guide poured out: "What is this?" "What's that for?" and so on. Another interesting aspect was the explanation about radiation, and we learned that in our daily lives, we are constantly bombarded with low-level radiation.

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Author Manuel Romero of the Mexican LYM, with a model of a nuclear fuel rod, at the Laguna Verde plant. A large group of LYM members toured the plant.

Then, the moment we had all been waiting for arrived. We put on our safety helmets and safety glasses, to enter the building where the reactor itself is housed. It was incredible, going through all the security systems.

At the first radiological checkpoint, the engineer leading our group told those in charge of the section that we were a group of pro-nuclear youth, to which those working in the section responded with great enthusiasm. With all of the security equipment and safety checks, we felt as if we were about to take a voyage into outer space!

We saw the reactor's controls, and various floors of the reactor building, including the room where the refueling takes place. From the refueling area, one could see the pool which held the used fuel rods. It was an awesome experience to realize that a nuclear reactor was operating right in front of our eyes.

'The Safest Place in Mexico'

As we left the reactor building, safety regulations were stricter. We even joked that "we are in the safest place in Mexico," which was actually quite true. The most impressive thing was how they tracked radioactivity in the body, and

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A cutaway model of part of the Laguna Verde nuclear reactor. The two Laguna Verde reactors supply 6.25% of Mexico's total energy consumption.

wouldn't let you leave until you were free of contamination. Having exited the building with a radiation reading of .01 millirem, we burst into our now-famous song on nuclear energy.

The guides were thrilled with our songs, and it appears that we gave them back the hope of having more nuclear reactors in the country. Contrary to the urban myths that Laguna Verde is obsolete, that it pollutes, that it is old and unsafe, and so on, the fact is that the Laguna Verde nuclear plant is the safest, cleanest, and most carefully monitored site in all of Mexico!

Some of the most striking points about the plant include:

- It is located in the state of Veracruz, on the coast of the Gulf of Mexico;
- It has two BWR-5 reactors of the Mark 2 direct-cycle type;
- The plant generates 6.25% of the total energy consumed in Mexico;
- The plant has two turbo generators made by Mitsubishi Heavy Industries, of 682.44 megawatts each.

And so, once again, we are generating the critical mass so that the Mexico LYM can ensure that the nation will have sufficient energy for the 21st Century!