NAWAPA could revive the economy

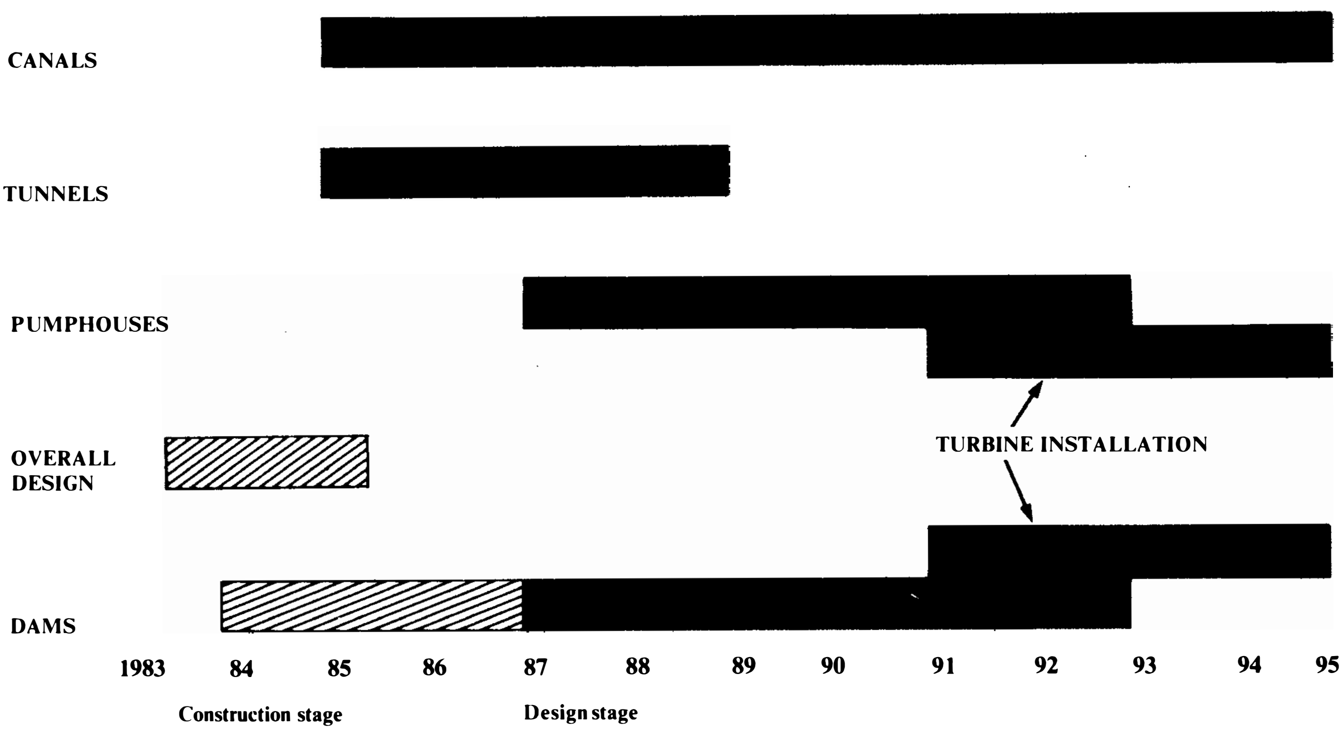
by Sylvia Barkley

Many Americans are familiar with the success story of California's irrigated agriculture. The fertile but drought-ridden expanse of southern California now includes over 10 million irrigated acres. The region not only blossomed, but rapidly developed into the producer of 10 percent of the total agricultural produce, including 50 percent of the nation's vegetables when federally funded irrigation projects brought water into southern and central California, starting in 1945.

