Housing Imports:
THREAT OR OPPORTUNITY?

by Marylee MacDonald

The typical factory-built house in Sweden (left) has board-and-batten siding and a tile roof. With Japanese manufactured homes (below), customers use computers to choose among a host of custom features and finishes, many mimicking U.S. designs.

Foreign houses are not ready to sweep the nation, but U.S. builders can learn much from their overseas competitors

Builders in the U.S. have looked over their shoulders for several years, wondering if the threat of a foreign housing invasion was rumor or reality. Would homes start streaming into East and West Coast ports like so many Volvos and Hondas? Would innovations abroad and changing world economics take work away from small and medium-sized builders at home?

Experience to date has proven otherwise. Foreign investment in building *is* increasing rapidly, bringing a welcome infusion of capital to the construction industry. But foreign housing manufacturers remain reluctant to set up U.S.-based factories.

A few early attempts that went sour taught foreign manufacturers that differences in land prices, buyers' preferences, and building codes can pose a formidable barrier to housing exports. To counter this, exporters turned their sights toward joint ventures with U.S. builders and developers who could show them the ropes stateside. So far, even this strategy has produced more of a trickle than a flood.

Countries at the leading edge of housing technology are Sweden, Denmark, and Japan. Each has a different approach to housing production, and companies from these countries are already active, either as investors or partners, with American firms.

Swedish Technology

Only 1,000 Swedish homes have been imported into the U.S. in the last 15 years. Now, however, several U.S. firms are using modified Swedish technology and trying to compete with site builders. Sweden's factory-produced housing is similar to American panelized construction, but many who have seen the housing in Sweden believe the quality there is generally higher.

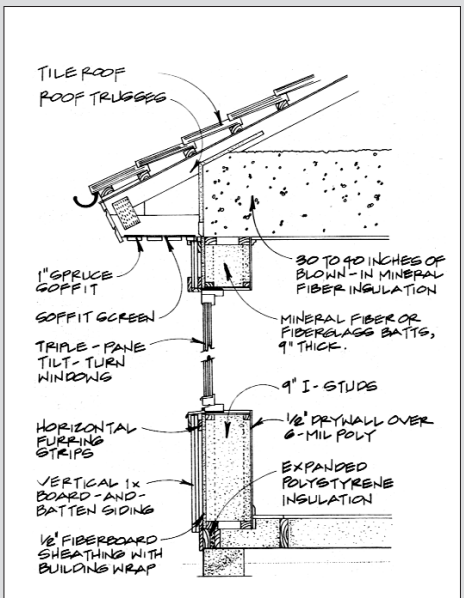
Typical features on a Swedish factory-built home include full one-inch-thick exterior trim, heavy PVC gutters, and triple-pane windows. For wall framing, the Swedes use 9-inch "I-studs," which cut heat loss through the frame and allow room for 9-inch mineral wool batts (see Wall Detail). The batts are factory cut to fit precisely between the studs, and attics are packed with 30 to 40 inches of insulation. All framing lumber is kiln-dried to reduce shrinkage.

Wall panels 4 to 30 feet long are completed at the factory and shipped to the site (see Figure 1). On site, the installers insert heavy-duty rubber gaskets between panels to block air leakage, and they hide the seam with the board-and-batten siding seen on nearly all Swedish homes.

The energy-saving features in Swedish homes are designed to meet, or often surpass, the Swedish national building code, which sets strict limits on infiltration and heat loss. The code requires a blower-door test on every house, and all factory-built homes are equipped with whole-house ventilation systems because the buildings are so tight (see Figure 2 next page).

Wall Detail

In factory-built Swedish homes, I-studs are 9 inches wide and deep trusses can be filled with 30 to 40 inches of insulation. Horizontal furring strips create a dead air space over fiberboard sheathing. The siding is full 1x board-and-batten.



