International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume 9 Issue 3, May-Jun 2025 Available Online: www.ijtsrd.com e-ISSN: 2456 – 6470

Internet of Energy

Paul A. Adekunte[1], Matthew N. O. Sadiku[2], Janet O. Sadiku[3]

[1]International Institute of Professional Security, Lagos, Nigeria
[2]Roy G. Perry College of Engineering, Prairie View A&M University, Prairie View, TX, USA
[3]Juliana King University, Houston, TX, USA

ABSTRACT

The Internet of Energy (IoE) or Energy Internet is a futuristic evolution of the electricity system, conceptualized as an energy-sharing network. IoE integrates small-scale renewable energy systems, electric loads, storage devices, and electric vehicles for effective transaction of power backed by emerging technologies like Internet of Things (IoT), vehicle-to-grid, and blockchain. It leverages on technologies like smart grids, big data analytics, and AI to enhance energy efficiency, reduce costs, and facilitate renewable energy integration. IoE transforms the energy sector into a network where various components communicate and cooperate to improve performance and reliability. The paper looks into the challenges, benefits, and future of Internet of Energy.

KEYWORDS: *Internet of Energy (IoE), Smart grids, Big Data analytics, blockchain, Artificial Intelligence (AI), Internet of Things (IoT), sensors*

How to cite this paper: Paul A. Adekunte | Matthew N. O. Sadiku | Janet O. Sadiku "Internet of Energy" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-9 | Issue-3, June 2025, pp.356-364, URL: www.ijtsrd.com/papers/ijtsrd79975.pdf

IJTSRD79975

INTRODUCTION

The Internet, which is sometimes called the Internet of Everything (IoT), as shown in Figures 1 to 3, is an all-inclusive term that most of us use casually, not knowing that words such as the Internet of Energy and the Internet of Things (IoT) describe specialized aspects of it [1].

The Internet of Energy (IoE) is the implementation of Internet of Things (IoT) technology into distributed energy systems to optimize the efficiency of energy infrastructure and reduce wastage [2]. This has a great impact on the power sector. The internet can be imagined as a cyber universe, of which the Internet of Energy (IoT) is a corner of that universe dedicated to all things energy-related. While the Internet of Everything encompasses how people interact with smart objects as well as one another, IoE specifically refers to the automation and upgrading of our energy infrastructure: the power grid from grid operators to energy producers and distribution utilities [1].

The IoE allows for the exchange of energy information, called Big Data, as shown in Figure 4. Big data analytics provide grid operators, energy producers, and distribution utilities with real-time energy consumption trends, allowing them to forecast where and when energy demand or energy consumption will peak. With the data provided, grid operators, who manage and track energy production and delivery, can direct adjustments in the energy supply as needed or required [1].

The IoE includes energy infrastructure in energy production and delivery by using artificial intelligence (AI) at power plants and power delivery systems. This also means upgrading and automating our appliances and metering at the point of delivery i. e at our homes. Smart meters and intelligent appliances or devices help to optimize our energy supply, energy management, and energy use. This therefore means that within the IoE, there is the smart grid technology, as shown in Figure 5, or the Internet of Things (IoT), which helps power producers and distributors monitor and deliver power on a more efficient basis. Each segment can "talk" to the others about the most energy-efficient ways to provide power from the point of power generation to your home [1[. The blockchain technology in the energy sector helps in cost reduction, as the traditional energy transactions often involve intermediaries, which adds to the overall costs, as shown in Figure 6. By eliminating the middlemen, blockchain enables direct transactions between parties, thereby reducing unnecessary fees and lowering consumer energy prices. It also facilitates more efficient systems for energy companies, and ensures security by providing a secure, unchangeable record of energy transactions, creating trust between producers and consumers [3].

HISTORICAL BACKGROUND

Some of the key milestones in IoT are as follows [4]:

- **1970s**: this was the early experiments with connected devices, such as Stanford artificial Intelligence Laboratory's computer-controlled vending machine (1972), laid the groundwork for IoT.
- **1980s**: The Carnegie Mellon University's Coca-Cola vending machine, connected to ARPANET (1982), became one of the first internt-connected appliances.
- **1990s**: The term "internet of Things" was coined independently by Kevin Ashton (1999) and Peter T. Lewis (1985). Reza Raji described the concept in IEEE Spectrum as moving small packets of data to integrate and automate everything from home appliances to factories (1994).
- **2000s**: The IoT concept gained momentum, with Cisco Systems estimating that the IoT was "born" between 2008 and 2009.

INTERNET OF THINGS

The Internet of Things (IoT) is a network of physical objects which have embedded intelligent sensors and AI software to connect and exchange data. This serves as a collection of smart devices that gather information to carry out a function, which is at times without human intervention. Some of the examples of IoT include [1]:

- Connected appliances such as a smart home's ability to turn on lights or trigger the security system.
- Wireless inventory trackers.
- Biometric cybersecurity scanners.
- Shipping containers and logistical tracking.
- Wearable health monitors e. g. FitBits, ECG monitors.

