water behind a dam at high tide and channeling it back to the sea through a turbine at low tide. (Special reversible turbines can be used to harness incoming tides as well.)

Most coastal areas are unsuited to tidal power schemes—the difference between the water levels at high and low tides (the "tidal range") averages only three feet around the world. But on the New England coast, the range reaches 20 feet; in Nova Scotia's Bay of Fundy, up to 40 feet.

The Canadian government is studying a plan to build a five-mile-long dam across the Minas Basin at the head of the bay. More than 100 turbines would generate some 4,000 megawatts of electricity, enough to supply the state of Nevada. But Fay believes that the environmental costs of such "megaprojects" are too high. Not only would the dam disrupt the vast mudflats of the bay, damaging fish and animal life, but it could raise the tidal range by up to one foot from Cape Cod to Nova Scotia.

Small-scale tidal generators of one to 100 megawatts, Fay contends, could do the same job for about the same cost per megawatt. The idea is already catching on. In Annapolis Royal, Nova Scotia, an 18-megawatt plant is nearing completion; Maine's Passamaquoddy Indians have in hand a preliminary plan for a 12-megawatt project that would cost $3–4 million per megawatt—roughly the same as a nuclear plant.

The technology of tide-generated electricity is ready and awaiting wider use. In the future, another method of tapping the ocean tides may well become more practical. Underwater "windmills" anchored offshore would pose no foreseeable environmental hazards and could be located practically anywhere in any ocean.

Success Story?

"Milk" by Daniel Jack Chasan, in *Science 83* (July-Aug. 1983), P.O. Box 10790, Des Moines, Iowa 50340.

At about age 35, in many areas of the world, humans' physiological machinery switches off production of the enzymes needed to digest milk. Not in America.

That fact, says Chasan, a freelance writer, may help to explain the strong, if declining appetite of U.S. adults for milk, cheese, ice cream, and butter. Americans consume the equivalent of 541 pounds of milk per person annually. And the dairymen keep increasing productivity. Wisconsin, home to 46,000 dairy farms, still leads in output, but California's farms are larger and more efficient. Some dairymen in the West milk as many as 6,000 cows, although the average state herd numbers 400. Wisconsin's average is 50. A typical California cow yields 15,000 pounds of milk annually, 3,000 more than its Wisconsin counterpart.

Technological advances (and hard work) account for today's high dairy farm output. Cows still convert grass, hay, and grain into milk,

but farmers now use computer programs to learn "the correct amounts of feed and protein for cows of a particular weight, age, and productivity," says Chasan. A 1,400 pound Holstein may eat as much as 56 pounds of food, including corn and soybean meal, every day. Many stall-fed California cows, milked by machine three or four times every day, may never set foot in a pasture.

The milk, Chasan says, "probably won't see the light of day until you pour it into a glass." From the cow, it travels through tubes to a refrigerated storage tank and then is trucked to a processing plant. There, it is pasteurized by heat to kill bacteria. It is homogenized (to keep the cream from separating) by being forced at high pressure through steel mesh that breaks fat globules into tiny particles.

Since 1960, weight-conscious Americans have reduced their annual per capita consumption of dairy products by more than 100 pounds, or 15 percent. Last year, 10 percent of the nation's milk products ended up in federal warehouses as a result of Washington's longstanding policy of buying up surpluses to maintain dairymen's incomes.

There is a certain irony in the booming productivity of the American dairy industry. As Chasan notes, American farmers "are increasing the production of a commodity for which no adequate market exists."

ARTS & LETTERS

Picasso's Newspaper

"Guernica and 'Guernica'" by Phyllis Tuchman, in *Artforum* (April 1983), P.O. Box 980, Farmingdale, N.Y. 11737.

Gripping newspaper stories often provide novelists with inspiration —Dostoevski is a famous case in point—but painters seem unlikely beneficiaries. Yet it was a newspaper that provided much of the raw material for Pablo Picasso's famous painting, *Guernica*.

Picasso was commissioned to paint a mural for the Spanish Loyalist pavilion at the Paris Exposition (world's fair) of 1937. The left-wing Spanish Loyalists were then slowly losing a bitter civil war to Generalissimo Francisco Franco's Fascists. On April 26 of that year, Franco's bombers, aided by the German Luftwaffe, destroyed Guernica, the ancient Basque capital, giving Picasso his theme.

Picasso worked at the painting for five weeks, beginning just four days after the bombing, writes Tuchman, an art historian and critic. The enormous (11½ ft. x 25½ ft.) black, white, and gray canvas synthesizes elements of cubism, collage, and surrealism, familiar echoes of Picasso's previous creations. It has its own cast of characters—four women, a child, a dismembered soldier, a bull, a horse, and a bird—much like a film or play.

Most of these characters and much of the painting's imagery appear to be drawn from dramatic accounts of the Guernica bombing in the