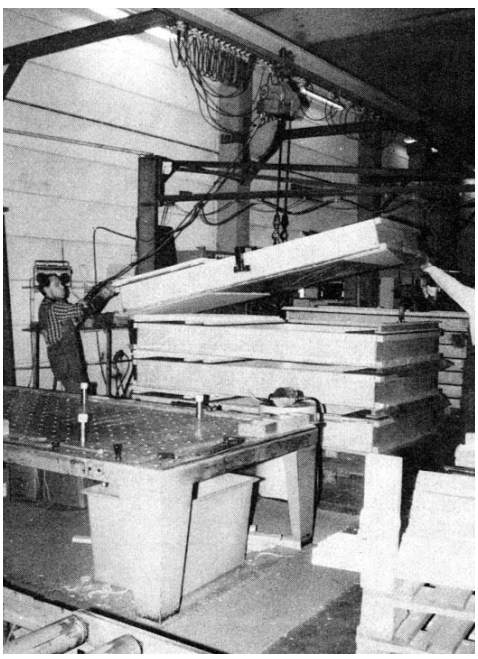


Figure 1. *Swedish workers build highly insulated closed panels, complete with windows and doors. On site, the joints between panels are sealed with rubber gaskets and hidden with vertical battens.*

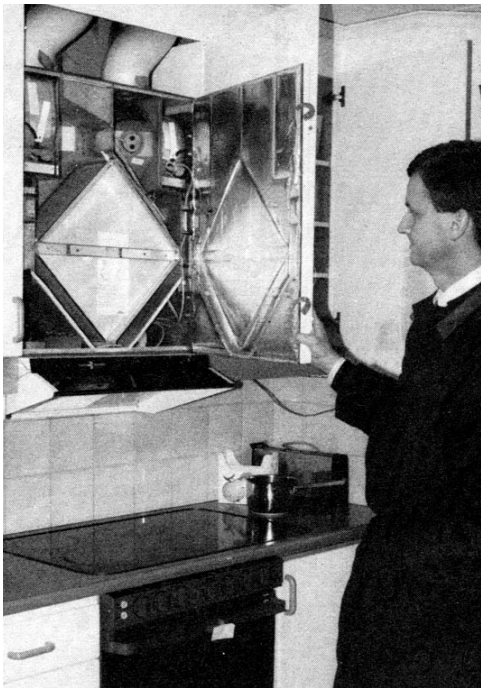


Figure 2. *Whole-house ventilation systems, typically installed above the kitchen range, are found in every factory-built Swedish house.*

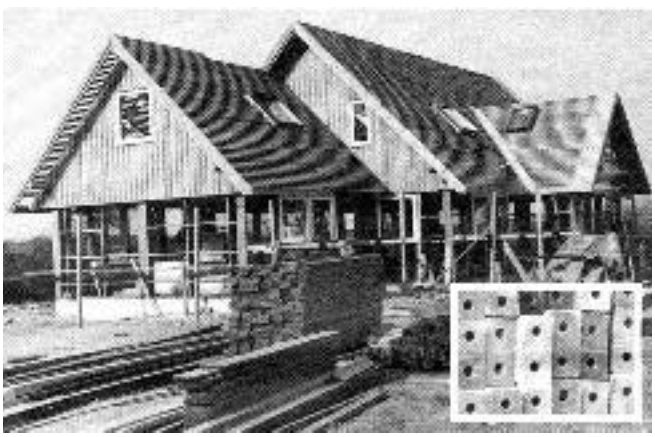


Figure 3. *Danish pre-cut homes use modified post-and-beam construction. Studs and other structural members are drilled to receive dowels (inset). Walls hold 10 inches of insulation.*

Figure 4. *This Misawa home is built with PALC panels, one of Japan's newest building materials. PALC, a lightweight concrete, is reinforced with steel mesh and stamped with different colors and patterns.*

Site builders in Sweden can't compete with the factory's tight tolerances and quality control. Factory builders have a further advantage with their ability to help buyers qualify for government-subsidized interest rates (5% for first-time homeowners). And they wield marketing clout with storefront sales offices in downtowns and shopping catalogues where buyers can pick out basic designs. In fact, in the last ten years, factory housing has increased from only 10% of the Swedish market to over 90% today.