IMPORTANCE OF THE IoE

The aim of the Internet of Energy is to upgrade and automate energy production and delivery processes fully. With millions of data points to monitor, the IoE can provide energy providers, grid operators, and utilities with the necessary information to balance energy production and energy demand. The IoE will also enable the incorporation of renewable energy sources into the existing grid. As climate change is driving renewable energy development, currently there is no easy way to bring that energy into the grid on a broad scale.

The overdependence on fossil fuels in order to meet with the growing demand of energy has led to several negative outcomes, such as the depletion of natural resources, increased pollution, imminent climate change, extreme weather conditions, human sufferings, and turbulent geopolitics, leading to increased cost of production and services [5].

As fossil fuel resources diminishes, that inability brings an ever-increasing urgency to get renewable energy online. The IoE is built on the Internet of Things – devices are already in use, such as smartphones and smart speakers like Amazon's echo, Google Nest, or the Apple Home Pod, which are used to connect lighting, security systems, HVAC systems, and appliances for homes and businesses. For example, the use of Wi-Fi, smartphone, and remotes help energy consumers improve their home efficiency by managing the lights or "telling" the air conditioner when to turn on or up. When these challenges are surmounted, it will bring about greater efficiency in energy production, resulting in more reliable energy supply that will include all energy sources. It will also result to lower energy development and production costs across the industry, bringing about more affordable energy for consumers [1].

DIFFERENCE BETWEEN IoE AND IoT

Internet of Energy is built on the principles of the Internet of Things to provide people with the data necessary to optimize and manage the power grid, with the goal to increase the autonomous operation of the power grid. The use of the IoT devices, such as the smart sensors and communication technologies in the energy industry, is to create the Internet of Energy to manage energy generation and energy resources.

The IoE is a smart energy infrastructure system that incorporates the IoT to connect every point within the power grid: generation, load, distribution, storage, and smart meters. As a result, the IoE supports the power grid's ability to operate with more efficiency, resilience, and reliability. Not limited to a two-way flow of information, the IoE allows for a multi-dimensional flow of information [1].

HOW IS IoT USED IN ENERGY SYSTEMS?

The current smart grid allows grid operators to manage traditional energy generation sources, for example, from fossil fuels and hydropower, but it does not easily allow for the inclusion of renewable energy sources, such as solar power or wind power, as sown in Figures 7 to 9. However, the use of the IoT will help with improved energy data management and optimize most processes within the grid. With the drive for the development of clean energy and sustainability caused by climate change, as shown in Figure 10, the IoT will help incorporate renewable energy sources, such as wind farms and solar panel arrays into the smart grid to further expand the Internet of Energy. The ultimate goal is to ensure a sustainable and renewable energy delivered seamlessly to the point of use – smart power.

HOW IS THE INTERNET OF ENERGY USED?

The Internet of Energy (IoE) has numerous uses, with its utilization ranging from grid operations to commercial, residential, and industrial consumers. In the course of serious catastrophic events, such as fire or storm, disrupting power generation and distribution networks, the IoE is to help the grid operators manage the grid in real-time to diagnose and reroute power along different power lines.

The IoE also allows local utilities to pinpoint trouble spots within their microgrids, such as a blown transformer, and identify and communicate with affected customers. This ability to identify a trouble spot allows utilities to send repair crews where they are needed without tracking down the problem point.

On daily basis, the IoE also helps grid operators and the energy industry plan for and meet with the energy demands of residential, commercial, and industrial consumers. Real-time monitoring shows where demand increases or diminishes, and thereby allowing energy generation to be adjusted accordingly. IoE therefore means more tools to manage their energy consumption and increased energy efficiency for consumers. Smart homes need to be equipped with digital controls for lighting, heating, and appliances to help homeowners control their energy consumption using a combination of voice commands, remotes, and switches, apps, or AI [1].

FOUR PILLARS OF THE INTERNET OF ENERGY

Just like the internet, the Internet of Energy depends on four central pillars which are: people, data, things, and processes. Energy infrastructure (generators, transmission lines, pipelines, etc.) needs to be controlled by people who rely on real-time data to inform their actions. With the energy data received from various IoT technology points, the people involved in the energy industry can make informed decisions about the processes they manage [1].

HOW THE INTERNET OF ENERGY WORKS

The Internet of Energy makes use of IoT technology to collect or gather data and manage operations at many points in the power grid's infrastructure. Sensors within the energy industry's IoT support the diagnostic, analytical, optimization, and integration processes. The result is increased energy efficiency for the energy sector players and residential, commercial, and industrial buildings and plants.

The smart meters such as those we use in our homes or businesses, are the examples of how the IoE works. Smart meters make use of two wireless networks to communicate with the utility company. The Home Area Network (HAN) connects your appliances and lights to the meter itself, while the Wide Area Network (WAN) submits the data to the utility. Gas and electric utilities make use of smart meters. Similar information from neighbouring homes and businesses helps your utility determine real-time energy demand in your area. Communicating data upline, power utilities can adjust power generation and get power from other power systems on the power grid, if necessary, because of data exchanges happening throughout the IoE [1].

