

SYSTEM AND METHOD OF USING GRAPHENE ENRICHED PRODUCTS FOR DISTRIBUTING HEAT ENERGY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a system and method of using graphene enriched products. More particularly, the present invention relates to a system and method of using graphene enriched products for distributing heat energy.

2. Description of the Related Art

The distribution of heat energy has traditionally been through the use of a medium, typically a liquid or a gas. The use of these mediums to distribute heat has several disadvantages. Liquid or gas mediums require containment vessels such as pipes in order to be effective mediums for distributing heat. Containment of liquid or gas mediums come with a new set of challenges. The containment vessel generally includes strong seals to prevent leakage of the medium. Additionally, the containment vessel should be strong enough to withstand the pressure of the contained medium. Generally, thick walled pipes are used which are heavy and bulky, or alternatively, lighter and expensive materials are used.

Additionally, in order to move the traditional medium sufficiently through the distribution system, some type of propulsion is required. A pump is typically used to move the liquid or gas through the distribution system. Pumps generally require their own mechanical or electrical energy to operate, further reducing the total efficiency of the system. Further, pumps generally require periodic maintenance and replacement. Traditional mediums moving through pipes at high pressure are also subject to frictional losses and turbulence due to the interior surfaces of the pipes. These losses further reduce the efficiency of the traditional system. A more efficient system to conduct heat energy that overcomes these disadvantages is desirable.

Graphene is a recently-developed material that has many advantageous properties, among them is very high thermal conductivity when compared to traditional materials. Graphene is typically manufactured in the form of thin sheets, one atom thick. A piece of a graphene enriched product (GEP) is shown in Figure 1. Graphene is shown with or without a substrate separating the layers. The graphene is applied using techniques known to those of skill in the art.

A GEP has at least one layer of graphene adjustably affixed to at least one of its surfaces. For example, a cylindrical conduit can have multiple layers of graphene affixed to its surface with or without a substrate layer separating them. Energy, including but not limited to heat energy, can be conducted through the layers of graphene affixed to the conduit. Due to the high thermal conductivity of graphene and its linear conductivity properties, very little heat is lost to the environment. Thick insulation, typical of other mediums to conduct heat to prevent radiant heat energy from escaping, is not needed, due to the inherent linear heat conductive properties of graphene. Generally, a protective outer layer covering the graphene protects the graphene layers from damage. Since graphene is a solid, the containment issues of liquid or gas mediums are eliminated. Expensive containment vessels, seals, gaskets, and other equipment required with traditional liquids or gases are not required. Pumps are also not required, as the heat energy is conducted linearly through graphene due to the inherent properties of the material. An energy distribution system using GEPs to distribute heat energy therefore overcomes the disadvantages of a typical liquid or gas heat energy distribution system.

What is needed then is a system and method of using GEPs to conduct and distribute heat energy.

DESCRIPTION OF THE FIGURES

Other advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Figure 1 is a side view of prior art showing at least one layer of graphene applied to both sides of a substrate;

Figure 2 is a cross sectional view of a GEP of the present invention;

Figure 3 is a cross sectional view of a tunnel containing a plurality of GEPs of the present invention;

Figure 4 is a diagram of a heat distribution network using GEPs of the present invention;

Figure 5 is a diagram of an alternative heat distribution network using GEPs of the present invention; and

Figure 6 is a diagram of an alternative heat distribution network using GEPs of the present invention.

SUMMARY OF THE INVENTION

The present invention provides a system and method of using GEPs to conduct and distribute heat energy. The system includes at least one heat energy source, at least one GEP, a system for extracting heat energy through the GEP, and a system for distributing the heat energy extracted through the GEP. The present invention can include a variety of heat sources including geothermal, solar, nuclear, chemical, magmatic, or electrical energy. The present invention can include a variety of devices to engage the heat source. The present invention can also include a variety of conduits upon which graphene is applied or combined to form GEPs. The system for extracting heat energy can include a variety of devices, such as heat exchangers, boilers, turbines, thermocouples, or thermoelectric generators. The system for distributing heat energy can include a computer controlled manifold or regulator for dividing the heat energy extracted through the heat source. The system for distributing heat energy can include a variety of devices for converting the heat energy into other forms of energy including electricity, steam, mechanical, potential, kinetic, elastic, conduction, convection, chemical, nuclear, or incandescence.

