A self-contained, portable dwelling fabricated from a cargo container is described. The dwelling includes windows and a door in its walls and a plurality of solar panels on the roof. The solar panels collect solar power, which is transferred to storage batteries. The solar panels, storage batteries, and a power inverter make up a self-contained electrical system for the dwelling. The dwelling includes a self-contained sewage and water system including a black water tank, a gray water tank, a potable water storage tank, a toilet, a shower, and a sink. Various electrical appliances, such as an air conditioner, microwave, refrigerator, may be included. Further, a solar powered exhaust fan and a skylight may be included. The dwelling includes International Standards Organization (ISO) locking devices to allow transport on ISO compliant transporting vehicles.
SELF-CONTAINED TRANSPORTABLE DWELLING

FIELD OF THE INVENTION

[0001] The invention relates generally to transportable housing and more particularly to a self-contained transportable housing unit which includes various amenities such as sleeping quarters, shower facilities, a toilet and a sink, and cooking facilities.

BACKGROUND

[0002] Portable dwellings have existed almost since the advent of civilization. Nomadic societies have utilized portable dwellings, which have allowed them to periodically uproot and move their belongings, including their dwellings, to a new location. Examples of such portable dwellings include tepees used by native Americans, yurts used by central Asian nomads, and matjieshuis used by Khoikhoi herders in southern Africa.

[0003] The matjieshuis, as an example, is a portable mat-house. Structurally, it is a semi-permanent shelter that can be erected or dismantled quickly. The matjieshuis includes a framework of lightweight poles and a covering of sedge mats. Today, the matjieshuis are rare, but they include variants utilizing plastic and corrugated iron.

[0004] Another example of portable dwellings are yurts. A yurt, or ger, is a Mongolian dwelling which is a round, somewhat portable structure which utilizes its walls, rafters, roof ring, and tensioning bands in unison to hold itself up. Yurts include numerous pieces which must be put together to create the structure. Further, yurts do not contain toilet facilities or electrical amenities.

[0005] Numerous disadvantages exist in the portable shelters in conventional use today and in the past. Some of the portable dwellings may require a concrete foundation, and all of these dwellings may require insulation to be useful in most climate areas of the world. Further, while considered portable, the amount of time necessary to assemble each dwelling may be hours or days. When it is required to move these portable dwellings, it is required that they be taken apart. The conventional portable dwellings require outside power for electricity and outside water hookups for water supply. Further, conventional portable dwellings lack various amenities, such as separate toilet facilities and shower facilities and electrical appliances for refrigeration, cooking, heating, etc. Also, the conventional portable dwellings may not withstand heavy winds or bad weather, and they have a short life expectancy. Examples of conventional portable housing units may be found in U.S. Pat. Nos. 5,706,614 (Wiley, Ir., et al.), 5,193,325 (Allison), 5,070,661 (Lo Guidici), 4,854,094 (Clark) and 4,299,065 (Fairgrieve).

[0006] There are numerous reasons in today's society necessitating portable housing. For example, construction sites which are located many miles from the normal housing of construction workers need not provide shelter for the workers. The shelter may come in the form of a hotel or motel or other such accommodation, if one exists close enough to the construction site. However, for lengthy construction projects, the costs associated with sheltering an entire construction crew at a hotel can become prohibitive.

[0007] Another example is an oilfield exploration project, where oilfield equipment and crews are often dispatched to areas far from human population centers. Further need for temporary housing occurs during the aftermath of natural disasters, such as floods, earthquakes, tornadoes, hurricanes, etc. Such natural disasters often displace numerous people, either through the destruction of their homes, or by making it difficult or impossible to reach or inhabitate in their homes.

[0008] Yet another example for the need for temporary housing is at times when a house is being renovated. Also, temporary living space is needed in farming and vineyard areas to accommodate seasonal migrant workers brought in to harvest crops. Temporary living spaces are also needed as hunting camps, overnight shelters in wilderness areas or along wilderness trails, camp areas, and as low income housing for college students. Also, the need for temporary housing for the homeless remains a continuing problem.

[0009] All of the aforementioned examples of needs for temporary housing can occur virtually anywhere in the world. There thus exists a need for all-weather temporary housing which includes basic amenities to allow for extending stays.