PURPOSES OF THE IoE

The Internet of Energy is to optimize efficiency in the generation, transmission, and utilization of electricity through the digital tools that are the Internet of Things: sensors, actuators, computers, etc. As a result, energy optimization will reduce costs and increase reliability in delivering power to homes and businesses. Additionally, it will help to eliminate wasted power generation by informing energy producers when the systems are at peak capacity or in low demand. The operators too can direct excess energy to energy storage in the form of complex battery arrays, which hold power in reserve for a time when energy demand increases or to balance energy loads [1].

SOURCES OF INTERNET OF ENERGY

Since the IoE depends on the IoT, the access points are in the thousands or even in millions. Power plants, transmission lines, substations, and delivery networks each have many smart sensors – from smart meters and actuators to pressure gauges and voltage regulators – that feed the IoE.

From the drilling site or electrical generation plant down to the smart device in your homes that runs your lights, heating, and appliances, all send and receive energy data that manage energy production and delivery [1].

CHALLENGES

The IoE has several valuable features coupled with flexible technology platforms. Coordination and cooperation between the technologies, networks, and the entities are essential. The sheer complexity of the interconnections and the system security and standardization issues is the greatest challenge for producers and consumers alike [1].

EMERGING TECHNOLOGIES

Emerging technologies like the big data analytics, cloud computing, Internet of Things (IoT), and blockchain have wide possibilities in facilitating synchronization of renewable energy systems with national grid as well as energy trade in distributed energy systems in an open platform. Big data analytics and cloud computing can support energy management, demand response and fault detection [5, 6], as shown in Figure 11.

The three types of interactive agents in an Energy Internet are the: energy cells, utility cells, and the clearance house. Energy cells are individual residential consumers, small-scale commercial/industrial consumers or group of these entities. A typical energy cell can own local generation facilities, electric loads, storage devices, and electric vehicles. Tens of hundreds of such energy cells are connected to Energy Internet to trade-in energy, sell surplus energy to make profit or buy deficient energy. The physical connection in the Energy Internet is operated and maintained by the utility cell. Being a separate entity, utility cell provides ancillary services to maintain the stability of the electricity system. The clearance house gathers all the information regarding the demand, supply, and forecasts and performs market clearance algorithm to schedule the optimal dispatch order and to determine the market clearance price [5].

CONCLUSION

The Internet of Energy (IoE) represents a future where energy systems will become interconnected and intelligent, enabling a sustainable and efficient energy landscape. By leveraging data and digital communication, IoE can revolutionize how energy is generated, transmitted, and consumed. It will promote clean energy sources, improve efficiency, and empower consumers with more control over their energy data. Despite significant opportunities IoE offers, the following challenges facing it need be solved, such as infrastructure development, cybersecurity, and data privacy. More information on Internet of Energy can be found in the books in [7, 8].

REFERENCES

[1] "The Internet of Energy: Challenges and purpose," January 19, 2022, https://justenergy.cm/the-internet-of-energy-challenges-and-purpose

[2] "What is the Internet of Energy?" 26 May, 2019, https://www.nesfircroft.com/what-is-the-internet-of-energy

[3] A. Cohen (December 06, 2024), "The blockchain revolution in the energy market," https://www,forbes.com/the-blockchain-evolution-in-the-enertgy-market

[4] "Internet of things," Wikipedia, the free encyclopedia, https://en.m.wikipedia.org/internet-of-things

[5] A. Joseph and P. Balachandra (2020), "Energy internet, the future electricity system: Overview, concept, model structure, and mechanism," https://www.mdpi.com/energy-internet-the-future-electricity-system-overview-concept-model-structure-and-mechanism

[6] K. Wang et al. (April 2017), "Big data analytics for system stability evaluation strategy in the Energy Internet," *IEEE Transactions on Industrial Informatics*, vol. 13, pp. 1969-1978.

[7] Q. Gu and Q. Qu (September 2022), "Towards an internet of energy for smart and distributed generation: Applications, strategies, and challenges," *Journal of Computational Design and Engineering*, vol. 9, no. 5. Pp.1789-1816.

[8] Y. R. Kafle et al. (September 2016), "Towards an internet of energy," *Conference: 2016 IEEE International Conference on Power System Technology* (POWERCON).