DETAILED DESCRIPTION

The systems and methods described herein are not limited in their application to the details of construction and the arrangement of components set forth in the description or illustrated in the drawings. The present invention is capable of other embodiments and of being practiced or of being carried out in various ways. Also, the phraseology and terminology used herein is for the purpose of description and should not be regarded as limiting. The use of “including”, “comprising”, “having”, “containing”, “involving” and variations thereof herein, is meant to encompass the items listed thereafter, equivalents thereof, and additional items, as well as alternate embodiments consisting of the items listed thereafter exclusively.

Referring generally to the Figures, the present invention provides a system and method of using GEPs to conduct and distribute heat energy. The system 30 includes at least one heat energy source 32, at least one GEP 10 for extracting heat energy, and a system distribution 30 for distributing the heat energy extracted through the GEP 10. The present invention can include a variety of heat sources 32 including geothermal, solar, nuclear, chemical, magmatic, or electrical energy. The GEP 10 of the present invention can be formed into a variety of configurations. The present invention can also include a variety

of conduits upon which graphene is applied or combined with GEPs. The system 30 for extracting heat energy can include a variety of devices, such as heat exchangers, boilers, turbines, thermocouples, or thermoelectric generators. The system 30 for distributing heat energy can include a computer controlled manifold or regulator for dividing the heat energy extracted through the heat source. Also, the system 30 for distributing heat energy can include a variety of devices for converting the heat energy into other forms of energy including electricity, steam, mechanical, potential, kinetic, elastic, conduction, convection, chemical, nuclear, or incandescence.

The system 30 of the present invention allows for the use of GEPs 10 to conduct and distribute heat energy. The source of the heat energy can be many types, such as but not limited to geothermal heat energy. Geothermal heat energy is generally located deep below the Earth's surface, but there are locations where geothermal heat energy is more accessible. In some locations the Earth's crust is thinner than in other locations, or unique geological conditions are present that make geothermal heat energy easily accessible. Geothermal energy may generally be accessed using well-drilling equipment as is well known to those of skill in the art. Alternatively, new wells may be sunk in favorable locations, or existing wells may be repurposed or re-drilled, or the GEPs 10 may be otherwise modified to enable access to the heat using technology known to those of skill in the art.

Another source of heat energy that can be accessed using GEPs 10 is solar energy. A solar array can be located on a building rooftop, an open field, or a variety of other locations that receive adequate solar exposure. Solar energy can be captured in a number of ways as is known to those of skill in the art, and converted into heat energy. Solar energy can be used to heat a liquid, such as water or liquid sodium. The liquid can be a source of heat energy for GEPs 10 to conduct and distribute.

Yet another source of heat energy that can be accessed using GEPs 10 is nuclear energy. Nuclear energy is well known for producing vast quantities of heat. This heat is often used to boil water for steam generation. A reactor core can be capable of producing vast amounts of heat, which can be conducted and extracted using GEPs 10, in addition to or in place of water or other cooling systems.

Chemical energy is another heat source that can be accessed using GEPs 10. Many chemicals are known by those of skill in the art to produce vast amounts of heat when

mixed together, such as sodium metal and water. These and other chemical combinations can produce vast amounts of heat, which may be extracted and conducted using GEPs 10.

Magmatic energy is another heat source that can be accessed using GEPs 10. Magma is present in a number of locations around the world, such as Iceland or Hawaii. The amount of magmatic heat energy in a single location may be very large and nearly inexhaustible, similar to geothermal energy. This heat can be extracted and conducted using GEPs 10 and technology known to those of skill in the art.

Electrical energy is yet another source of heat energy that can be accessed using GEPs 10. Electrical energy transmission result in heat generation, due to the resistance of the transmission medium. High capacity electrical wires may have high levels of heat energy (elevated temperatures) that GEPs may conduct and extract. Electrical substations contain transformers that give off high levels of heat to the atmosphere. Instead of wasting that heat energy, GEPs 10 according to the present invention can conduct and extract the heat energy for additional use.