SUMMARY

[0010] The invention provides a self-contained, transportable housing unit. The housing unit includes a roof, four external walls and a base, a plurality of solar panels positioned on the roof, a door located in one of the walls, and a plurality of windows located on at least one of the walls.

[0011] In one aspect of the invention, a self-contained water and sewage system is provided, including a black water tank, a toilet which is drainable into the black water tank, a gray water tank, a shower which is drainable into the gray water tank, and a sink which is drainable into the gray water tank.

[0012] In another aspect of the invention, a self-contained electrical system is provided, including a plurality of solar panels, one or more storage batteries, and an inverter to translate stored electrical power to one-hundred ten alternate current electrical power.

[0013] The invention also provides a method for providing a habitable, self-contained transportable housing unit from a cargo container. The method includes the steps of providing a cargo container, installing a self-contained electrical system, installing a self-contained water and sewage system, and preparing a sleeping quarters.

[0014] These and other advantages and features of the invention will be more readily understood from the following detailed description of the invention which is provided in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a perspective view of a transportable dwelling constructed in accordance with an embodiment of the invention.

[0016] FIG. 2 is another perspective view of the transportable dwelling of FIG. 1.

[0017] FIG. 3 is an interior layout of the transportable dwelling of FIG. 1.

[0018] FIG. 4 is a perspective view of another transportable dwelling constructed in accordance with an embodiment of the invention.
FIG. 5 is another perspective view of the transportable dwelling of FIG. 4.

FIG. 6 is an interior layout of the transportable dwelling of FIG. 4.

FIG. 7 is a partial side view of a solar panel mounted on the transportable dwelling of FIG. 1.

**DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS**

With reference to FIGS. 1-3, in which like numerals denote like elements, there is shown a transportable dwelling 10. The transportable dwelling 10 may be fabricated from International Standards Organization (ISO) compliant cargo containers. Preferably, new cargo containers are used, since used cargo containers may include contaminants which are toxic or otherwise undesirable. The dwelling 10 includes a pair of long walls 12, and 12, extending between a first end 14, and a second end 14. A base 16 and a roof 18 connect with the walls 12, 12, and the ends 14, 14. The dwelling 10 as illustrated is approximately eight feet wide by eight feet tall by twenty feet long.

The walls 12, 12, the ends 14, 14, the base 16 and the roof 18 may all be formed of a corrugated metallic material. Preferably, an insulating material 20 is affixed to the structural components of the dwelling 10. In one preferred embodiment, the insulating material 20 is sandwiched between a pair of aluminum sheeting to form each of the walls 12, 12, the ends 14, 14, the base 16 and the roof 18. In another preferred embodiment, the insulating material 20 is a flame retardant polyurethane foam material which is sprayed onto the walls 12, 12, and the ends 14, 14, to a thickness of approximately one and one-half inches. In yet another embodiment, the insulating material 20 is interior flame retardant panels. By utilizing such building materials, the portable dwelling 10 is an all-weather dwelling, meaning that it may be used in virtually all climates.

A rectangular opening is formed in the wall 12, and a door 22 is installed therein. The door 22 is sufficiently large to allow ingress and egress from the dwelling 10, but not large enough to hamper the structural integrity of the dwelling 10. The door 22 may be designed for handicap access. For dwellings 10 formed from ISO compliant cargo containers, the door 22 is sized and shaped so as to allow the dwelling 10 to be shipped through ISO compliant shipping means, such as, for example, cargo ships, ground cargo transports, railcars, and other such shipping means with guidelines pertaining to the required structural integrity of shipped items. Preferably, the door 22 is about thirty inches by about seventy-eight inches. The door 22 may include a lock to provide enhanced security.

As illustrated, a large window 24 is also installed in the wall 12. The window 24, which is optional, allows light into the interior of the dwelling 10, namely the sleeping quarters 47 (FIG. 3). Preferably, the window 24 is dimensioned at three feet by four feet. Two smaller windows 26 are installed in the wall 12, and the windows 26 may each be preferably two feet by two feet in size. The windows 26 also allow light into the sleeping quarters 47. An additional two windows 28 may be installed in the first end 14. As with the windows 26, the windows 28 are preferably two feet by two feet in size, and, like the windows 24, 26, the windows 28 allow light into the sleeping quarters 47. The windows 24, 26, 28 may include screens.