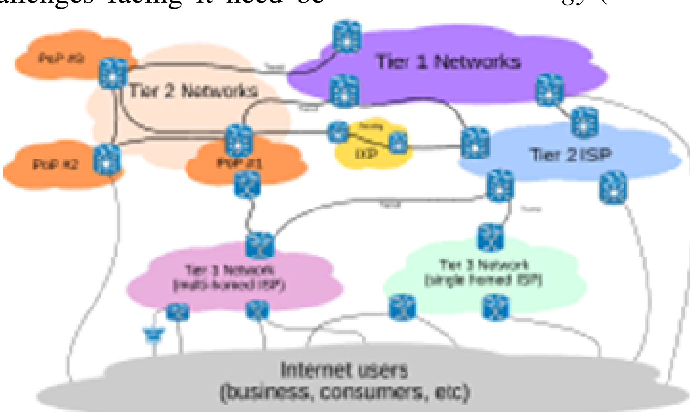

Figure 1. Internet

Source:https://www.google.com/search?q=images+on+interactive+agents+of+energy+internet+by+wikipedia&sca_esv=244132eb41020ebb&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpqo60mYMQ5EMCuU1gU

CUhUWPvCHw%3A1747007910199&ei=pjkhaKL7C5ajhbIPh_q48Ak&ved=0ahUKEwii5qDPz5yNAxWWUUEAHQc9Dp4Q4dUDCBE&oq=images+on+interactive+agents+of+energy+internet+by+wikipedia&gs_lp=EgNpbWciPGltYWdlcyBvbiBpbnRlcmFjdGl2ZSBhZ2VudHMgb2YgZW5lcmd5IGludGVybmV0IGJ5IHdpa2lwZWRpYUi4ZlCpBli2RHABeACQAQCYAawDoAG4F6oBCTAuMy45LjAuMbgBDMgBAPgBAZgCAKACAJgDAIgGAZIHAKAHyQSyBwC4BwA&sclient=img#vhid=Pu_RWm_SG0WaIM&vssid=mosaic

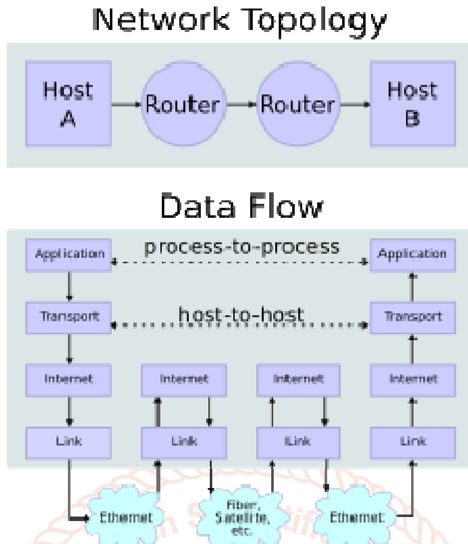

Figure 2. Internet

Source:https://www.google.com/search?q=images+on+energy+internet+by+wikipedia&sca_esv=244132eb41020ebb&udm=2&biw=1036&bih=539&sxsrf=AHTn8zopB3aXB7nxVMqK6HYL5JrvXC8d-A%3A1747007941241&ei=xTkhaPXFDp2khbIP2NCL4Qs&ved=0ahUKEwi1vIfez5yNAxUdUkEAHVjoIrwQ4dUDCBE&oq=images+on+energy+internet+by+wikipedia&gs_lp=EgNpbWciJmltYWdlcyBvbiBlbmVyZ3kgaW50ZXJuZXQgYnkgd2lraXBlZGlhSLCiAVDDIli3UnACeACQAQCYAaMCoAGNKKoBBjAuMy4xObgBDMgBAPgBAZgCAKACAJgDAIgGAZIHAKAH3geyBwC4BwA&sclient=img#vhid=y9BiKfs_u4zoSM&vssid=mosaic