The GEPs 10 according to the present invention can include a variety of configurations that can be placed in contact with a heat source for conducting heat energy away from the heat source. In one embodiment, a conduit 14 is used. The conduit 14 can be of a variety of types, such as but not limited to pipe, wire, cable, beams, or rods. The conduit 14 can be continuous or segmented. Continuous conduit 14 may be in a variety of forms such as wire or an extrusion. Continuous conduit 14 does not require intermediate fasteners, and as a result may be used in situations where such fasteners are undesirable.

The graphene 12 that is adjustably affixed to the conduit 14, or substrate using a variety of techniques known to those of skill in the art. For example, in one embodiment, adhesives are used to attach the graphene 12 to the conduit 14. The graphene 12 can then be layered onto the conduit 14 to create additional energy conductive capacity beyond a single layer of graphene 12. In another preferred embodiment, layers of graphene 12 are placed in direct contact with one another. Once the desired number of layers has been reached, the combined layers of graphene 12 can be covered with an adhesive, sealant, or other protective covering known to those of skill in the art.

In use, for example, a continuous undersea cable constructed of GEPs 10 can be connected to a heat energy source 32 and deposited onto the sea bottom as is known by those of skill in the art until the destination is reached. Due to the distance required, a

continuous GEP 10 can be manufactured on a large scale, enabling rapid deployment the sea bottom without concerns relating to joining sections that are then exposed to the sea and also difficult to access and inspect.

A segmented conduit (not shown) may be joined in a variety of ways, as is known by those of skill in the art. For example, in use, on existing oil well drilling equipment, a geothermal well may be sunk using GEPs 10. The pipe sections can either be pre-threaded or can be threaded into one another as they descend into the well bore. Similarly, pipe sections may be laid in excavated trenches near the surface. These pipe sections may be of a variety of lengths and types including curves, junctions, or straight sections.

In another embodiment, a bundle of cables or wires, all formed of graphene, may be used. Each cable or wire is a GEP 10, and combined they provide additional surface area and strength that is desirable in some situations. Additionally, a large cable bundle can be modified over its length, splitting away portions of the bundle to conduct heat energy as desired. In one embodiment, it is known by those of skill in the art that high voltage electrical wires generate heat due to the resistance of the wire material, such as steel. By using GEP 10 high voltage wires, the heat energy present in the high voltage wire bundle may be extracted and conducted for use, rather than losing the heat energy to the atmosphere. Alternatively, the wires can be covered or surrounded by GEPs 10 to conduct heat.

In another embodiment, graphene may be applied to flat surfaces to form the GEP 10, including but not limited to road surfaces, walls, floors, or any other flat surface. For example, encasing graphene between two flat substrates can provide a structure that not only has many additional uses, but also can conduct heat and/or electricity very efficiently due to the properties of graphene. A wall panel including graphene is the GEP 10 and can conduct heat to a radiator attached to the wall panel. The wall panel can also include electrical outlets connected to graphene to receive electricity conducted by the GEP 10. The electrical outlet can also include devices such as transformers for processing electrical energy conducted by the GEP 10, such as but not limited to converting direct current (DC) to alternating current (AC).

As stated above, a roadway or other transportation surface can be a GEP 10. A GEP 10 according to the present invention included in a roadway can conduct heat energy that can be used to melt snow and ice. Additionally, electricity can be conducted by the

graphene to power devices included in the roadway or beyond, such as but not limited to lights, signs or other devices. For example, the roadway can extend to a structure, such as a house or office building. The GEP 10 of the roadway is connected to the structure. A device within the structure extracts the energy conducted by the GEPs 10. The heat is used within the structure for climate control, hot water, cooking, cleaning, or other uses known to those in the art. Electricity is used within the structure for lighting, operating electrically powered devices, charging batteries, or other uses known to those of skill in the art.