Something Lost in Translation

In the American marketplace, however, the Swedish approach has had only mixed success. Many features that sell in Sweden seem not to impress buyers here. For example, few Americans seem willing to pay for features they can't see, such as better insulation and tighter walls.

A Swedish housing subdivision in Sharon, Mass., one of the first in this country, points up the problems. The project imported 34 houses, manufactured by Myresjohus, one of Sweden's largest housing companies.

The developer didn't have any problems complying with American building codes. However, Karl-Olof Lejdstrom, president of the company that did the Sharon, Mass., project, discovered that American buyers weren't willing to pay extra for 1-foot-thick walls or for 2 feet of attic insulation.

"We found we couldn't get a premium price for these homes," he says. "The American consumer liked the homes but would rather have a marble bathtub than triple-pane windows."

The company also learned the hard way that changes in the foreign exchange rate soon offset savings from building in a factory. With favorable exchange rates, Lejdstrom's costs were running $70 per square foot, including the garage and basement — very competitive with comparable U.S. construction. But the company had to switch to standard American building techniques when the dollar weakened. Continuing to build to Swedish standards would have pushed prices to over $110 per square foot. The remaining lots in the development were built with 6-inch studs and double-pane Anderson windows.

Like American builders, the Swedes have also had problems adjusting to regional recessions. One Swedish company, Valhalla Construction Concepts, guessed wrong in their market research. When it came time to decide whether to jump into the Nashville or Washington D.C. market, they chose Nashville, just in time to watch the bottom drop out of the local economy.

While the company hasn't gone under, it's had to adapt fast to local tastes and make changes in the basic Swedish system. Instead of using the typical closed panels, complete with insulation, fiberboard sheathing, and drywall, says Sven Mjornell, a company spokesman, "We're importing open panels and using brick or vinyl siding." This leaves more work for the job site and reduces the factory advantage.

Another company importing Swedish housing, Helmet House Const., Vero Beach, Fla., has found that plumbing, electrical, and HVAC building inspectors require panels to be installed open. Making a virtue of necessity, the company has found a way to take advantage of having to work with open panels. They show buyers the high quality lumber used in the framing.

"Florida has the worst lumber in the U.S.," says John Hjalmby. "Our clients are all experienced homeowners, and we show them the difference in quality between our lumber and that used on nearby sites."

Even so, the company has made changes to the standard Swedish system. The company's Swedish factory fabricates open panels using 2x6s and 1/2-inch CDX plywood, rather than I-beam studs and fiberboard. Drywall is installed at the job site, and windows, trusses, and roof tile are purchased locally.

They don't use the Swedish I-stud because it won't look solid to their picky custom buyers. The company builds $350,000 custom homes (not including land), at a volume of 15 houses a year, and they depend on a quality image to make sales.

Exporting Factories, Not Homes

While the projects mentioned here have imported panels or whole houses from Sweden, two American joint-venture firms are planning to import Swedish equipment and set up factories here. To set up a factory, you need a substantial and predictable volume, and each company believes it can achieve that in its market niche. One firm has focused on affordable housing and the other on high-end custom building.

The National Affordable Housing Corporation has identified a ready market in New Jersey, where the state's Supreme Court has mandated that 147,500 units of affordable housing be built in the state by the end of 1990. NAHC figures that housing for this ready-made market can be provided quickly by going to a prepackaged source. But assembling the first units shipped from Sweden has not gone as smoothly as hoped (see "A Builder's Perspective," next page).

Targeting the upper end of the market, Jerrold Morris (LanDynamics International) is importing Swedish equipment for his factory in Oregon, where there is a dearth of factory-built housing. Morris plans to couple advanced computer technology to the Swedish factory equipment to give the kind of customization American consumers expect.

Morris hopes to create a demand for his factory's output by working with local builders in markets where the building season is short and where there is a lack of skilled labor, areas such as Santa Fe, N.M., and parts of Colorado.