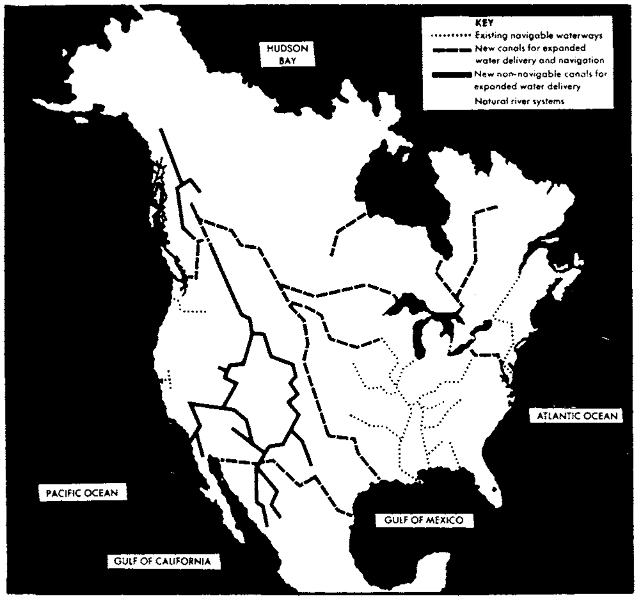
The opportunity to bring into production more than 20 million acres of fertile farmland now unsupplied with water, to keep in production the more than 50 million acres now dependent on irrigation, and to double the productivity of almost 30 million more acres now producing low yields because they are farmed "dry," are three good reasons why the federal government must consider an integrated, continent-wide water development program for the nation. To these a fourth can be added: not only are American farms running out of fresh water supplies, but the nation's cities may soon go to the tap and find it dry. Cities across the High Plains, the Southwest, and southern California are threatened with acute water shortages before the end of the century. Not the least dramatic case is the metropolitan area of Los Angeles, which is facing the loss of half the Colorado River water it currently uses under the terms of the Central Arizona Water Project agreement, and has no current means to replace it.

This is the context in which the Fusion Energy Foundation, the National Democratic Policy Committee, and leaders in the Democratic Party including 1982 California senatorial candidate Will Wertz are calling for the implementation, under federal government auspices, of an updated version of the continent-scale North American Water and Power Alliance project (NAWAPA), de-

Figure 1
NAWAPA timetable—design and construction



The North American Water and Power Alliance



The NAWAPA water proposal

veloped during the 1960s by the Ralph M. Parsons Company of Pasadena, California. The new NAWAPA plan would use a 500-mile long valley in the Canadian Rockies as a natural reservoir to catch and store part of the enormous volumes of water now being lost as runoff in Alaska and Northwest Canada. By constructing major networks of irrigation canals, and a connection into the Great Lakes and Mississippi River, NAWAPA would move 130 million acre-feet of water per year for irrigation in the United States, and 100 million more acre-feet for Canada and Mexico. The project would supply over 50,000 megawatts electric in hydroelectric capacity above the amount of power used to move the water.

An evaluation of the feasibility and the effects of implementation of a national water control project on the scale of NAWAPA shows that such an effort would not only mobilize the entire U.S. economy around the productive tasks involved in its completion—putting hundreds of thousands of skilled workers and engineers to work—but would have beneficial spinoff effects on the nation's industrial, agricultural, and labor productivity for decades to come.

Why should it be so big?

Any analysis of a major development project must include an examination of the feasibility of its construction and a rundown of the benefits it would provide. In the case of the North American Water and Power Alliance, the question of feasibility is particularly relevant because of the immense scale of the project. This size is brought forward by many as the major obstacle to implementing NAWAPA. But in the conception of its original designers, its early supporters, and the current leaders of the National Democratic Policy Committee's campaign to implement NAWAPA, this large size is considered one of the project's greatest assets.

The NAWAPA project would indeed be gigantic: the largest public works project ever built, and approximately twice the size of the Ob River diversion now underway in the U.S.S.R. The plan would divert and control 250 million acre-feet a year (MAFY) of water, over half the amount used in the United States today (390 MAFY). It would require 4,300 miles of canals and 1,000 miles of tunnels, and a series of pumps which would lift 90 MAFY half a mile up. In terms of redrawing the map of the continent, the most impressive structure to be built as part of the project is the 500-mile long Rocky Mountain Trench Reservoir, an artificial lake at 3,000 feet elevation which would hold more water than the United States uses in a year.

In engineering terms, the size of NAWAPA does not offer any major challenges. The original design called for a 1,700-foot-high dam, which would have been the world's highest; but currently construction in Alaska would be incorporated into the plan in a way which removes the necessity for this particular record-breaker. The canals would be a maximum of 600 feet wide and 60 feet deep, the same dimensions as the Panama Canal. The tunnels and pump system would be the largest in aggregate, but no one component of the system stretches current design and engineering capability to its limits.

