CLAIMS

1. A method of estimating a characteristic (Q_n', Q_l') of a load of liquefied natural gas being transported by a tanker at any point on a route (401, P; 501, 502, 503), characterized in that the estimation is made by integrating, over the route (410, 411, 412, 420; 510, 511, 512) from a reference point (400, P; 500) at which said characteristic is known (Q_n, Q_l), a relationship associating the instantaneous transformation of the load with instantaneous navigation conditions.

2. A method according to claim 1, wherein said point of the route is the point where the tanker reaches its delivery terminal (401; 501, 502, 503) or a point along the route where it is necessary to select between two itineraries (P).

3. A method according to claim 1 or claim 2, wherein the route comprises an intended route (410, 411, 412; 510, 511, 512) and the relationship is used on the basis of predicted values for the instantaneous navigation conditions.

4. A method according to any one of claims 1 to 3, wherein the route comprises a route that has been followed (420) and the relationship is used on the basis of values recorded on that route for the instantaneous navigation conditions.

5. A method according to any one of claims 1 to 4, wherein the instantaneous navigation conditions comprise the speed of the tanker or the state of the sea or the state of the atmosphere along the route.

6. A method according to any one of claims 1 to 5, wherein the reference point (400; 500) is the loading terminal of the tanker.

7. A method according to any one of claims 1 to 6, wherein the characteristic of the transported gas comprises the composition of the liquefied gas, the temperature of the liquefied gas, the proportion or quantity of gas that has evaporated since loading, a quality of the liquefied gas, or a quantity of liquefied gas that remains.

8. A method according to any one of claims 1 to 7, wherein the relationship supplies the quantity (Q_n) and the composition (Q_1) of the gas that has evaporated.

9. A method according to any one of claims 1 to 8, wherein the relationship takes account of the characteristics of the tanks of the methane tanker.

10. A method according to any one of claims 1 to 9, wherein estimates are made for a plurality of possible destinations (501, 502, 503) and a comparison is made between those iterations of the market values of the transported gas as calculated for the respective possible destinations, in order to select the destination that is the most lucrative for the load.

11. A device for estimating a characteristic of a load of liquefied natural gas being transported by a tanker, which device has characterization means for characterizing the state of the gas being transported by a tanker as a function of the route of the tanker, the device being characterized in that the characterization means make use of a relationship associating the instantaneous evaporation of the liquefied gas with instantaneous navigation conditions.

CLAIMS

1. A computer-implemented method of estimating characteristics (Q_n', Q_l') of a load of liquefied natural gas being or intended to be transported by a tanker along a route, wherein the characteristics comprise a composition of the liquefied natural gas and a quantity of the liquefied natural gas at an estimation point on the route (401, P; 501, 502, 503), characterized in that the method comprises:

extracting (1100) from an experience database a relationship associating an instantaneous transformation of the composition and quantity of the liquefied natural gas with instantaneous navigation conditions, wherein the instantaneous transformation of the composition and quantity of the liquefied natural gas is caused by evaporation and formation of boil-off gas, wherein the instantaneous navigation conditions comprise a state of the sea, a speed of advance of the tanker and a state of the atmosphere, and

integrating, over the route (410, 411, 412, 420; 510, 511, 512) from a reference point (400, P; 500) at which said characteristics are known (Q_n, Q_l) to the estimation point, the relationship associating the instantaneous transformation of the composition and quantity of the liquefied natural gas with the instantaneous navigation conditions, wherein the integrating is performed as a function of instantaneous navigation conditions along the route from the reference point to the estimation point, to obtain an estimate of the composition and of the quantity of liquefied natural gas at the estimation point.

2. A method according to claim 1, wherein said estimation point is a point where the tanker reaches a delivery terminal (401; 501, 502, 503) or a point along

the route where it is necessary to select between at least two itineraries (P).

3. A method according to claim 1 or claim 2, wherein the route comprises an intended route (410, 411, 412; 510, 511, 512) and the integrating is performed on the basis of predicted values for the instantaneous navigation conditions.

4. A method according to any one of claims 1 to 3, wherein the route comprises a route that has been followed (420) and the integrating is performed on the basis of values recorded on that route for the instantaneous navigation conditions.

5. A method according to any one of claims 1 to 4, wherein the reference point (400; 500) is a loading terminal of the tanker.