"The S&L crisis has put a strain on many builders who can't get acquisition and development money. I can help the builder buy the land, and I can deliver the clients to an architect who will help them design their house," Morris says.

If these fledgling efforts take hold, it will still be years before they have the business volume to match existing American panelized and modular builders. And then the threat will be more to U.S. factory builders than to stick builders.

Danish Pre-Cuts

Eighty pre-cut Danish homes have also been imported into the U.S. The Danish houses are a modified post-and-beam construction, and all members are fastened together with dowels (see Figure 3). The Danish factories, where the pre-cut pieces are milled, use Swedish lumber and insulation, but do not use the same panelized construction as in Sweden. Instead, they achieve superinsulated wall sections by using three criss-crossed layers of batt insulation — a total of 10 inches.

Peter Creighton, President of Danish Homes, Inc. (Bolton, Mass.) hires Danish crews to erect many of the homes. The crews have built houses throughout New England, Wisconsin, Michigan, and the Virgin Islands. Erecting the homes takes eight to ten weeks and costs about $70 per square foot, excluding site costs, according to Creighton.

The Japanese Experience

In Japan, where densely populated cities and subsidized interest rates provide a steady demand for new homes, factory-built housing is rapidly replacing Japan's indigenous site-built timber-frame construction. Factory housing costs about half of what traditional Japanese housing costs. And with land prices out of sight ($23 million for less than a tenth of an acre in Kyoto), potential buyers need to economize on hard

A Builder's Perspective

by Ronald Bardenhausen

Under order of the New Jersey Supreme Court, cities in that state have cleared the way for the construction of affordable housing through interest rate subsidies, higher density allowances, and financial give-backs. Nearly 150,000 units must be completed by the end of 1990 to comply with the ruling.

To tap into this ready-made market, the National Affordable Housing Corp. (NAHC), a small New Jersey developer with a track record in historic rehab, has begun to import panelized Swedish Houses to erect on infill lots.

The Swedish solution, however, hasn't been problem-free, as builder Ronald Bardenhausen soon found out. Bardenhausen was hired by NAHC to erect the first batch of Swedish Housing to be built at a Camden, N.J., infill site. — M.M.

The developers of an affordable housing project in Camden, N.J., hired me to erect the frame of a housing package manufactured in a Swedish factory. The developers thought the houses would go together as quickly and easily as a set of Legos. But that hasn't been the case.

When the first shipment arrived, the foundations were already completed. The Swedish crew installed the first six units and trained my crew in how to do the work. My crew is experienced in both panelized construction and stick building, and I've been in the business 30 years; I started as a carpenter.

Still we had more than our share of surprises. First, everything came precut and had to be assembled according to a blueprint. That sounds fine in theory, but when the precutting is so thorough that you need a blueprint to install the roof sheathing, you have a problem. For example, you had to study the prints to see whether to start with a short or long piece of sheathing, or you'd run out of material.

Speaking of blueprints, some of the measurements on the drawings had been converted to inches; but most were still metric. I bought a calculator so I could mark the plans with the inch equivalents my crew was familiar with. This wasn't difficult, but it did take time and had to be done at night so the plans would be marked by the next day's work.

I had been the successful bidder on erecting the frame, and only the frame. But I hadn't bid on unloading, handling, and storing the rest of the material. The NAHC had little familiarity with new construction, and hadn't thought about these aspects of the job. This became costly to the developer.

All the panels, finish trim, stairs, lock sets, doors, garage doors, and insulation arrived on the site at once, as NAHC had arranged. It would have been better if the delivery had taken place in stages, especially on a project of this size. I began stashing the material in the garages of the units as soon as we could get them up. Garages were soon packed with doors and trim, and I still had more coming. I had to store material, such as finished trim, on pallets outside, and cover it with plastic sheeting. Simply to do inventory of this much material on a job site is a huge and difficult job.

In this neighborhood, pilferage is a tremendous problem, particularly if you have material stored outside. Even

Builder Ron Bardenhausen erected panelized townhouses that were shipped from Sweden. Storing all materials on site caused some frustrations.

though we had a night watchman, things still disappeared. (In the case of 19 missing locksets, I can't determine whether they were stolen or never sent.)