In another embodiment, shown in Figure 3, a utility tunnel 20 houses several GEPs 10', 10'', 10'''. The GEP 10' includes a core of graphene 12' surrounded by a protective covering 16. The graphene 12' within the GEP 10' can be arranged in a variety of ways. For example, the graphene 12' can be layered in a concentric pattern, a series of planar or generally planar layers, or a spiral pattern. Additional patterns and arrangements of graphene 12' can be included in the GEP 10', known to those of skill in the art. The graphene 12' can also be arranged in a plurality of individual cables, encased within protective covering 16. The protective covering 16 can be made of a variety of materials known to those of skill in the art. For example, the covering 16 can be a polymer wrap.

The GEP 10'' includes alternating layers of graphene 12'' and covering/substrate 16'. The graphene 10'' can be arranged in a variety of patterns and layers, such as but not limited to those listed above. In one embodiment, the graphene 10'' can be used to conduct heat energy in different directions. The energy could be from different sources, such as but not limited to a geothermal energy source and a solar energy source. Alternatively, the graphene 12'' can conduct heat in the same direction, but at different temperature (energy) levels. For example, one layer of graphene 12'' can conduct high levels of heat energy used in industrial applications, electricity generation, or large scale energy demand. Another layer of graphene 12'' can conduct heat at a lower temperature for climate control, hot water generation, cooking, or other uses of heat energy known to those of skill in the art. The substrate 16' forms the outer layer of GEP 10'', as well as an interior layer separating the layers of graphene 12''. The substrate can be formed of a variety of materials known to those of skill in the art, such as but not limited to plastics, composites, and carbon fiber.

The GEP 10''' includes layers of graphene 12''' surrounding a substrate 16''. The layers of graphene 12''' can be arranged in a number of ways, such as those described

above or others known to those of skill in the art. The substrate 16'' provides support for the layers of graphene 12''' and can be constructed of a variety of materials, such as polymers, carbon fiber, fiberglass or other materials known to those of skill in the art.

The GEPs 10', 10'', 10''' are supported within the tunnel 20 by internal supports 18. The supports 18 can include a variety of components, such as vertical and horizontal supports. These supports 18 can be constructed of a variety of materials, such as steel, and can include additional uses separate from supporting GEPs 10', 10'', 10'''. Among these uses are for a service walkway for technicians to use while in the tunnel 20. Connections to other GEPs 10 can be made within the tunnel. For example, a GEP 10 from a heat energy source 32 can enter the tunnel and connect to a GEP 10 such as GEPs 10', 10'', 10'''. Similarly, other GEPs 10 connected to energy destinations can also enter the tunnel 20, such as but not limited to residential structures, factories, refineries, schools, hospitals, transportation structures, agricultural facilities, food production plants, and government buildings.

The tunnel 20 can also include additional shapes and structures, not limited to those shown in Figure 3. Other tunnels can intersect the tunnel 20 at various angles, forming structures similar to the letter "T", "X", or other shapes known to those of skill in the art. The size of tunnel 20 is also exemplary and not limiting. Some tunnels can be too small for a human to enter and others can be much larger, such as a vehicle-sized tunnel. An example of a small tunnel 20 can be a diameter of approximately 1 meter or less. An example of a large tunnel 40 can be a diameter of approximately 10 meters, such as a railway tunnel or subway. A portion of a large tunnel 20 can be reserved for GEPs 10', 10'', 10''' while other portions can be used for vehicular traffic, such as train, car, truck and pedestrian traffic.

The heat energy extracted through the GEPs 10 can be transported using a distribution system 30. The distribution system 30 can include a variety of components, including the control systems 31, GEPs 10, and other devices known to those of skill in the art.

The control systems 31 perform numerous functions in the operation of the distribution systems 30. The control systems 31 can include a computer with installed software and devices to send and receive electrical signals. The control systems 31 can also include display devices, such as a monitor, to provide information about the operation of the distribution systems 31. The control systems 31 can also include input/output devices,

such as a keyboard, buttons, a touch-sensitive display or other devices known to those of skill in the art. The control systems 31 can include communications devices, such as but not limited to internet modems, wireless internet devices, or radio communications devices. The control systems 31 can also include devices to operate other components of the distribution systems 30, such as but not limited to the regulator, manifold, or other equipment known to those of skill in the art.