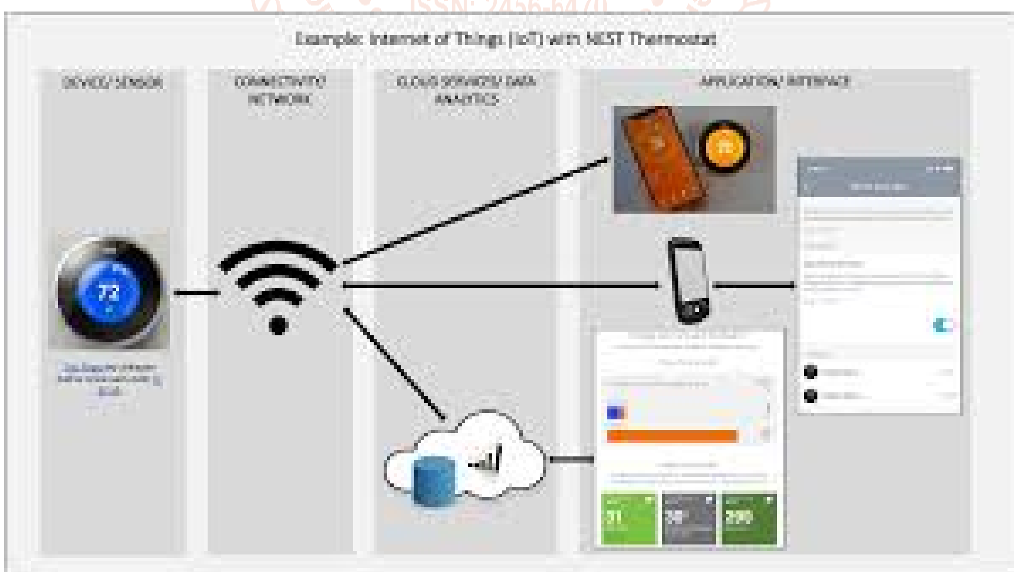

Figure 3. Internet of things

Source:https://www.google.com/search?q=internet+of+energy+by+wikipedia&sca_esv=244132eb41020ebb&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpBDoxzCZWDYRFDq7xDHtDw60Rf6w%3A1747011288502&ei=2EYhaPW5Hs_hbIPxITEqQc&ved=0ahUKEwj1hZSa3JyNAxXPX0EAHUQCMXUQ4dUDCBE&oq=internet+of+energy+by+wikipedia&gs_lp=EgNpbWciH2ludGVybmV0IG9mIGVuZXJneSBieSB3aWtpcGVkaWFIi84BUJwaWNOSAXABeACQAQCYAZoCoAGvFaoBBTAuNy42uAEMyAEAAEBmAIDoALGBMICBxAjGCcYyQLCAgYQABgHGB7CAgUQABiABMICBBAAGB7CAgYQABgIGB6YAwCIBgGSBwUxLjAuMqAHmAqyBwMyLTK4B7UE&sclient=img#vhid=S8HLx2NmXEy-LM&vssid=mosaic

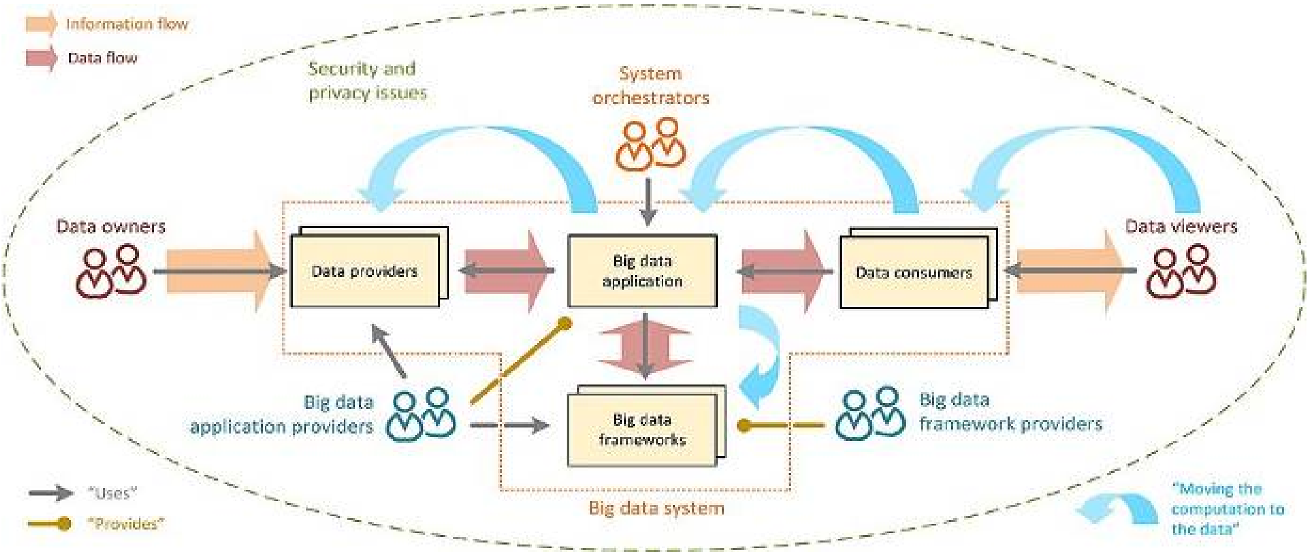

Figure 4. Big data

Source:https://www.google.com/search?q=images+on+interactive+agents+of+energy+internet+by+wikipedia&sca_esv=23d642d60e6ce234&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpz5kLMHuOFVS9sUHgVWq6K70UExA%3A1747034342585&ei=5qAhaIvI_DPqfkP_JTvsA8&oq=images+on+interactive+agents+of+energy+internet+&gs_lp=EgNpbWciMGltYWdlcyBvbiBpbnRlcmFjdGl2ZSBhZ2VudHMgb2YgZW5lcmd5IGludGVybmV0ICoCCAAyBxAjGCcYyQJIijFQ1QxY1QxwAXgAkAEAmAHcA6AB3AOqAQM0LTG4AQHIAQD4AQGYAgKgAvEDmAMAiAYBkgcFMS40LTGgBgCsgcDNC0xuAfmAw&sclient=img#vhid=4jxib6BGAz0iKM&vssid=mosaic