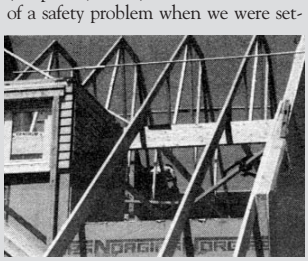
"Building System" Problems

Working with a completed, closed-panel "building system" also presented problems. First, we had to remove all the drywall because the electrical inspector wanted to inspect the wiring. (Much of the drywall had to be removed anyway since it was damaged during shipment by salt water.) The Swedes had installed conduit in the walls, but it was PVC, not UL-approved metal, and our electrical inspector wouldn't buy it. We had to install all new conduit and wiring.

The closed-panel system is designed to be airtight, and the panels bolt together with lag bolts. This worked well, as soon as I went out and bought metric wrenches. A rubber gasket goes in between the panels to provide an air seal. The gaskets are a durable, high-quality rubber, but in cases where the foundation was slightly out of level and we had to shim panels, the gaskets aren't doing a bit of good.

Two things about the framing itself caused problems. One was having precut floor joists. Slight variations in the framing meant that the second-floor joists only had 1½ inches of bearing. I know that meets the minimal requirements of code, but we could have done a better job if they simply sent us 12-foot floor joists and let us cut them to length. I was told that in Sweden they simply don't have power tools on the job site. If they cut, they use a chain saw or a hand bow saw.

The second problem was related to setting the panels for the second-floor walls on top of the floor joists. The system called for a particleboard deck, so we had to wait until the house was weathertight before we put down floor sheathing. This made it hard for my men to set the second-floor ceiling joists. We had scraps of plywood that we'd move around, but otherwise we were working many feet off the ground (see photo, below). This was even more of a safety problem when we were setting trusses. These were very tall trusses, and there was no "safety net" beneath if someone took a fall.



Without a second-floor deck, setting the upper-story panels and roof trusses was treacherous work.

To provide fire protection at the roof, the Swedes had sent two layers of ½-inch exterior drywall, but that left a hump in the roof at the party walls between units. We switched to two layers of ⅜-inch drywall to make the roof more uniform.

The doors are good quality, but the locks aren't standard. No jig made in the U.S. would cut the locksets, and I had to do a lot of hand mortising. Also, they only sent one lockset extension; the door was so thick it needed two. We're waiting for the rest to arrive.

On balance, there are several things I like about the housing system. The quality of windows and doors is excellent. The tilt-turn windows and patio doors provide an extremely tight seal. The windows and doors have double-rabbeted gaskets around the openings and locks in several places on the frame. That could be important for security in this neighborhood. I also like the front door. It's 2 inches thick, and again has a double-rabbeted, gasketed jamb that seals tight. Insulation provided by the factory is cut very precisely to fit the stud and joist spacing, and the vapor barrier is thicker than the ones normally used in American construction.

The spruce lumber was virtually free of knots, and the interior pine was very attractive. The fit of interior trim was very tight. For instance, the stair treads fit so precisely they had to be tapped into place with a rubber mallet. In fact, the quality of all the materials provided by the Swedish factory is very high, and I can see that the next time I erect houses designed with this system, the process will go much more smoothly.

If I were doing this again, I'd want to be in on the planning from the outset. Are the panels going to arrive open or closed, and what inspections will be needed? Can the plans be converted to English measures? Can the factory modify its system slightly to give the workers a floor to stand on before they have to set the second-floor walls and trusses? Could the factory ship finish materials separately? In this case, the building owners thought they could save money by buying the complete house package for a fixed price, but I don't see the point of having fiberglass and drywall shipped from Sweden or of having everything arrive at the job site at once. The logistical problems of storage and handling seemed to outweigh any benefits.

