

## WIRELESS ENERGY TRANSFER AND ITS FUTURE MARKET PROSPECTS

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### *Abstract*

—This document discusses about current available technology for wireless energy transfer of electricity and how it can be used in future markets. .As of today, electricity is being transferred to equipments through conductors. In this era of increasing use of electrical and electronics appliances, wireless transmission of energy can be very useful and will revolutionize the whole electronics and electrical segment of the market.

*Keywords—wireless energy; transfer; market; prospects; methods*

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## I. INTRODUCTION

Wireless energy transfer is a process of transferring electromagnetic energy from a source to an electric load without using connecting wires. Its advantageous to use wireless transmission of energy in cases where it is dangerous, inconvenient and practically impossible to use conventional method of using wires to transmit power. The basic principle through which energy is transferred wirelessly is electromagnetic induction. Under this process, two conductors are placed in close vicinity and energy is then transferred. The method is resonant coupling. In this method, inductors are first synchronized to a common frequency and then energy gets transferred under that frequency. Energy can be transferred up to few meters in this method.

## II. METHODS OF POWER TRANSMISSION

### A. *Short Distance Method*

The principle involved in this method is electromagnetic induction. The maximum range that can be achieved through this method is of the order of few centimeters. It is commonly employed in devices like electric toothbrush battery charger, induction cooker stovetop.



Fig.1 An electric toothbrush

### B. *Medium Distance Method*

The method used here employs the principle of wave coupling. To transfer energy from a certain medium to another one, the electromagnetic waves are sent through a crumpling electromagnetic field.

### C. *Long Distance Method*

This method uses radio waves, microwaves to transmit power. With the help of this method, power transmission over multiple kilometers can be achieved. Power beaming is another method that has been hypothesized by researchers. In this method, the electrical power can be beamed to locations on earth by employing microwaves using satellites that are revolving around the earth.

## III. CLASSIFICATION OF WIRELESS ENERGY MARKET

Wireless Power can be classified into 2 categories:

- By Sector
- By Technology

A. *By Sector*

The various sectors included are:

- Mobile computing and communication devices (smartphones, tablets, computer)
- Consumer Electronics (remote controls, TVs, portable lighting systems, kitchen appliances, hearing aids)
- Industrial devices (wireless sensor networks, slip rings, cordless power tools, communication devices in medical and military use)
- Wireless power infrastructure (in-vehicle, office, airport, coffee shops, hospitality industry)
- Electric Vehicles (wireless charging system in EVs)

B. *By Technology*

Various technologies involved are:

- Induction
- Magnetic Resonance Coupling
- Conduction
- Radio Frequency (RF)
- Microwaves
- Laser

#### IV. FUTURE PROSPECTS OF WIRELESS POWER

The major application of wireless energy transfer can be anticipated in the market of Smartphone industry. As per a market survey conducted, the export of smartphones increased by 38.5% in 2012 as compared to 2011

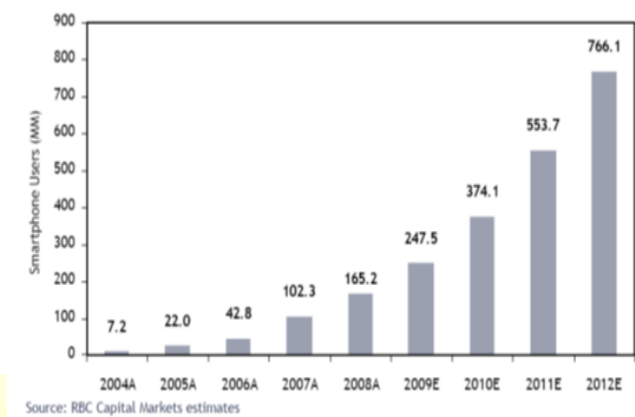


Fig.2 Growth of Smartphone Market in last 8 years

Potential of world-wide wireless charging market is supposed to attain a market share of approximately \$7.16 billion in 2017 from \$456.86 million in 2011 at an estimated compounded annual growth rate of 57.46%. Japan is currently the major player in this market. The market of North America will take around 2 years to grow as they have not completely accepted this concept. The concept of wireless charging is not limited to smartphone market. It expands to products such as Digital Cameras, Laptops, PCs and other electronic devices.

