

(19)



(11)

EP 2 509 039 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

10.10.2012 Bulletin 2012/41

(51) Int Cl.:

G06Q 30/00 (2012.01)

G06Q 50/00 (2012.01)

G07F 15/00 (2006.01)

(21) Application number: **11305391.2**

(22) Date of filing: **05.04.2011**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA ME

(71) Applicant: **Alcatel Lucent**

75007 Paris (FR)

(72) Inventors:

- **Stocker, Klaus**
70567, Stuttgart (DE)
- **Kopp, Dieter**
75428, Illingen (DE)

(74) Representative: **Wetzel, Emmanuelle et al**

Alcatel-Lucent Deutschland AG
Intellectual Property & Corporate Standards
Lorenzstrasse 10
70435 Stuttgart (DE)

(54) **Method of trading a commodity**

(57) Method of trading a commodity comprising the steps of receiving an offer from a generator, receiving a bid from a consumer, authenticating the offer and the bid by means of a digital signature, and matching the offer to the bid.

EP 2 509 039 A1

Description

Background

[0001] This section introduces aspects that may be helpful in facilitating a better understanding of the invention. Accordingly, the statements of this section are to be read in this light and are not to be understood as admissions about what is in the prior art or what is not in the prior art.

[0002] In economic terms, electricity is a commodity capable of being bought, sold, and traded. An electricity market is a system for effecting purchases, through bids to buy; sales, through offers to sell; and short-term trades, generally in the form of financial or obligation swaps. Bids and offers use supply and demand principles to set the price. Long-term trades are contracts similar to power purchase agreements and generally considered private bi-lateral transactions between counterparties.

[0003] The commodities within an electricity market generally consist of two types: power and energy. Power is the metered net electrical transfer rate at any given moment and is measured in kilowatts (kW) or megawatts (MW). Energy is electricity that flows through a metered point for a given period and is measured in kilowatt hours (kWh) or megawatt hours (MWh).

[0004] Wholesale transactions, including bids and offers, in electricity are typically cleared and settled by a market operator or a special-purpose independent entity charged exclusively with that function. Market operators typically do not clear trades but often require knowledge of the trade in order to maintain generation and load balance. An example of an established market operator is the European Energy Exchange (EEX), which also provides an intraday market.

[0005] A downside of these conventional energy exchanges lies in their limitation to a comparatively small number of market participants. As a consequence, they are generally targeted at electricity retailers as opposed to end-use customers.

Summary

[0006] The present invention was made in view of the prior art described above, and the object of some embodiments is to provide a practical method capable of trading a commodity.

[0007] According to an embodiment there is provided a method of trading a commodity comprising the steps of receiving an offer from a generator, receiving a bid from a consumer, authenticating the offer and the bid by means of a digital signature, and matching the offer to the bid.

Description of the Embodiments

[0008] Hereinafter, the best mode for carrying out a method according to an embodiment is described in de-

tail.

[0009] In the embodiment at hand, the commodity traded is an energy commodity such as electricity, natural gas, oil, or coal. Among these sources of energy, electricity poses the particular challenge of being impossible or uneconomical to store and hence needing to be consumed as soon as it is produced. It is nevertheless noted that the method may be applied to any other commodity, meaning any good for which there is demand, but which is supplied without qualitative differentiation across a market. Herein, the term "good" is meant to encompass intangible assets such as emission allowances.

[0010] In the present embodiment, the steps of the method are carried out by the operator of an energy market comprising as participants at least one generator and one consumer.

[0011] In an optional preliminary step, the generator and consumer take measurements of the energy generated and consumed, respectively. To this end, the consumer would be equipped with an energy meter, that is, a device that measures the amount of energy consumed by a residence, business, or suitably powered device. In the case of electrical energy, the energy meter is commonly called an electric meter. To simplify the process of result reporting to the utility and energy market operator, the energy meter supports automated meter reading (AMR), that is, a technology of automatically collecting consumption, diagnostic, or status data and transferring that data to a central database for billing, troubleshooting, or analyzing. To provide for a sufficiently fine-grained consumption recording, the meter employed preferably takes the form of a smart meter, communicating the aforementioned data at least on a daily basis.

[0012] In a first processing step, the market operator receives an offer from the generator. To bind the latter's identity to an associated public key, the market operator receives a public key certificate, also known as a digital certificate or identity certificate, along with the offer. To this end, the market operator and generator make use of a public key infrastructure (PKI), that is, a set of hardware, software, people, policies, and procedures needed to create, manage, distribute, use, store, and revoke digital certificates.

[0013] As an example, the generator may offer a fixed amount of energy, expressed in a suitable measurement unit such as kWh or MWh, for consumption during an arbitrary time interval. As an alternative, the generator may offer an arbitrary amount of energy over a fixed time interval, such as one hour, 15 minutes, one minute, or one second. To cater for complex consumption patterns, any combination of these parameters can be conceived.

[0014] To establish an appropriate baseline for settlement, the offer comprises an ask price. In financial economics, ask price, also called offer price, asking price, or simply ask, is a price a seller of a good is willing to accept for that particular good.

[0015] In a second processing step, the market operator receives a bid from a consumer. Similar to the offer,

the bid may comprise a bid price, that is, the highest price that the consumer is willing to pay for the good.

[0016] In a third processing step, the market operator authenticates the offer and the bid by means of a digital signature. In cryptography, a digital signature or digital signature scheme is a mathematical scheme for demonstrating the authenticity of a digital message or document. A valid digital signature gives a recipient reason to believe that the message was created by a known sender, and that it was not altered in transit. Digital signatures are commonly used for software distribution, financial transactions, and in other cases where it is important to detect forgery or tampering.