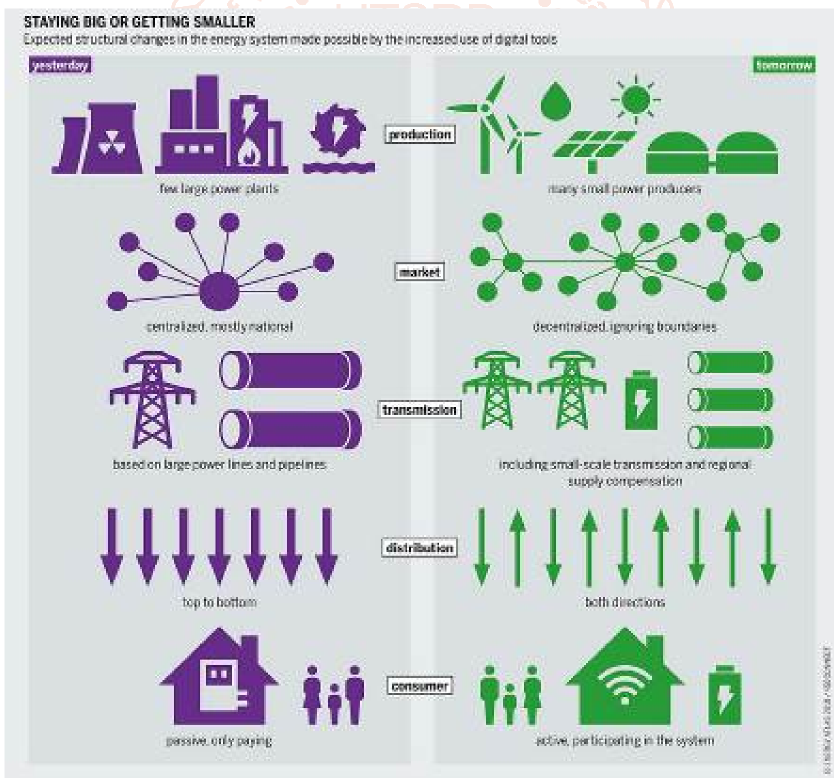

Figure 5. Smart grid

Source:https://www.google.com/search?q=images+on+interactive+agents+of+energy+internet+by+wikipedia&sca_esv=244132eb41020ebb&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpqo60mYMQ5EMCuU1gUCUhUWPvCHw%3A1747007910199&ei=pjkhaKL7C5ajhbIPh_q48Ak&ved=0ahUKEwii5qDPz5yNAxWWUUEAHQc9Dp4Q4dUDCBE&oq=images+on+interactive+agents+of+energy+internet+by+wikipedia&gs_lp=EgNpbWciPGltYWdlcyBvbiBpbnRlcmFjdGl2ZSBhZ2VudHMgb2YgZW5lcmd5IGludGVybmV0IGJ5IHdpa2lwZWRpYUi4ZlCpBli2RHABeACQAQCYAawDoAG4F6oBCTAuMy45LjAuMbgBDMgBAPgBAZgCAKACAJgDAIgGAZIHAKAHyQSyBwC4BwA&sclient=img#vhid=I5dzKMkHuK0gFM&vssid=mosaic

Figure 6. Blockchain

Source:https://www.google.com/search?q=images+of+energy+blockchain+by+wikipedia&sca_esv=e62aff6ab256d97c&udm=2&biw=1036&bih=539&sxsrf=AHTn8zoHZXaS6T_ZoYuVVnPQirF8HEBbDQ%3A1747046352512&ei=0M8haO6OH7iThbIPm5GUoAw&ved=0ahUKEwjutv3p3p2NAxW4SUEAHZsIBcQQ4dUDCBE&oq=images+of+energy+blockchain+by+wikipedia&gs_lp=EgNpbWciKGltYWdlcyBvZiBlbmVyZ3kgYmxvY2tjaGFpbiBieSB3aWtpcGVkaWFIz0VQtwZY9ipwAXgAkAEAmAH5AqABrRiqAQgwLjIuMTAuMbgBDMgBAPgBAZgCAKACAJgDAIgGAZIHAKAHyQSyBwC4BwA&sclient=img#vhid=uY2lnRCIIJwtBM&vssid=mosaic