Figure 2

NAWAPA cement and hydroturbine requirements

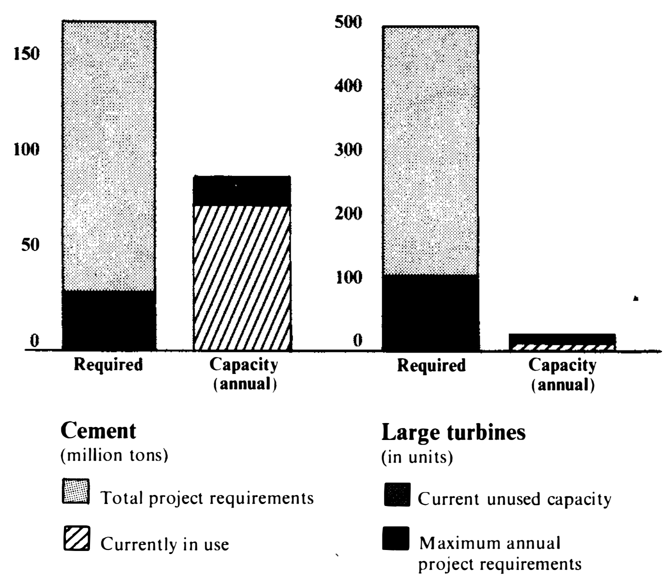
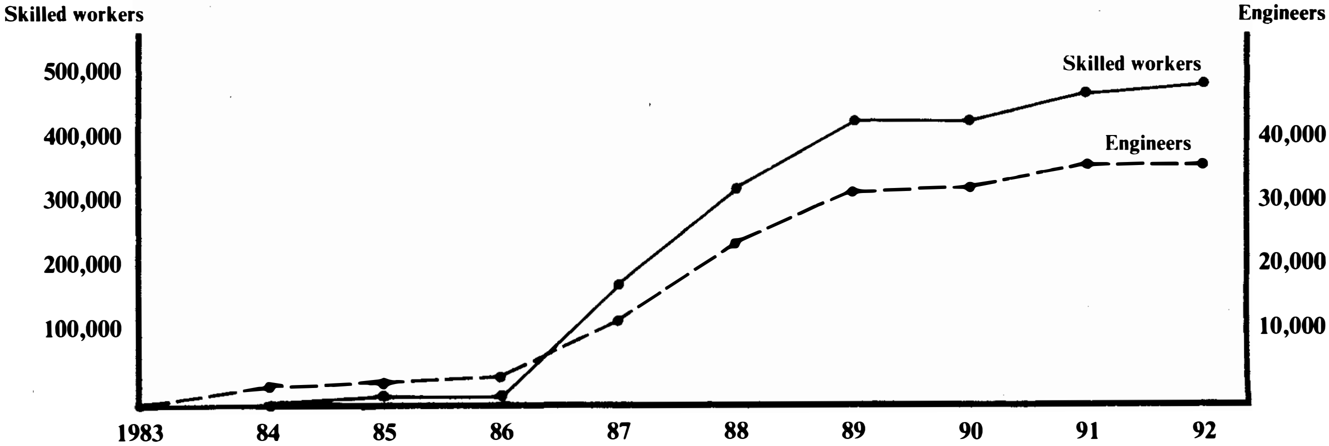


Figure 3
NAWAPA manpower requirements 1983-92



One could almost say that, to an engineer, NAWAPA is boring.

The question which can be asked is "Why *should* the project be so big? Isn't it easier to break it up?" In fact, the economic policy reasons for fighting for, designing, and building the entire project at once are compelling. On an economic basis, one of the strongest points in NAWAPA's favor is the extremely low price which it can charge for water at completion. At today's prices, the cost of water will be only $11.50 per acre-foot, in contrast to current costs of $40 to $60. This is due in part to the economies of scale, and also to the revenue which can be created from the sale of excess power. NAWAPA uses most of the power it generates to pump water uphill, but it provides a net surplus of 55 gigawatts of generating capability in the United States alone which will produce saleable power. The price contrast to smaller projects which are forced to buy power to move water uphill is startling. The Army Corps of Engineers, for example, faced with legislative restrictions which prohibited the corps from considering the Alaskan water source, calculated that the *best* plan for supplying water to the High Plains area would yield only 7.2 MAFY at a cost of $350 to $880 per acre-foot.

The political feasibility of NAWAPA is also dependent on undertaking the entire project in one sweep. The fact that NAWAPA will provide water to 23 Western and Midwestern states, and hydropower and transportation advantages to a significant portion of the Northeast, will overcome the regional rivalries which stall many projects.

On a broader scale, the plan represents an enormous opportunity for international cooperation among Canada, the United States and Mexico. Mexico will receive 40 MAFY according to the latest design, and this water will be mainly available in the region of Sonora, where high-technology farming is already in place, but where high altitudes have made efficient delivery of irrigation water difficult. Mexico indicated interest in NAWAPA when it was first proposed.

For Canada, the situation is more complex. The plan would use more Canadian water than it supplies, but this water is currently completely unused. The plan would also provide water transportation for the agricultural western provinces, and add 50 percent to the hydroelectric generating capacity of Niagara Falls because of the additional water flow into the Great Lakes. Part of the NAWAPA proposal, the barge canals into James Bay and the northern Quebec-Labrador areas, are specifically designed to enhance the economic development of these empty regions. The Canadian reaction to NAWAPA has been mixed. Government spokesmen are generally hostile to the "monstrous scheme" to deprive Canada of its water, while business and farm interests, particularly in the Western Plains states, are enthusiastic. An upcoming conference in Toronto, Canada, is planned as the starting point for organizing support in association with the U.S. initiative.

