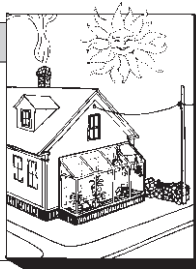


Low-Flush Toilets

by Alex Wilson



At a 1980 workshop, energy guru Amory Lovins suggested that our energy problems were relatively easy to solve. Far more difficult, he said, would be coming to grips with impending water shortages. Indeed, water consumption and price trends in this country are alarming. Since the 1950s, water consumption has doubled. Since 1972, water prices have increased 400 percent.

Heavy water use is putting a big demand on existing reservoirs and water supplies throughout the country. In the arid Southwest, problems are evident. But even in our own backyard, concerns are increasing about water supplies, especially during drought years.

Toilets are our largest water users. In most households, toilet flushing accounts for 40 percent of water use. Most toilets in use consume five-to-six gallons per flush, adding up to over 100 gallons per day, or 36,000 gallons per year for the average family.

As big a concern as water supply in many areas is water treatment. Water treatment plants are reaching or beyond their designated capacities in many areas. Some municipalities have placed moratoriums on new construction because of limits at their treatment plants.

Not surprisingly, attention is now turning toward water-conserving plumbing fixtures, particularly low-flush toilets. This column takes a look at low-flush toilets and the

A112.19.2M (1982). A number of states, including New Jersey, New York, Oregon and California, have adopted the 3.5 gallon standard through separate legislation.

This is a big change from the five-to-six gallon flush toilets which were standard in the 1960s. But many municipalities and several states feel the need to adopt stricter water conservation standards. Carroll County, Maryland, and Monterey, California, have already instituted stricter standards, and Delaware, Maryland, New Jersey and Pennsylvania are considering doing so.

For this reason, ANSI has, for the past two years, been developing a new "low-consumption" standard for toilets. The low-consumption standard limits water use to 1.6 gallons (6 liters) per flush. According to Jim Bauer, Manager of Technical Services of American Standard, and Secretary of the ANSI Committee dealing with these standards, the new standard is likely to be adopted formally later this year or early in 1988.

Adoption of the standard will not mean that low-consumption toilets will be required, but rather, that there will be a formal standard on the books which legislators or code officials will be able to refer to in their laws and regulations. The new standard will have three levels of water conservation: "low-consumption"—up to 1.6 gallons per

consumption model: the Ultra One/G. This model, which has been on the market for two to three years now, uses only 1 gallon per flush and relies on conventional gravity-flow technology.

John Komer, the advertising manager at Elger, admits that the market for this toilet is currently limited. "At this point," said Komer, "it's only in areas where one of three things is happening: either there's a code enforcing the installation of these toilets, or there's a building moratorium because of the capabilities of local sewage systems to handle increasing sewage loads, or, in rural areas, they're trying to extend the life of septic systems."

The other large U.S. manufacturers currently do not have low-consumption toilet models on the market, but stand ready. "The demand is just not there," according to Jim Bauer of American Standard. But his company is ready to jump into the field when necessary. In fact, American Standard could quickly import the technology used by their European division, Ideal Standard.

The current world leader in low-consumption toilets is Ifo Sanitar AB, of Sweden. The company has been making ultra-low consumption toilets since 1936, and they have some four million units in use around the

world. Their Ifo Cascade model is available in both 1-1/2 and 1 gallon per flush models, for elongated and round bowls, respectively. They rely on conventional gravity-flow technology.

Briggs Plumbingware, another large U.S. manufacturer of plumbing

At this point the market for low-flush toilets is limited to certain situations . . . such as a community wishing to extend the life of an overburdened sewage system.

fixtures, recently acquired the Superline product line of low-consumption toilets from Theford Systems. They manufacture both 1-1/2 and 1 gallon models at their California plant. Like the Elger and Ifo toilets, these also operate by gravity flow.

Low FLUSH TOILETS: A Summary of the Issues.

Water use. Low-consumption toilets reduce household water use by 20 percent or more. This will have a big impact on water supplies in arid parts of the country and even in the Northeast during drought years. It may also be a factor for some rural homeowners on spring and well water systems.

Water treatment plant capacity. Overcapacity at water treatment plants is currently a bigger problem in much of the country than water supply. For the next five to ten years, this will probably be the major cause of regulations mandating the use of low-flush toilets.

Extended life of rural septic systems. Lower water use by rural homeowners will extend the operating life of their septic systems.

Reduced mound or leach-field size. Reducing water flow by installing low-consumption toilets and other water-saving fixtures can reduce the required size of a leach field, saving time for the builder and money for the homeowner. This may be especially important with very expensive raised mound drain fields.