With a little additional planning and more thought given to these problems, there's no reason why imported products could not have a smooth and efficient installation. —*R.B.*

Figure 5. *Japanese model homes have one typical Japanese room with shoji screens, tatami mats, and a low table (top). But most rooms feature Western furniture, designs, and props (bottom).*

building costs. Currently, about 20% to 25% of Japan's one-, two-, and three-family detached housing is produced in factories, and that number is rising.

The large companies producing the housing in Japan also own the banks that provide the 100- or 150-year mortgages that are now common. This gives the manufacturers a strong incentive to build a high quality product. Typically, these are panelized and modular houses using a variety of structural systems — stressed-skin wood panels, steel, and lightweight concrete called PALC (see Figure 4). Ten big companies, such as Toshiba, Panasonic, Toyota, Sekisui, Misawa, and Daiwa, churn out 30,000 to 55,000 such homes a year. Despite the volume, the quality remains remarkably high.

One of the reasons large companies are gaining an increasing share of the market is that they've used their marketing expertise to appeal to consumers. They create demand by scattering "home parks" throughout the city. Buyers can walk through models by the various companies and comparison shop. In a home park in Kyoto, models are equipped with books written in English, French wine, German postcards, golf clubs, and travel brochures. These are marketing touches designed to appeal to the Japanese jet set.

Although each house has one traditional Japanese room (see Figure 5), with minor modifications these houses could fit anywhere in the world. The homes have open interiors, and baths and kitchens are equipped with European or American-style cabinets and appliances.

Despite their Western-style housing, the Japanese have been hesitant to enter the American residential market, except as investors. Their reluctance stems, in part, from concerns over the interest rate fluctuations common in the U.S., according to Mr. Maieda, Daiwa House Corp., Irvine, Calif. Daiwa is a large Japanese construction company that does factory building in Japan, but its American subsidiary, founded in 1976, has not imported the Japanese technology.

"To do single-family construction in the U.S., we would need to build a huge plant," Mr. Maieda said. Instead, the company is building high-rise condos in Westwood, Calif., relying on its expertise in heavier construction.

The ability to shift between low-rise and high-rise construction is common in Japan. Construction companies are large and encompass several divisions, each working in distinct areas of the industry, such as residential construction, hotel management, and office building construction.

Shuwa Construction Corp., which has done some residential building in San Francisco and Pasadena, shifted back to high-rise condo development when it found its residential arm in financial trouble. Instead of seeking out American builders familiar with the local market, the company made the mistake of bringing its own people from Japan to plan the developments, market the homes, and manage the construction, according to Jim Garriqus, an American partner in another Japanese firm (Haseko Corp., Atlanta, Ga.).

"In the next year or two you may see Japanese companies trying to get into the residential market," says Garriqus, "but in general, they're more comfortable with concrete and steel." Garriqus believes that when they do get involved in residential construction, "they'll work like Ryan and Pulte Homes, building large tracts of land with entry-level housing."

In America, the forward wave of Japanese housing technology will not be complete houses, but rather home electronics for the affluent buyer. Home automation systems, security systems, large-screen home entertainment centers, high-tech toilets, programmable ductless air conditioners, and other electronic gadgets will find their way to our shores.

Will Foreign Housing Flood Our Ports?

Given the obstacles to exporting homes, it's not likely that either Japanese or Swedish construction technology will make a large dent in the U.S. market in the foreseeable future. For substantial gains, several market conditions would probably have to change:

- Mortgage interest rates would have to remain stable since factory housing requires steady demand.
- The foreign exchange rate would have to favor manufacturers in other countries — and remain stable.
- The U.S. would have to adopt one uniform building code with stiff energy-saving requirements.

In addition, more American buyers would have to shift in their thinking about factory-made housing to view it as a premium product, not an economy model. And if this market were established, a workforce would need to be trained to assemble houses built with different technology.

The companies that are already here may grow, but they face the same obstacles as other factory-builders as well as the special obstacles of exporters. The builders who are experimenting with foreign technology have learned what American site-builders already know: It's important to stay close to the local market. It's that sensitivity, rather than any particular system, that gives small and medium-sized builders their competitive edge. ■

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