The timetable: a crash program?

The next question concerns the timetable for the construction of NAWAPA. In a certain sense, it is misleading to talk of a well-defined construction period for the project, since the associated water-distribution networks will continue to be built for decades, and since any realistic proposal will include immediate preliminary refurbishing of the railroad system to provide the necessary carrying capacity for materials and equipment. Apart from these "leading" and "trailing" edge construction projects, the plan should be built as quickly as possible, with a projected timetable of 12 years (see Figure 1).

This allows two years before any direct project construction is started—two years of planning, also required for the repair and upgrading of the rail network over which millions of tons of steel, concrete, and heavy equipment will have to move. While the demand for materials will be spread over the ten years of construction, most of it will have to be moved to locations remote from existing plants. An estimated 300 stiff-leg derricks, 600 bulldozers, and 3,000 drag-line excavators will be used, and they too will have to be transported to a series of remote sites throughout the Rockies and the Great Plains area.

When the planning is complete and construction goes into high gear, the demands on the productive capacity of the entire U.S. economy will become significant. Figure 2 shows the relative levels of total demand, maximum yearly demand, total yearly capacity, and current idle capacity for two items that represent the range of problems which will be encountered in the "crash program" construction.

The first set of bars represents the cement requirements and capacity. Although the overall requirement for cement, 158 million tons, is greater than the entire U.S. yearly production, the maximum requirement for any one year is not much larger than the current "excess" capacity of 20 million tons per year. One peculiarity of the cement industry is the high cost of shipping by any means except water. At present, there is a shortage of cement capacity in the western states, but there are plentiful supplies of the raw material, limestone. In association with the project, new plants can be built on proposed canal routes. These plants will have access to a wide market when the project has been completed.

The second set of bars represents a different type of problem. The large turbines which will be used by NAWAPA both to generate power and to pump water are now made by only one company in the United States, Allis Chalmers, and its yearly capacity is not even close to the maximum demand that will be felt. However, the cause for the low capacity is not physical: almost any heavy machinery manufacturer has the equipment to begin large turbine production.

The problem is the lack of the engineering teams needed to design and supervise the production of these enormous yet precise devices. Only a decade ago, there were 5 to 10 companies in the United States producing this size of turbines, but now the needed engineering expertise is scattered. But this situation could be turned around rapidly, under conditions of mobilization, and therefore the discrepancy of need and capacity shown in Figure 2 does not actually represent a major obstacle to the crash program timetable.

The second point which must be considered, once feasibility is established, is urgency. The manpower requirements shown in Figure 3 demonstrate that the abbreviated timetable will impose a tremendous requirement for engineers as well as for skilled workers, with a peak of 40,000 engineers and almost half a million workers employed directly by 1991. But this very demand must be posed and met if the project is to be built.

Such a mobilization represents the only effective answer to the most serious question of feasibility, the quality of the available manpower. Ten or 20 years ago the achievements of the Apollo program, of the SeaBees of World War II, demonstrated the existence of a pervasive technological literacy and a sense of personal responsibility for the task at hand. Only through these same characteristics can the unavoidable corrections and adjustments in a megaproject like NAWAPA be made as necessary without self-feeding delays. After the anti-growth, anti-technology policies of the Carter years and the Volcker depression which is now descending with full force on the skilled, productive workforce, many of the engineers who are still employed are producing new video games rather than dams.

On top of this, a generation of students has been taught that it is evil for man to leave his mark on the world. Only if the entire country, and the entire continent, are drawn into the effort, in the way that occurred with the Apollo project, can the magnificent concept of NAWAPA become a reality.

NAWAPA's benefits in coming years

The benefits produced by NAWAPA would be on the same scale as its construction. A total of 50 million acres of farmland could be irrigated in the United States, almost doubling the area now irrigated in the West. On irrigated land, the increase in crop productivity ranges from 40 percent for crops such as soybeans and alfalfa, to 140 percent for corn. If all the acreage irrigated by the current plan were to be used for corn, the United States would increase its production by 150 percent to 500 million tons per year. In consumer terms, this would represent 67 billion pounds of beef. Rather than remaining a net importer of beef, the United States could produce enough high-quality animal protein for itself and an additional 400 million people.

The economic effects of NAWAPA will go well beyond the direct impetus to agriculture. New investment in agricultural machinery and other farm infrastructure will be required. And the addition of 50 million acres of irrigated land will require an investment in local distribution systems on the same order as the building of NAWAPA itself.