6. A method according to any one of claims 1 to 5, wherein the characteristics of the transported gas further comprise the temperature of the liquefied gas, or a proportion or quantity of gas that has evaporated since loading.

7. A method according to any one of claims 1 to 6, wherein the relationship further supplies a quantity (Q_n) and a composition (Q_l) of the gas that has evaporated.

8. A method according to any one of claims 1 to 7, wherein the relationship takes account of characteristics of a tank of the tanker, wherein the characteristics are selected in a group consisting of a storage capacity and an insulation system.

9. A method according to any one of claims 1 to 8, further comprising:

selecting a plurality of possible destinations (501, 502, 503) and a plurality of potential routes respectively leading to all said possible destinations,

integrating, over each said potential route (510, 511, 512) from the reference point (400, P; 500) at which said characteristics are known (Q_n, Q_l) to the possible destination that said potential route leads to, the relationship associating the instantaneous transformation of the composition and quantity of the liquefied natural gas with the instantaneous navigation conditions, wherein the integrating is performed as a function of instantaneous navigation conditions along the potential route from the reference point to the possible destination that said potential route leads to, to obtain an estimate of the composition and of the quantity of liquefied natural gas at each of the possible destinations,

calculating a market value of the load of liquefied natural gas for each possible destination as a function of the estimate of the composition and of the quantity of liquefied natural gas at the possible destination, and

making a comparison between the market values , in order to select a destination that is the most lucrative for the load of liquefied natural gas among the possible destinations.

10. A method according to any one of claims 1 to 8, further comprising:

selecting a plurality of potential routes (410, 411, 412) leading to a port (401),

integrating, over each said potential route (410, 411, 412) from the reference point (400, P; 500) at which said characteristics are known (Q_n, Q_l) to the port (401), the relationship associating the instantaneous transformation of the composition and quantity of the liquefied natural gas with the instantaneous navigation conditions, wherein the integrating is performed as a

function of instantaneous navigation conditions along the potential route from the reference point to the port (401), to obtain an estimate of the composition and of the quantity of liquefied natural gas at the port for each said potential route (410, 411, 412),

selecting a route that provides a best estimated composition and/or a greatest estimated quantity of liquefied natural gas among said potential routes.

11. A method according to any one of claims 1 to 10, further comprising:

building up (1000) the experience database by collecting values of measured parameters at successive instants in time during one or more voyages of one or more tankers, wherein the tanker is fitted with sensors and recorders for measuring said parameters, wherein the measured parameters are selected among a quantity of the evaporated gas in the tanker, a composition of the evaporated gas in the tanker, a rate of evaporation in the tanker, a state of the sea, a height of waves, a period of waves, a direction of waves, a speed of the tanker, and a temperature of the sea or the wind.

12. A method according to claim 11, wherein the relationship associating an instantaneous transformation of the composition and quantity of the liquefied natural gas with instantaneous navigation conditions is extracted (1100) from the experience database by using a statistical correlation approach to associate the quantity and the composition of the remaining LNG and of the evaporated gas with parameters constituted by a state of the sea, characteristics of the tanker, speed of advance of the tanker, weather conditions and the nature of the LNG initially taken on board.

13. A computer-implemented device for estimating characteristics of a load of liquefied natural gas being

or intended to be transported by a tanker along a route, wherein the characteristics comprise a composition of the liquefied natural gas and a quantity of the liquefied natural gas at an estimation point on the route (401, P; 501, 502, 503), which device has characterization means for characterizing a state of the liquefied natural gas being or intended to be transported by a tanker as a function of the route of the tanker, the device being characterized in that the characterization meansare configured to:

integrate, over the route (410, 411, 412, 420; 510, 511, 512) from a reference point (400, P; 500) at which said characteristics are known (Q_n, Q_l) to the estimation point, a relationship associating an instantaneous transformation of the composition and quantity of the liquefied natural gas with instantaneous navigation conditions, wherein the instantaneous transformation of the composition and quantity of the liquefied natural gas is caused by evaporation of the liquefied gas, wherein the integrating is performed as a function of instantaneous navigation conditions along the route from the reference point to the estimation point, to obtain an estimate of the composition and of the quantity of liquefied natural gas at the estimation point.

14. A computer-implemented device according to claim 13, wherein the relationship associating an instantaneous transformation of the composition and quantity of the liquefied natural gas with instantaneous navigation conditions is extracted from an experience database.