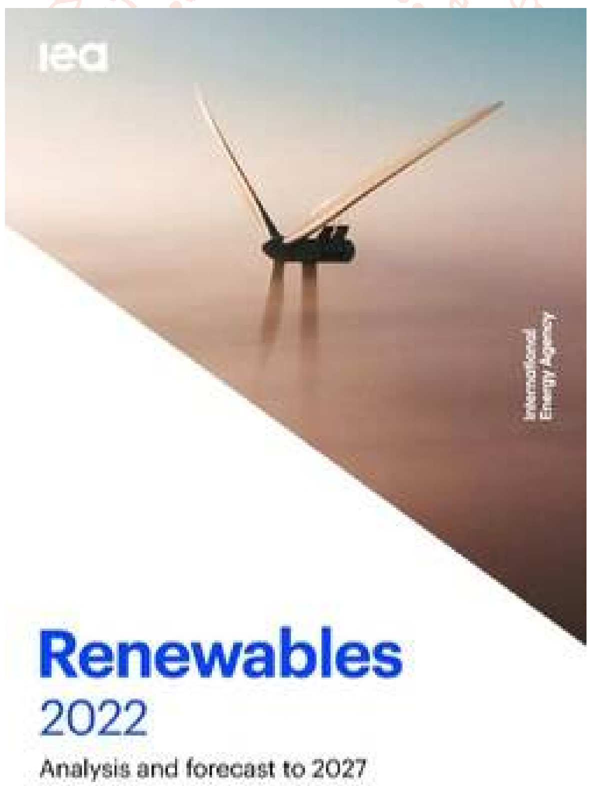

Figure 7. International Energy Agency

Source:https://www.google.com/search?q=images+on+interactive+agents+of+energy+internet+by+wikipedia&sca_esv=244132eb41020ebb&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpqo60mYMQ5EMCuU1gUCUhUWPvCHw%3A1747007910199&ei=pjkhaKL7C5ajhbIPh_q48Ak&ved=0ahUKEwii5qDPz5yNAxWWUUEAHQc9Dp4Q4dUDCBE&oq=images+on+interactive+agents+of+energy+internet+by+wikipedia&gs_lp=EgNpbWciPGltYWdlcyBvbiBpbnRlcmFjdGl2ZSBhZ2VudHMgb2YgZW5lcmd5IGludGVybmV0IGJ5IHdpa2lwZWRpYUi4ZlCpBli2RHABeACQAQCYAawDoAG4F6oBCTAuMy45LjAuMbgBDMgBAPgBAZgCAKACAJgDAIgGAZIHAKAHyQSyBwC4BwA&sclient=img#vhid=W4wK-DDtUX0x5M&vssid=mosaic

Figure 8. Renewable energy

Source:https://www.google.com/search?q=internet+of+energy+by+wikipedia&sca_esv=244132eb41020ebb&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpBDoxzCZWDYRFDq7xDHtDw60Rf6w%3A1747011288502&ei=2EYhaPW5Hs_hbIPxITEqQc&ved=0ahUKEwj1hZSa3JyNAxXPX0EAHUQCMXUQ4dUDCBE&oq=internet+of+energy+by+wikipedia&gs_lp=EgNpbWciH2ludGVybmV0IG9mIGVuZXJneSBieSB3aWtpcGVkaWFIi84BUJwaWNOSAXABeACQAQCYAZoCoAGvFaoBBTAuNy42uAEMyAEAAEBmAIDoALGBMICBxAjGCcYyQLCAgYQABgHGB7CAgUQABiABMICBBAAGB7CAgYQABgIGB6YAwCIBgGSBwUxLjAuMqAHmAqyBwMyLTK4B7UE&sclient=img#vhid=Pc1lkKKh2JojZM&vssid=mosaic

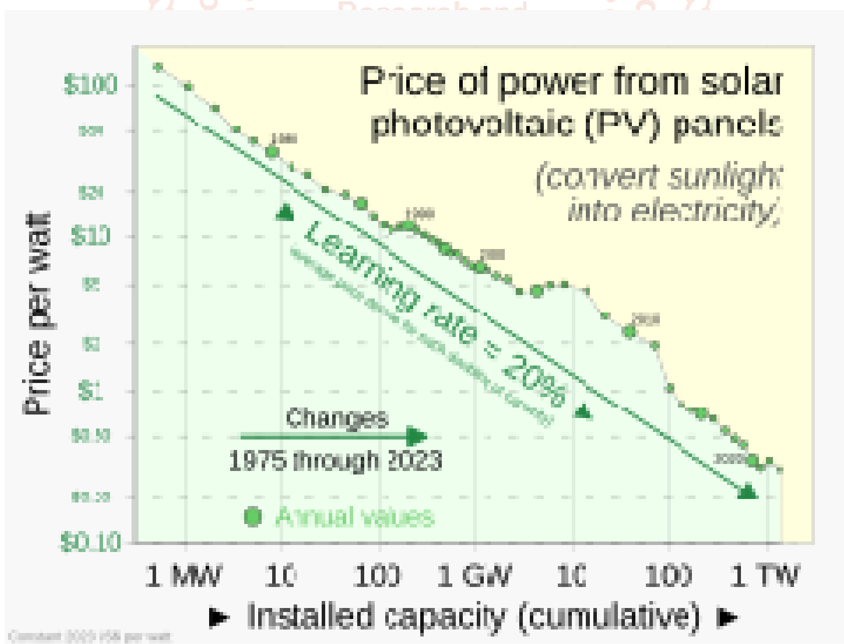

Figure 9. Renewable energy

Source:https://www.google.com/search?q=internet+of+energy+by+wikipedia&sca_esv=244132eb41020ebb&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpBDoxzCZWDYRFDq7xDHtDw60Rf6w%3A1747011288502&ei=2EYhaPW5Hs_hbIPxITEqQc&ved=0ahUKEwj1hZSa3JyNAxXPX0EAHUQCMXUQ4dUDCBE&oq=internet+of+energy+by+wikipedia&gs_lp=EgNpbWciH2ludGVybmV0IG9mIGVuZXJneSBieSB3aWtpcGVkaWFIi84BUJwaWNOSAXABeACQAQCYAZoCoAGvFaoBBTAuNy42uAEMyAEAAEBmAIDoALGBMICBxAjGCcYyQLCAgYQABgHGB7CAgUQABiABMICBBAAGB7CAgYQABgIGB6YAwCIBgGSBwUxLjAuMqAHmAqyBwMyLTK4B7UE&sclient=img#vhid=f0VDZE3ztTzF7M&vssid=mosaic