End doors 30, 30, are installed in the wall 14. The end doors 30, 30, allow access to a storage closet 32 positioned between a partition wall 34 and the doors 30, 30. The storage closet 32 may be used to store necessary equipment (described in detail below) used to make the dwelling 10 more habitable.

Within the dwelling 10, aside from the storage closet 32 and the sleeping quarters 47, there are two additional partitioned sections, namely a shower room 36 and a bathroom 42. The shower room 36 contains a shower 38 and may include a door 40 to afford privacy. Likewise, the bathroom 42 includes a toilet 44 and may include a door 46 to afford privacy. The shower room 36 and the bathroom 42 may include a twelve volt direct current light.

A pair of bunks 48, 48, each containing a pair of cots, are located in the sleeping quarters 47 to allow four grown individuals to occupy the dwelling 10. Preferably, the cots include a standard twin size mattress. Obviously, more than one child may be able to use one of the cots of the bunks 48, 48. Each of the bunks 48, 48, may include a low wattage, twelve volt direct current reading light. An additional twelve volt light may also be located separately in the sleeping quarters 47, and another twelve volt light may be externally located at the entrance to the portable dwelling 10 near the door 22.

An awning (not shown) may be mounted on the exterior of the dwelling 10 to provide an expanded living area. The awning may be of ample size, such as approximately seventeen feet by eight feet, and may include screening so that the area within the screening under the awning may be utilized to accommodate additional cots.

The dwelling 10 includes one or more solar panels, shown schematically in FIGS. 1 and 2 as solar panels 50, which collect solar power and translate it into usable electrical power which are stored in storage batteries. Specifically, solar energy is absorbed in the panels 50 and transferred to one or more twelve volt direct current storage batteries 52, shown in FIG. 3 as being stored in the storage closet 32. An inverter system 54 is included to transfer the twelve volt direct current electricity to 110 volt current to provide electricity to run various electrical appliances. To take advantage of areas where outside power is available, the dwelling 10 is also outfitted with an outside power hookup 56. Examples of outside power may include an external electrical grid and a power generator.

The solar panels 50 may be mounted to the roof 18 in such a way as to allow rotation of the solar panels 50. Unlike permanent dwellings, upon which solar panels are permanently mounted in such a way as to absorb optimal sunlight, transportable dwellings, such as the dwelling 10, may be located in a location which precludes the ability to optimally line up the solar panels 50 relative to the line of travel of the sun. Hence, the ability to rotate the solar panels 50 adds the benefit of being able to take advantage of solar radiation regardless of the positioning of the dwelling 10 relative to the line of travel of the sun. As shown in FIG. 7, the solar panels 50 may be mounted to the roof 18 by a shaft 82, which is capable of being rotated by a turn crank 80. Other suitable constructions may be utilized to allow for rotation of the solar panels 50. Additionally, the solar panels 50 may be situated close to an edge of the roof 18 to allow for clamping of the solar panels 50 in position. This feature may take on additional importance in high wind areas.
The toilet 44 is preferably permanently affixed to the floor, such as by bolts, and may be a Sealand brand Vacuflush and which uses approximately one pint of water per flush, the water being supplied by a storage tank 58. Such a toilet 44 is powered by a twelve volt direct current diaphragm pump, which pumps the toilet water from the toilet 44 to an approved black water tank 60. The tank 60 is preferably a fifty or one hundred gallon holding tank. The tank 60 may be periodically pumped out by portable toilet personnel such as those that maintain standard porta-johns or porta-potties at construction sites. Additionally, the tank 60 will include a separate drain valve (not shown) for allowing drainage into a sewer hookup such as those used conventionally in recreational vehicle camp sites.

The shower 38 will be supplied water from the storage tank 58, and water used in the shower 38 will be pumped into a gray water tank 62. The gray water tank 62 will have a separate drain valve (not shown) like the black water tank 60.