The computer of the control systems 31 receives information and signals regarding the operation of the distribution systems 30. The amount of heat energy distributed by the distribution systems 30 is measured and controlled by the computer software. Sensors connected to the GEPs 10 measure the amount of heat energy and transmit electrical signals to the computer. The software interprets these signals and converts them to numerical values. These values are compared to the software requirements. These requirements can be preset in the software or they can be adjustable, depending upon the energy requirements. Additional sensors can be connected to other devices, such as but not limited to thermostats and electricity usage meters. The software monitors the temperature requirements of the destination through the signals provided by the thermostats and can adjust the flow of energy to the devices that provide heat energy to the at least one destination, such as forced air heating units. The software monitors the electrical requirements of the destinations through signals provided by the electricity usage meters and can adjust the flow of energy to the devices that provide electrical energy to the at least one destination, such as thermoelectric generators.

The control systems 31 can include display devices, such as but not limited to a video monitor. The display devices can provide visual information about the conditions and operation of the distribution system 30. The amount of energy available from the GEPs 10 can be displayed, for example. Other information can also be displayed such as but not limited to the percentage of heat energy used for heating the at least one destination, heating hot water used for cooking and food preparation, or converted to electricity. The display devices may be combined with other controls, such as input/output devices allowing an operator to touch the monitor to operate software generated controls on the display.

The control systems 31 can include input/output devices in addition to, or in conjunction with any display devices. The input/output devices can be of a number of types, such as buttons, dials, switches, or other types known to those of skill in the art. The

input/output devices can control a number of operational modes of the distribution systems 30, such as directing energy to a particular device, such as a thermoelectric generator. The control provided the input/output devices can be regulated by the computer software. The software may prevent a user from using an input/output device to damage the distribution systems 30 or other devices and systems receiving energy from the distribution systems 30. The software may also be overridden by external control, such as by a utility operating company.

The control systems 31 can include communications devices, such as but not limited to Internet, wireless Internet, radio, or satellite devices. The control systems 31 can receive data and instructions through the communication devices. The computer software can receive firmware upgrades, updates, antivirus scans, and other instructions known to those of skill in the art. The owner or operator of the distribution systems 30 can use the communication devices to access the control systems 31, to monitor its operation and current status, and to modify its operational parameters. For example, a utility that may control the distribution system 30 can direct the distribution system 30 to reduce the amount of energy received through the GEPs 10 depending upon the demands of the larger network, or due to other reasons, such as maintenance or repairs. The operator that may control the distribution systems 30 can use the internet or other communications device to access the control systems 31. For example, if the distribution systems 30 are installed in a residential home, the operator may be the homeowner. Using the Internet the homeowner can monitor the energy usage of the home, whether it is heat energy for climate control, electricity generation, or other uses. The homeowner can then adjust the distribution systems 30 remotely, raising the interior temperature prior to arrival for example. The homeowner can also determine if any faults are present in the distribution system 30, by using the diagnostics included in the control system software. In the event of a hot water leak, the hot water heater will be continually supplied with cold water, requiring more energy than during normal operation.

The control systems 31 can include a variety of sensors, such as but not limited to temperature, energy flow, or energy consumption. The control system 31 monitors these sensors to determine the current status of the distribution system 30, changes in system demand, or other parameters known to those of skill in the art. The sensors can be placed throughout the control system 31, such as on the GEPs 10 connected to various energy

converting devices, such as but not limited to thermoelectric generators, heat exchangers, boilers, or turbines. Additional sensors can be placed at the output of the energy converting devices, to measure their efficiency in converting the heat energy into other forms of energy.