[0017] To protect their confidentiality in addition to their authenticity, both offer and bid are preferably encrypted by the generator and consumer, respectively, prior to transit and decrypted accordingly upon receipt by the market operator. In cryptography, encryption is the process of transforming information referred to as plaintext using an algorithm called cipher to make it unreadable to anyone except those possessing special knowledge, usually referred to as a key.

[0018] In a fourth processing step, the energy market operator matches the offer to the bid, typically taking into account intrinsic properties of an underlying energy distribution network, also known as an electricity network in the case of electrical energy. Such properties may be based on parameters such as distribution voltage, voltage drop upon transit, load factor, or overall capacity. An advanced embodiment may also consider the configuration of the distribution network, such as radial or interconnected.

[0019] To support a large number of market participants, the energy market operator makes use of a matching algorithm known as suitably efficient and practical when applied to a large input data set. In telecommunications and software engineering, such algorithm is said to "scale", scalability being the ability of a system, network, or process, to handle growing amounts of work in a graceful manner or its ability to be enlarged to accommodate that growth. As a result of this design, the energy market operator is able to support private consumers in addition to industrial quantity buyers, thus allowing for business-to-consumer (B2C) transactions unsupported by conventional energy exchanges.

[0020] In a final step, once a settlement between generator and consumer is established, the former delivers the agreed-upon amount of energy to the latter by means of the energy distribution network.

[0021] As a particular benefit of this embodiment, it may allow for the evolution of new pricing schemes especially suited for intermittent energy sources such as wind, sun, or tide. In energy distribution, an intermittent energy source, also labeled intermittent power source in the case of electrical energy, is any source of energy that is not continuously available due to some factor outside direct control.

[0022] A person of skill in the art would readily recognize

that steps of various above-described methods can be performed by programmed computers. Herein, some embodiments are also intended to cover program storage devices, e.g., digital data storage media, which are machine or computer readable and encode machine-executable or computer-executable programs of instructions, wherein said instructions perform some or all of the steps of said above-described methods. The program storage devices may be, e.g., digital memories, magnetic storage media such as magnetic disks and magnetic tapes, hard drives, or optically readable digital data storage media. The embodiments are also intended to cover computers programmed to perform said steps of the above-described methods.

[0023] The description merely illustrates the principles of the invention. It will thus be appreciated that those skilled in the art will be able to devise various arrangements that, although not explicitly described or shown herein, embody the principles of the invention and are included within its spirit and scope. Furthermore, all examples recited herein are principally intended expressly to be only for pedagogical purposes to aid the reader in understanding the principles of the invention and the concepts contributed by the inventor(s) to furthering the art, and are to be construed as being without limitation to such specifically recited examples and conditions. Moreover, all statements herein reciting principles, aspects, and embodiments of the invention, as well as specific examples thereof, are intended to encompass equivalents thereof.

Claims

1. Method of trading a commodity comprising the steps of receiving an offer from a generator, receiving a bid from a consumer, authenticating the offer and the bid by means of a digital signature, and matching the offer to the bid.
2. Method as in claim 1 comprising the additional step of receiving a public key certificate based on the digital signature.
3. Method as in claim 2 wherein the public key certificate is received by means of a public key infrastructure.
4. Method as in any of the preceding claims wherein the commodity takes the form of energy.
5. Method as in claim 4 wherein the offer is for sale of a fixed amount of energy over an arbitrary time interval.
6. Method as in claim 5 wherein the amount of energy is expressed in kilowatt hours.

7. Method as in claim 4 wherein the offer is for sale of an arbitrary amount of energy over a fixed time interval.
8. Method as in any of claims 4 to 7 comprising the preliminary step of measuring the energy generated by the generator, wherein the offer is based on the measurement. 5
9. Method as in any of claims 4 to 8 comprising the preliminary step of further measuring the energy consumed by the consumer, wherein the bid is based on the further measurement. 10
10. Method as in claim 9 wherein the energy consumed is measured by means of a smart meter. 15
11. Method as in any of claims 4 to 10 wherein the generator and the consumer are connected by means of an energy distribution network. 20
12. Method as in claim 11 wherein the match is based on a property of the energy distribution network.
13. Method as in claim 11 or 12 comprising the subsequent step of delivering the energy from the generator to the consumer by means of the energy distribution network. 25
14. Method as in any of the preceding claims wherein the offer is encrypted, the method comprising the additional step of decrypting the offer upon reception. 30
15. Method as in any of the preceding claims wherein the bid is encrypted, the method comprising the additional step of decrypting the bid upon reception. 35

40

45

50

55



EUROPEAN SEARCH REPORT

Application Number
EP 11 30 5391

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2010/218108 A1 (CRABTREE JASON [US] ET AL) 26 August 2010 (2010-08-26) * the whole document *	1-15	INV. G06Q30/00 G06Q50/00 G07F15/00
X	EP 1 638 089 A2 (OMX TECHNOLOGY AB [SE]) 22 March 2006 (2006-03-22) * the whole document *	1-15	
A	US 2003/063723 A1 (BOOTH DEREK [US] ET AL) 3 April 2003 (2003-04-03) * the whole document *	1-15	
A	US 2010/332373 A1 (CRABTREE JASON [US] ET AL) 30 December 2010 (2010-12-30) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			G06Q G07F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 July 2011	Examiner Heselius, Per
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 30 5391

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-07-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010218108 A1	26-08-2010	NONE	
EP 1638089 A2	22-03-2006	NONE	
US 2003063723 A1	03-04-2003	CA 2465941 A1	10-04-2003
		EP 1446937 A1	18-08-2004
		MX PA04003987 A	26-07-2005
		WO 03030509 A1	10-04-2003
		US 2005240315 A1	27-10-2005
US 2010332373 A1	30-12-2010	NONE	