This concept can be implemented profitably in places like:

- Commercial Outlets
- Cinema Halls
- Cafes
- Airports
- Educational Institutions

Currently, North America is the biggest market for wireless devices but it is expected that North America will be surpassed by Asia-Pacific region in terms of market size by mid-decade. Revenues in Asia-Pacific region are anticipated to reach about \$6 billion by 2020. It will then represent 40% of the total global market.

In terms of usage and application, mobile devices will be the biggest sector generating about 36% of the total profits by the year 2020.

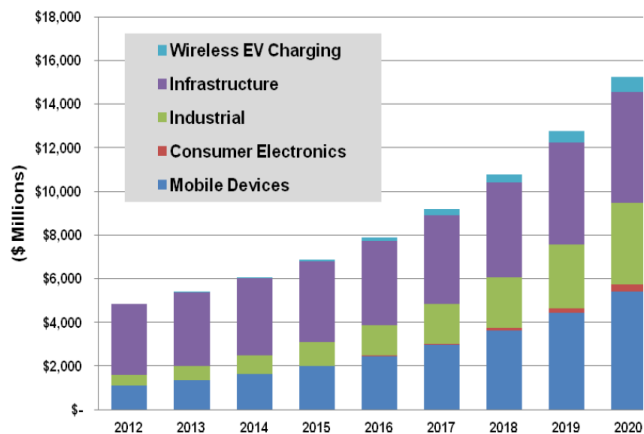


Fig.3 Revenue by application, Global Market: 2012-2020

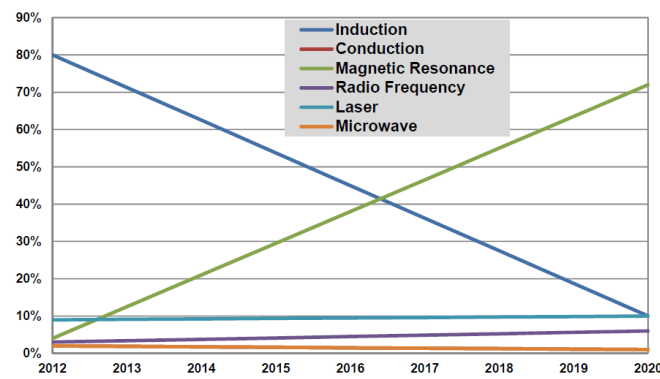


Fig.4 Technological share, Global Markets: 2012-2020

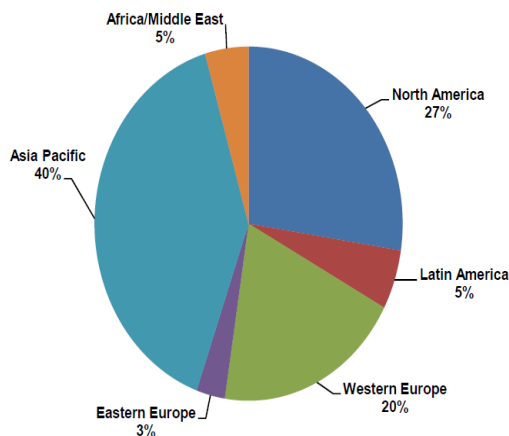


Fig.5 Revenue Share(region wise), Global Markets: 2012-2020

## V. CONCLUSION

The concept wireless power is still in its developing stage but wireless power market has huge potential. The major reasons that are running this market are comfort and decrement in power consumption along with electronic wastes. The main thrust areas of this market are the lack of standards and interoperability. A major disadvantage is that efficiency of wireless charging is less than wired charging. Electric vehicles has huge potential for future with respect to application of wireless energy. The global market is expected to increase rapidly in coming years and hence if the focus is given in this sector then it can prove very profitable to any organization.

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