The storage tank 58 will preferably be a one hundred to two hundred gallon tank and include a water filter to supply potable water to the dwelling 10. A twelve volt direct current pump 68 may be used to pump water from the storage tank 58 through the dwelling 10. An accumulator tank 64 may be included within the water system of the dwelling 10 to minimize pulsating water flow and pump cycling. Alternatively, to take advantage of areas where outside water is available, an outside water hookup 66 is included with the dwelling 10. The outside water hookup 66 will allow flow from the outside water source, such as a city water supply, and bypass the storage tank 58 and the accumulator tank 64. A pressure regulator (not shown) may be used to decrease water pressure coming from a city water supply to about forty or fifty pounds per square inch. A sink 70 is located within the dwelling 10 for access to the potable water. The sink 70 includes hot and cold water and drains into the gray water tank 62.

One of the solar panels 50 is dedicated to heating water used in the shower 38 and the sink 70. This dedicated solar panel 50 will include a heat control system (not shown) which can regulate the temperature of the water.

The roof 18 may further include a skylight and exhaust system 72. The skylight and exhaust system 72 includes a solar powered exhaust fan (not shown) and are provided to provide air circulation to the interior of the portable dwelling 10.

The portable dwelling 10 may further accommodate several electrical appliances (not shown), such as, for example, a small refrigerator 77, a microwave 78, and a low voltage heat/air conditioner 79. Further, the dwelling 10 may be outfitted with a small CSA certified propane heater approved for indoor use. The dwelling 10 also has outside telephone connections, for those areas where telephone service is available, and a twelve volt phone adapter for charging cellular phones and/or flashlights.

Each dwelling 10 includes a standard lower corner ISO locking device 74 located exteriorly. Such locking devices 74 are conventionally used on ISO cargo containers. Thus, the dwellings 10 are adapted to be transported anywhere in the world on standard ISO trailers. Each dwelling 10 also includes forklift pockets 76 to adapt the dwelling 10 for forklift loading and unloading.

A second, emergency exit may also be included in the dwelling 10. Such an exit may be mandatory based upon local ordinances, and would certainly be practical. The second emergency exit may be situated at the large window 24 or in the roof, such as through the skylight and exhaust system 72. If the exit is situated in the roof, a ladder will be included to provide easy access to the exit and an easy descent from the roof to the ground. While the dwelling 10 has been described as being transportable, there may be occasions when it may be desired to more permanently secure the dwelling 10 to the ground. In areas where high winds are common, such as, for example, the Gulf Coast region of the United States, which is prone to hurricanes, tornadoes, and funnel clouds, it may be desired to anchor the dwelling 10. To accomplish this, holes may be drilled in the ground at the corner edges of the dwelling 10. Re-bar or steel is then cemented in place in the holes and attached to the lower ISO corners, either through welding or through some other attachment mechanism.

FIGS. 4-6 illustrate a portable dwelling 110, which differs from the dwelling 10 in several significant respects. The portable dwelling 110 includes long walls 112, 112, a first end 114, a second end 114, a base 116 and a roof 118. The long walls 112, 112 differ, from, respectively, the walls 12, 12, in that they are twice as long, approximately forty feet in length. Further, wall 112, includes four small windows 26 instead of a large window 24 (on wall 12,) and wall 112b includes four small windows 26 instead of two small windows 26 (on wall 12.). The first end 114, differs from the first end 14, in that as illustrated it does not include any windows 26. The base 116 differs from the base 16, and the roof 118 differs from the roof 18, in that the base 116 and the roof 118 are approximately forty feet in length, twice the approximately twenty feet in length of the base 16 and the roof 18. Thus, the portable dwelling 110 as illustrated is approximately eight feet wide by eight feet tall by forty feet long.

The portable dwelling 110 further lacks an inside shower room, such as the shower room 36 in FIGS. 1-3. Instead, the portable dwelling 110 includes an outside shower enclosure 136 with a shower 138. As with the portable dwelling 10, water for the shower 136 will be received from the storage tank 58, and drained back to a gray water tank 62 or to a sewer or septic system.

Finally, the sleeping quarters 147 are larger than the sleeping quarters 47 of the portable dwelling 10. The sleeping quarters 147 are large enough to accommodate three bunks 148, b, c, each having a pair of cots. Thus, the portable dwelling 110 can accommodate up to six sleeping adults. The cots may be smaller than standard size twin mattress.

