How To Get A Free Greenhouse (Or Nearly So!)

- **If you're looking at the cost of new greenhouses, you're likely to be shocked! They ARE expensive! And when they arrive in your driveway on a couple of pallets and in a couple of crates, with a little instruction pamplet on how to assemble them, they're still a complete and baffling mystery. But read on, and you will be pleasantly surprised at the alternative!**

- There are greenhouse businesses all over the US that grew flowers and ornamental plants, for which there is very little market in today's economy. There are other greenhouse operators who simply went out of business when they no longer could make money on outmoded greenhouses that used energy as if it was free. You can purchase a greenhouse from one of these companies for pennies on the dollar, disassemble it, and transport it to your location for reassembly and reconfiguration as an Aquaponic Solar Greenhouse.

- We're not talking about "junk" greenhouses here: we know a grower in Maine who got a nearly-new, 42,000 square foot aluminum and glass greenhouse that cost $40 per square foot (yes, that's $1.68 million worth of greenhouse) for simply taking it down and hauling it away. He's got it behind his barn on pallets, waiting for the Spring thaw so he can start assembling the first increment he'll use. So if you look carefully, you can find really great deals.

- You won't simply rebuild the greenhouse the way it was; you will make improvements in the orientation, internal layout, assembly, and insulation of the structure so it is more energy efficient and durable. Here's how you do it:

- **First, do your web-based "due diligence":** put "Wanted" ads on Craigslist for your area, for the size of greenhouse you want, and for your price range; and of course, also search Craigslist, Ebay, and other online auctions for your greenhouse. Go to banks in your area and ask them for any foreclosed properties with greenhouses on them, then start talking to the bank if you find a good one.

- **Here's a good trick for finding used greenhouses in your area:** Use Google Maps "Earth View" to "cruise around" in your area, looking for greenhouses from the air. Often they're out at the end of the road, screened from view by trees, and you'd never know there was a greenhouse there without the Maps interface. Locate your candidates, then go "interview them": drive by and check them out; find out who owns the property (usually your County Tax Office has this information), then contact the owner and make them an offer, starting with "I'll remove that old greenhouse from your property, leave the site clean, and not charge you anything".

- What are you looking for in a greenhouse? You want one that has a full-length screened ridge vent for venting hot air in summertime, that can be opened manually from the ground. You also want one that has roll-up side curtains and end walls (these are usually the first 4 to 5 feet in height of the sides and ends) that can also be manually operated, so that you can let in cool air. If it has "Aluminet" or similar sliding mesh shades inside, they're a plus. If it has what are called "water walls" they are a plus, but they're not necessary, as you can easily build your own later.

- What you DON'T need: you don't need to spend any money on air conditioning units, air conditioning ducting or fans, propane space heaters (air heaters); these are all a waste

of money to remove and reinstall; in fact, don't even accept these if the owner gives them away for FREE! You're going to be using MUCH more energy-efficient heating and cooling systems than these outmoded and energy-wasting ones! Don't worry if the greenhouse sides seem high; you can make them shorter by cutting the wall columns shorter when you reinstall it at your site.

- **What you ARE looking for is a relatively new structure that has no rust;** they're all made of galvanized metal. Don't worry if the owner says "the glazing or plastic covering is old", you're going to replace that anyway with Asahi Glass' ETFE film or regular poly film. Also, it needs to be reasonably-priced; to determine if you're getting a deal or getting scammed, get the brand name and model, then call the manufacturer for a current price, plus shipping to your location; now you will have an idea of what "discount" you are getting for the used house. It's VERY likely that if you are persistent and polite, you can find a greenhouse in good condition for ten to twenty cents on the "original" dollar cost. Third, being reasonably nearby may also be a benefit; read the next few paragraphs, then you can determine how far away "too far" is for you.

- **Disassembling your used greenhouse:** Let's say you've found your greenhouse. The next step is to get a good tent and some camping gear, and take your work crew, tools, U-Haul truck and/or flatbed trailer to the greenhouse site. You're going to camp at the greenhouse's location and take the greenhouse apart, taking photos and making sketches and labeling and numbering the parts as you go, so it's easy to reassemble when you get it home. You've got a gas-powered compressor for air wrenches (for undoing bolts); and a generator to charge battery-powered drills (for removing screws) and for electric tools and lights (and TV for after work hours). If the greenhouse has columns that go straight down into concrete piers, you'll want to rent a portable electric metal bandsaw or a cutting torch (make sure you know how to use these!) at your rental place that you can cut the columns off at the base with.

- Take your crew and do a tour or two around the greenhouse before you pick up tools, and familiarize yourself with it to figure out how to take it apart with the least amount of work. As you take it apart, stack and bundle "same" items together on your trailer or U-haul truck. Put each separate length of bolts and screws in a coffee can (or 5-gallon bucket) which you remembered to bring for this purpose, and label them so you know later where they go and what they connect together. If the deal you struck with the greenhouse owner includes cleaning up the garbage when you leave, you'll want to have an extra pickup truck along that you can haul stuff to the nearest dump with.