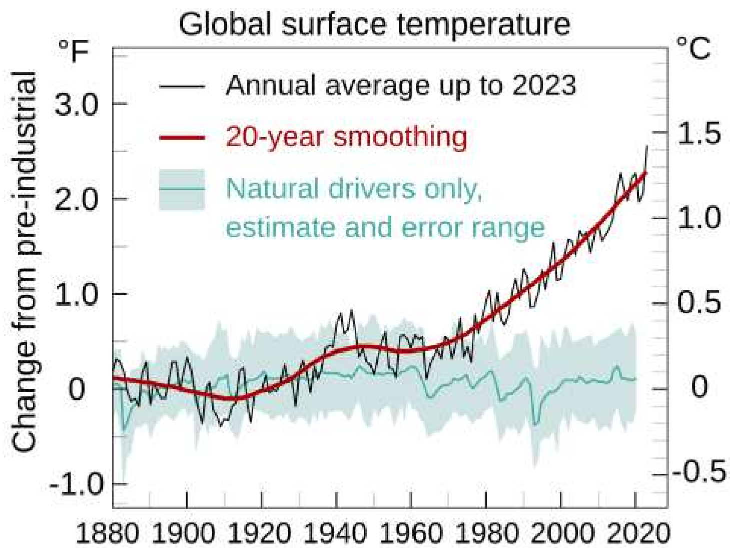

Figure 10. Climate change

Source:https://www.google.com/search?q=internet+of+energy+by+wikipedia&sca_esv=244132eb41020ebb&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpBDoxzCZWDYRFDq7xDHtDw60Rf6w%3A1747011288502&ei=2EYhaPW5Hs_hbIPxITEqQc&ved=0ahUKEwj1hZSa3JyNAxXPX0EAHUQCMXUQ4dUDCBE&oq=internet+of+energy+by+wikipedia&gs_lp=EgNpbWciH2ludGVybmV0IG9mIGVuZXJneSBieSB3aWtpcGVkaWFIi84BUJwaWNOSAXABeACQAQCYAZoCoAGvFaoBBTAuNy42uAEMyAEAAEBmAIDoALGBMICBxAjGCcYyQLCAgYQABgHGB7CAgUQABiABMICBBAAGB7CAgYQABgIGB6YAwCIBgGSBwUxLjAuMqAHmAqyBwMyLTK4B7UE&sclient=img#vhid=oXEJg0XdUAO8LM&vssid=mosaic

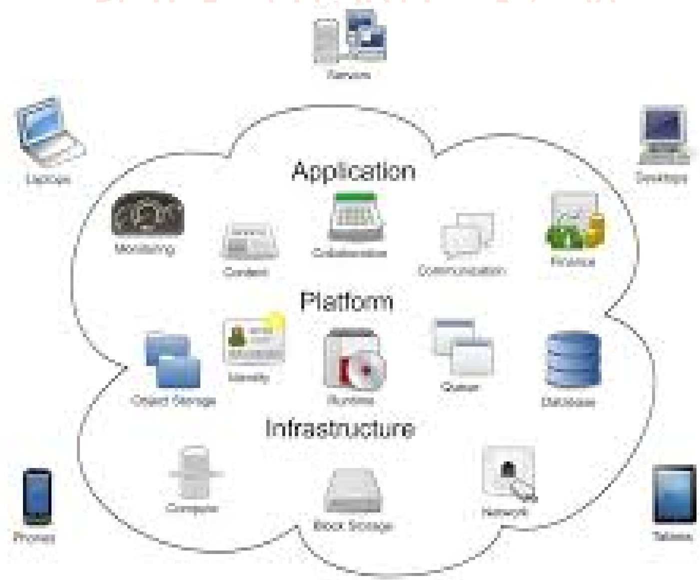

Figure 11. Cloud computing

Source:https://www.google.com/search?q=images+on+interactive+agents+of+energy+internet+by+wikipedia&sca_esv=23d642d60e6ce234&udm=2&biw=1036&bih=539&sxsrf=AHTn8zpz5kLMHuOFVS9sUHgVWq6K70UExA%3A1747034342585&ei=5qAhaIvI_DPqfkP_JTvsA8&oq=images+on+interactive+agents+of+energy+internet+&gs_lp=EgNpbWciMGltYWdlcyBvbiBpbnRlcmFjdGl2ZSBhZ2VudHMgb2YgZW5lcmd5IGludGVybmV0ICoCCAAyBxAjGCcYyQJIijFQ1QxY1QxwAXgAkAEAmAHcA6AB3AOqAQM0LTG4AQHIAQD4AQGYAgKgAvEDmAMAiAYBkgcFMS40LTGgBgCsgcDNC0xuAfmAw&sclient=img#vhid=2Z5AXeF6u8rCcM&vssid=mosaic