In one embodiment, the control system 31 distributes heat energy at a residential home 34. The control system 31 is connected to the home's thermostat. The home 34 is connected to a GEP 10, such as a conduit, that conducts heat energy into to the home 34. For example, the conduit can enter the home 34 through an underground connection into a basement or crawlspace. The conduit is connected to a heat exchanger located within the home 34. The heat exchanger can be of a number of types, such as a forced air heating unit or a boiler. Alternatively, a thermoelectric generator can be installed in place of or in conjunction with the heat exchanger for heating the home 34 using electric heating elements throughout the room. The control system 31 determines the energy needs of the home 34 through measurements taken by the thermostat and permits the desired amount of heat energy to pass through to the heat exchanger, boiler, and/or thermoelectric generator. Any additional heat not required by the home 34 can be directed back through the GEP 10 to another destination. Alternatively, the additional heat can also be directed to additional uses, such as the heating of the home 34 sidewalk and driveway for snow removal.

In another embodiment, the control system 31 distributes heat energy within a home 34 to multiple destinations. The home 34 is connected to a GEP 10 that brings heat energy into the home 34. Once within the home 34, the GEP 10 divides and each subdivided GEP 10 runs to a different destination within the home 34. For example, one subdivided GEP 10 can run to the home's hot water heater 50. Heat conducted through the GEP 10 is used to maintain a supply of hot water for the home 34. The heat can be conducted to the water through a heat exchanger or through a number of techniques known to those of skill in the art. Another GEP 10 can run to the kitchen where the heat energy can be used for food preparation. A cooking surface, such as a grill can receive the heat conducted through the GEP 10 by heat transfer. Other food preparation devices can also receive the heat energy such as but not limited to an oil fryer, oven, coffee/tea maker, dish washer, toaster, or other devices known to those of skill in the art.

In another embodiment, the control system 31 distributes heat energy within an industrial plant for commercial use. The GEP 10 extends from the point of entry into the plant to devices and machinery that require heat energy. Heat can be transferred from the GEP 10 by heat transfer, heat exchangers, or other techniques known to those of skill in the art. For example, an industrial oven utilizing a heating element can receive the heat energy from the GEP 10 and utilize the heat energy for industrial purposes, such as curing or drying materials or products. Heat can be exchanged into a fluid for the purposes of distillation. Plastic molding equipment can utilize the heat energy conducted through the GEP 10 to maintain a desired temperature in the plastic molds. The heat energy can be used for industrial scale food preparation, such as pasteurization or sterilization.

The control system 31 can include a regulator for limiting the amount of heat energy that is received through the GEP 10. The regulator can be a valve, switch, or other type of adjustably limiting device as known by those of skill in the art. The regulator may be operated by the control unit directly, based upon parameters in the system software. Alternatively, the regulator may be operated remotely, by a central utility or other authorized user.

The control system 31 can include a manifold for dividing and distributing heat energy received from GEPs 10. Generally, a manifold is a chamber or pipe with a number of inlets and outlets that is used to collect or distribute a fluid. In the present invention, the manifold collects or distributes heat energy conducted through the GEP 10. The manifold may include one or more layers of graphene that are in contact with GEPs 10 conducting heat from a heat source 32. The manifold divides the heat energy received into multiple outlets that are connected to additional GEPs 10 to transfer the heat energy. The outlets may be of a variety of types adapted to accept GEPs 10, wires, pipes, cables or other products known to those of skill in the art.

Heat is extracted through the GEPs 10 using a variety of systems. In one embodiment, a heat exchanger extracts heat energy through the GEPs 10 and transfers it to another medium. One example of a liquid medium to receive heat energy from a heat exchanger is water. Heated water can be used for a variety of purposes, such as steam production or other purposes known to those of skill in the art. Steam can be used to turn a turbine which can be used for electricity generation or other purposes known to those of skill in the art. One example of a solid medium to receive heat energy is polymer beads.

These beads can be heated to their melting point for use in an injection molding machine, or other uses known to those of skill in the art. A thermocouple or thermocouple array can convert heat energy from GEPs 10 into electrical energy through processes known by those of skill in the art.

Residential structures 34, educational structures 36, medical facilities 38, office buildings 40, shopping centers 42, factories 44, and water/waste treatment plants 46 can all utilize heated energy conducted and distributed by the GEPs 10 in a variety of ways such as but not limited to the following. The heat energy can be used for interior climate control. The heat energy can be used to heat water for use in cleaning, bathing, and food preparation. The heat energy can be used to generate electricity, including main power, emergency power or supplemental power. The heat energy can be used in distillation devices and equipment. The heat energy can also be used for industrial machinery such as but not limited to ovens, presses, or foundries. The heat energy can also be used to heat surfaces, such as roadways, driveways, or sidewalks. The heat energy can be used for recreational purposes, such as swimming pools or saunas. The heat energy can be used for food preparation, such as grills, ovens, or oil fryers.