Smaller piping. Use of low-consumption toilets and other water-saving fixtures means you can often downsize both supply and waste pipe sizes. This can save a great deal of money, especially in commercial buildings. \$87,000 was saved in one Denver office building under construction by installing low-

consumption toilets and other water-saving fixtures. The savings were primarily due to reduced supply and waste pipe diameters. With low-consumption toilets, soil pipe diameter can be reduced to 3-1/2 or even 3 inches (in fact, low-flow waste drainage is more effective with smaller diameter piping).

Will waste be flushed away as effectively? This is one of the biggest concerns with low-consumption toilets. According to Jim Bauer, Manager of Technical Services at American Standard, "If you gain something, you lose something. If you gain the low volume, you may lose a little on cleanliness. We may end up going back to the European custom of having a water closet and a brush next to it." Proponents of low-consumption toilets argue that these toilets are just as effective at flushing away waste as the older 5 to 6 gallon per flush models.

Will flow along sewer lines be adequate? Some question whether reducing water volume in sewage lines will reduce the effectiveness of flow. Most proponents of low-consumption toilets say this problem is unlikely, although some industry representatives are worried and call for more research before new standards are adopted. The same concern was raised in the 70s when 3.5 gallons per flush toilets were introduced, and no problems have been encountered. The Stevens Institute in New Jersey is presently researching this issue.



Microflush (Mimophore, Inc.) operates on 1/2 gallon per flush. Unlike most toilets, it relies on pressurized air to push the waste out.

various issues surrounding their use and acceptance.

Low-Flush Toilets

First, what constitutes a "low-flush" toilet? Almost all toilets (or "water closets" in the trade) sold in this country today are "water conservation models"—that is, they consume 3.5 gallons per flush or less under standard conditions, as defined by the American National Standards Institute (ANSI).

Most plumbing codes around the country have adopted the water conservation standards in ANSI

flush; "water conservation"—1.6 to 3.5 gallons per flush; and "standard"—over 3.5 gallons per flush.

The various issues affecting the use and acceptance of low-consumption toilets are summarized in the chart accompanying this article.

Low-Flush Toilets—What's Available?

Of the three largest U.S. manufacturers of toilets (American Standard, Kohler and Elger), only Elger currently offers a low-

Other low-consumption toilets rely on less conventional technologies. Water Control International manufactures a line of low-consumption toilets that use less than 1-1/2 gallons per flush, no matter what the incoming water line pressure (some of the gravity flow toilets may consume more than their rated flush at high line pressures). To achieve the low water use, it uses a proprietary system (Flushometer) which increases the water pressure in flushing.



Ifo Cascade is available in both 1-1/2 gallons and 1 gallon per flush models, and relies on conventional gravity-flow technology.

Ambient air is pressurized in a sealed tank during each flush cycle, providing a higher pressure, lower volume flush. Water Control's system, called the Cashsaver MX Series, is sold only in the West, but the same product is sold under several other brand names in the East.

Microphore, Inc., of Willits, Cal., manufactures the lowest water use toilets in the U.S. Their Microflush

compressor can serve an entire house and serve other functions as well, according to the company). The low-profile toilet is "designer-styled" and available in 3 standard and 23 custom colors.

The primary market for the toilet, according to Ross Bett of Microphore, is sites where there are severe water use or waste treatment restrictions—Barrow, Alaska, for example, and many New England sites where soil drainage problems require raised mound septic systems. With an approved "Fixture Unit Value" of one (a term building officials are likely to recognize), the Microflush toilets will allow a higher housing density on those borderline building sites.

Then at the far end of the spectrum there is a Japanese toilet which flushes on just one pint of water—supplemented apparently by soap bubbles which line the sides of the toilet bowl during use . . . ■

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800/462-3951 (MA only)
800/872-1235 (outside MA).

Microphore, Inc.
Plumbing Division
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707/459-5563.

Water Control International, Inc.
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Low consumption toilets marketed in the East under the label of Mansfield Plumbing Products of Perrysville, OH ("Quantum" toilets); Crane Plumbing, Inc., of Evansville, IL ("Economizer" toilets); and Gerber Plumbing Fixture Corp. of Chicago, IL.

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Ambient air is pressurized in a sealed tank during each flush cycle, providing a higher pressure, lower volume flush.

line operates on a remarkable 1/2 gallon per flush. Unlike most toilets, in which a large volume of water precedes the waste down the drain pipes, the Microflush relies on pressurized air to push the waste out. Waste from the fairly conventional looking toilet bowl flushes to a lower compartment. This compartment is sealed from the toilet bowl and air pressure then pushes it through the trap and down the waste line. There is no water tank, although an air compressor is necessary (one