While the invention has been described in detail in connection with exemplary embodiments known at the time, it should be readily understood that the invention is not limited to such disclosed embodiments. Rather, the invention can be modified to incorporate any number of variations, alterations, substitutions or equivalent arrangements not heretofore described, but which are commensurate with the spirit and scope of the invention. Accordingly, the invention is not to be seen as limited by the foregoing description, but is only limited by the scope of the appended claims.
What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. A self-contained, transportable dwelling, comprising:
   a roof, four external walls and a base;
   a plurality of solar panels positioned on said roof;
   a door located in one of said walls; and
   a plurality of windows located on at least one of said walls.
2. The dwelling of claim 1, comprising a self-contained water and sewage system.
3. The dwelling of claim 2, wherein said self-contained water and sewage system comprises:
   a black water tank;
   a toilet which is drainable into said black water tank;
   a gray water tank;
   a shower which is drainable into said gray water tank; and
   a sink which is drainable into said gray water tank.
4. The dwelling of claim 3, wherein said self-contained water and sewage system comprises a potable water storage tank which provides water to said toilet, shower and sink.
5. The dwelling of claim 3, wherein said self-contained water and sewage system comprises an accumulator tank.
6. The dwelling of claim 3, wherein said self-contained water and sewage system comprises a pump.
7. The dwelling of claim 1, comprising a self-contained electrical system.
8. The dwelling of claim 7, wherein said self-contained electrical system comprises:
   said solar panels; and
   one or more storage batteries.
9. The dwelling of claim 8, wherein said self-contained electrical system further comprises an inverter to translate stored electrical power to one-hundred ten alternate current electrical power.
10. The dwelling of claim 8, wherein one of said solar panels is dedicated to heating water for use in said shower.
11. The dwelling of claim 8, comprising:
   a refrigerator;
   a microwave;
   an air conditioner;
   a heater; and
   an exhaust fan.
12. The dwelling of claim 1, comprising a storage closet accessible from outside the dwelling.
13. The dwelling of claim 1, wherein the dwelling is fabricated from an International Standards Organization compliant cargo container.
14. The dwelling of claim 13, comprising a corner International Standards Organization locking device.
15. The dwelling of claim 13, comprising a plurality of forklift pockets.
16. The dwelling of claim 1, comprising separate sleeping quarters, toilet facilities and showering facilities.
17. A self-contained, transportable dwelling having separate sleeping quarters, toilet facilities and showering facilities, comprising:
   a roof, four external walls and a base;
   a door located in one of said walls;
   a plurality of windows located on at least one of said walls;
   a self-contained water and sewage system, including:
   a black water tank;
   a toilet which is drainable into said black water tank;
   a gray water tank;
   a shower which is drainable into said gray water tank;
   a sink which is drainable into said gray water tank;
   a potable water storage tank which provides water to said toilet, shower and sink;
   an accumulator tank; and
   a pump; and
   a self-contained electrical system, including:
   a plurality of solar panels positioned on said roof;
   one or more storage batteries; and
   an inverter to translate stored electrical power to one-hundred ten alternate current electrical power.
18. The dwelling of claim 17, further comprising:
   a refrigerator;
   a microwave; and
   an exhaust fan.
19. The dwelling of claim 17, further comprising:
   an air conditioner; and
   a heater.
20. A self-contained, transportable dwelling, comprising:
   a roof, four external walls and a base; and
   at least one solar panel rotatably positioned on said roof.
21. The dwelling of claim 20, wherein said solar panel is mounted to said roof with a rotatable shaft.
22. A method of providing a habitable, self-contained transportable dwelling from a cargo container, comprising:
   providing a cargo container;
   installing a self-contained electrical system;
   installing a self-contained water and sewage system; and
   preparing a sleeping quarters.
23. The method of claim 22, wherein said installing of the self-contained electrical system comprises:
   installing a plurality of solar panels;
   installing one or more storage batteries; and
   installing an inverter to translate stored electrical power to one-hundred ten alternate current electrical power.
24. The method of claim 22, wherein said installing of the self-contained water and sewage system comprises:
   installing a black water tank;
   installing a toilet which is drainable into said black water tank;
   installing a gray water tank;
   installing a shower which is drainable into said gray water tank;
   installing a sink which is drainable into said gray water tank;
   installing a potable water storage tank which provides water to said toilet, shower and sink;
   installing an accumulator tank; and
   installing a pump.
   * * * * *