Referring now to Figure 6, in another preferred embodiment, distribution system 30" includes at least one GEP 10 connected to at least one heat energy source 32. The GEP 10 enters through a wall of the structure 33, but in other embodiments, the GEP 10 can enter the structure 33 through a floor, roof, or other surface known to those of skill in the art. The GEP 10 is connected to control system 31 that controls the distribution of heat energy received through the GEP 10 and is described in further detail below. At least one GEP 10 is connected to control system 31 for the distribution of heat energy inside the structure 33. The GEP 10 can be connected to a plurality of devices and systems, such as but not limited to hot water heater 50, climate control system 52, food preparation devices 54, water treatment system 46, electricity generation system 56, and heated surfaces 58 such but not limited to a walkway or driveway.

The hot water heater 50 receives heat energy from the GEP 10. Heat is transferred from the GEP 10 to the water stored within the hot water heater 50, increasing the temperature of the water. The hot water heater 50 can include a thermostat control that can operate in coordination with the control system 31 to heat the water stored within the heater 50 to a predetermined temperature which is distributed throughout the structure 33

by a network of pipes. Alternatively, the control system 31 can directly distribute a sufficient amount of heat energy to the hot water heater 50, eliminating a thermostat from the hot water heater 50. In still another embodiment, multiple hot water heaters 50 are present within the structure 33. This type of water heater 50 is commonly known as point-of-use water heater. Rather than a central hot water heater, water is heated near to the point-of-use, such as a sink or bathtub. In this embodiment, the GEPs 10 extend throughout the structure 33, to hot water heaters 50 located near to the point-of-use. Heat is transferred to each hot water heater 50 as needed.

The climate control system 52 also receives heat energy from the GEP 10. Heat is transferred from a heat exchanger to another medium, such as air or water. In one embodiment, air is forced through the heat exchanger, causing its temperature to increase. The heated air is then blown through ductwork throughout the structure 33, raising the temperature of its interior spaces. In another embodiment, water is circulated around the heat exchanger, removing heat which is then circulated throughout the structure 33. Radiators located throughout the structure 33 assist in the transfer of heat from the water to the air in the structure's interior spaces.

The food preparation devices 54 also receive heat energy from the GEP 10. Heat is transferred from the GEP 10 to a variety of food preparation devices, such as ovens, grills, or cooktops. Water treatment system 46 also receives heat energy from the GEP 10. Heat is transferred from the GEP 10 to components of the water treatment system 46 that can receive heat energy, such as a distillation device. In one embodiment, water is drawn into the distillation device of water treatment system 46. The water is heated resulting in steam which is later condensed into liquid. The liquid is then supplied throughout the structure 33 for consumption.

The electricity generation system 56 also receives heat energy from the GEP 10. Thermoelectric generators convert heat energy received from the GEP 10. The electricity can be converted or conditioned by electricity generation system 56 in a variety of ways known to those of skill in the art. In one embodiment, DC current is converted into AC current which is then supplied throughout structure 33. In another embodiment, the electricity generation system 56 has a variety of modes, including but not limited to supplying full electrical power to the structure 33, supplying partial power to the structure 33, or supplying backup power to the structure 33.

The heated surfaces 58 also receive heat energy from the GEP 10. Heat energy is conducted through the GEP 10 to the heated surfaces 58. The heat energy radiates through the heated surfaces 58, such as concrete, asphalt, stone, or tile. As the heat radiates through the heated surfaces 58, the temperature of the heated surface 58 increases accordingly. The heated surface 58 can be located in a variety of locations in or around structure 33. For example, the heated surfaces 58 can be a sidewalk, driveway, bathroom or garage floor. The heated surfaces 58 can be used to melt snow and ice for those located outdoors.