- When you finish, you should have a U-Haul truck or trailer full of neatly labeled bundles of metal beams, columns, tie straps, braces, and buckets and cans of bolts and screws; and also a camera full of pictures and a sketch book full of sketches. Was it worth it? Yes! Here's why:

- If you purchase a brand-new greenhouse from the manufacturer, it's a bunch of parts and bolts that comes in a crate, and you are going to have to assemble it ANYWAY. If you buy a new one, your assembly crew WON'T be familiar with all the parts and pieces. They will be slow and tentative, and may make mistakes that require backing up, disassembing things, and beginning again. The BEST way to figure out how something goes TOGETHER is to take it APART! This is why taking apart an existing greenhouse is so valuable: it trains your crew, and when they DO put it together again at your place, the work goes smoothly and quickly, and even if you're paying for this labor, you still

may pay LESS or about the same as if you just had a crew assemble a new greenhouse at your site.

- **Another reason it is worth it: you may get a $30,000-50,000 greenhouse (that would cost another $3,000 to ship to you!); landed at your site for $3-6,000 plus another $1,500 worth of U-Haul rental, gas, tool rental, new bolts and screws, and so on.**

- **Re-assembling your used greenhouse:** Before you start re-assembling the greenhouse at your location you first want think about how you will grow in the greenhouse. If the way you grow has a lot of thermal mass built in, as deep water raft aquaponics systems do, you already have a built-in advantage for heating and cooling, and do not have to install extra thermal mass in the greenhouse (at extra cost). This is one benefit of the deep water raft culture system for greenhouse use: you do not have to install a whole separate system just to get thermal mass in your greenhouse. Another benefit is that you can heat or cool the aquaponics system water directly to keep the greenhouse warm or cool; this is MUCH more efficient than trying to heat or cool the greenhouse air directly.

- Other types of aquaponic systems have less thermal mass in the same area and/or volume than deep water raft culture systems do, and using them may require you to install extra thermal mass such as an insulated rock bed under the floor, or an insulated underground masonry water tank, AND extra insulation to keep the temperature in the greenhouse stable. In addition, there are other problems involving over-heating and over-cooling to overcome if you wish to use these kinds of aquaponic systems in a greenhouse in an inclement weather situation.

- One type of these, the flood-and-drain media-based system, doesn't work well as a thermal mass because it exposes the media and the plant roots to the greenhouse air on every single flood-and-drain cycle. This cools the media and plants down when you want to keep them warm, and warms them up when you want to keep them cool. However, these flood-and-drain media-based systems are not as difficult to heat and cool as NFT (Nutrient Film Technology) systems are, with their extremely shallow water depth in narrow channels. A trough in an NFT system that experiences decreased water flow because of a clog or pump or valve failure can heat up or cool down catastrophically in an amazingly short time, killing plants and wasting your time and money.

- Both of these types of systems usually have FAR less total water volume in them than deep water raft systems do, and function poorly as thermal masses, requiring you to make a separate installation of a thermal mass to keep your greenhouse cool in summer and warm in winter, and possibly extra insulation too. Why would you want to use them, if you are going to have to go to extra expense to keep your greenhouse temperature stable? Well, if you were CERTAIN they had a much higher production level per square foot than the deep water raft systems do, you would have a good reason to go to the extra expense. However, we don't know of a single successful commercial aquaponics farm that is based on either of these technologies; that tells you something.

- So, let's assume we're just going to put deep water raft troughs in our greenhouse. We mentioned earlier that it was much more efficient to heat and cool the water than trying to heat or cool the gtreenhouse air, so that's what we're going to do. However, once we've heated or cooled the water, we will need to insulate it to keep its temperature stable. This is much easier and less expensive than insulating the entire floor of the

greenhouse: simply install 2" cheap white styrofoam under and on the sides of your raft troughs when constructing them. When the 2" styrofoam rafts that hold the plant pots are on top of the trough water, your trough water is now insulated on all sides against heat loss.

- Do the same for your fish tank: install 2" insulation underneath it, on the sides, and on top of it. You can make a lift-up panel in the top styrofoam to feed them through; they won't mind the dark a bit. If you are in a location where the ground freezes in winter, you need to insulate your below-ground pipes. You can get round tube-type insulation for pipes as large as 1", but TBMK they don't make it for the 3" PVC that we use in these systems between troughs, so consider lining the trenches you put these larger pipes in with styrofoam before laying them down.

- In winter, you would get the greenhouse "closed-in" as quickly as possible so it was WARM inside; THEN install insulation, build the troughs, install fish tanks and plumbing. If it was summertime, you could install the structural members of the greenhouse and cover them with a temporary white tarp that left a 4-foot air gap near the ground for ventilation. Then you could install the insulation, troughs, fish tanks, plumbing and all in the shade before doing the greenhouse skin, vents, and ends, (if you're careful).

- Unless your greenhouse already came with glazing that was in very good shape, that you were easily able to remove and reinstall, I would seriously consider recovering it with ETFE film. The long life of this film, and the fact that it transmits more light than glass does, made up my mind for me. Even though you need to reinforce any existing conventional greenhouse to use ETFE film with it, this additional expense is well worth it, because then you will get maximum light transmission and growth in your plants; and you won’t have to replace the darn stuff every couple of years.

- Now that you have a well-insulated aquaponic installation inside a nice cheap used greenhouse with good opening vents, roll-up sides, and perhaps a water wall for summer, you are ready to heat it in the winter by heating the aquaponic water; and cool it in the summer by cooling the aquaponic water. How do you do this? Covered in the “Heating” section of this manual.