Other aspects, embodiments, and advantages of these exemplary aspects and embodiments are discussed in detail below. This description provides illustrative examples of various aspects and embodiments of the present invention, and is intended to provide an overview or framework for understanding the nature and character of the claimed aspects and embodiments. The accompanying drawings are included to provide illustration and a further understanding of the various aspects and embodiments, and are incorporated in and constitute a part of this specification. The drawings, together with the specification, serve to explain the described and claimed aspects and embodiments.

The invention has been described in an illustrative manner, and it is to be understood that the terminology, which has been used herein, is intended to be in the nature of words of description rather than of limitation.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the described invention, the invention can be practiced otherwise than as specifically described.

CLAIMS

1. A system for distributing heat energy comprising:
 - at least one heat source;
 - at least one graphene-enriched product in contact with said heat source for conducting heat from said heat source;
 - extracting means for extracting heat through said graphene-enriched product; and
 - distribution means for distributing the heat extracted from said graphene-enriched product.
2. The system as recited in Claim 1, wherein said heat source is selected from the group consisting of geothermal, solar, nuclear, chemical, magmatic, and electrical energy supplying power facilities.
3. The system as recited in Claim 1, wherein said graphene-enriched product is a conduit.
4. The system as recited in Claim 3, wherein said graphene-enriched product includes at least one expandable segment.
5. The system as recited in Claim 3, wherein said graphene-enriched product contains at least one layer of graphene.
6. The system as recited in Claim 1, wherein said means for extracting heat is selected from the group consisting of a heat exchanger, boiler, turbine, and a thermoelectric generator.
7. A system for distributing geothermal heat energy comprising:
 - a geothermal heat source;
 - at least one graphene-enriched product in contact with said heat source;
 - extraction means for extracting heat from said graphene-enriched product; and
 - distribution means for distributing the heat extracted by said graphene-enriched product.
8. A system for distributing heat energy, said system comprising:
 - at least one heat source;
 - a first graphene-enriched product in contact with said heat source;
 - a control system adjustably connected to said graphene-enriched product for selectively receiving heat energy from said graphene-enriched product;
 - a second graphene-enriched product adjustably connected to said control system for distributing the heat energy received by said control system.
9. A system for extracting and distributing heat energy, said system comprising:
 - at least one heat source;
 - at least one graphene-enriched conduit in thermal contact with said heat source for conducting heat from said heat source;

a heat receiving device connected to said conduit for receiving heat energy conducted by said conduit.

10. The system as recited in Claim 9, wherein said at least one heat source is selected from the group consisting of geothermal, solar, nuclear, chemical, magmatic, and electrical.
11. The system as recited in Claim 9, wherein said conduit further includes at least one layer of graphene-enriched materials.
12. The system as recited in Claim 11, wherein said conduit further includes a plurality of layers of graphene-enriched materials.
13. The system as recited in Claim 11, wherein said conduit further includes a plurality of adjustably joinable segments.
14. The system as recited in Claim 11, wherein said conduit is continuous.
15. The system as recited in Claim 9, wherein said heat receiving device distributes heat energy conducted by said conduit to at least one destination using graphene-enriched conduit.
16. The system as recited in Claim 9, wherein said heat receiving device converts the heat energy into another form of energy selected from the group consisting of electricity, steam, mechanical, potential, kinetic, elastic, conduction, convection, chemical, nuclear, and incandescence.
17. A method of extracting and distributing heat energy from a geothermal source using graphene enriched products comprising the steps of:
 - affixing graphene to a substrate;
 - inserting the substrate into a geothermal well;
 - connecting the substrate to a heat energy receiving device to transport heat;
 - regulating the heat energy extracted from the geothermal source using a control system;
 - distributing the heat energy to a network of graphene enriched products; and
 - delivering heat energy to a plurality of heat utilizing sources.
18. The method as recited in Claim 17, further comprising applying a plurality of graphene layers to a substrate.
19. The method as recited in Claim 17, further including assembling the substrate from a plurality of adjustably connected segments.
20. The method as recited in Claim 17, further including using a manifold controlled by the control system to distribute the heat energy to the network.