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International Standard and Social Implement of Dynamic Wireless Power Transfer for EV in the World

-Technical Issue and Directionality-

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Electric Road system using Dynamic Wireless Power Transfer(DWPT) will be one most important infrastructure for necessity to reduce greenhouse gas emissions and improve the global energy efficiency and reduce the total CO2 emissions for road transportation. This paper suggest the technical issue to be developed and propose the directionality to establish social implementation at Smart City in the near future. International and Domestic Standardization such as ISO/IEC, SAE/UL, China GB, and recommendation by ITU, emission level requirements by CISPR, guideline of ICNIRP regarding wireless power transfer for EV(e-mobility) are reviewed. Also reviewed technical research and evaluation programs at Europe such as Fabric test sites and its successors ,USA Utah State Univ, KAIST of Korea, and activity in Japan.

This paper reports two aspects of dynamic power transfer for EV(e-mobility), Standardization and Social Implementaion. Then propose technical issue should be developed and directionalityfor social implementation near future.

First, International standardization for static wireles power transfer ; Standaradization of WPT at ISO/IEC was started at Oct. 2010 as IEC 61980 series and released IS of IEC 61980-1; 2020 which is second edition. IS of communication standard -2 and - Part 3: Specific requirements for the magnetic field wireless power transfer systems will be mid 2022. Vehicle side requirements are discussed at ISO/TC22 and IS of ISO 19363 has released at April 2020. Vehicle communication standard ISO 15118-20 including both conductive and wireless has released at April 2022 as IS. Relating of ISO/IEC activity, some international organizations are active for EV wireless power transfer. ITU for frequency recommendations, CISPR for accepted emission revel of all bands, ICNIRP and IEC TC106 for human safty guideline are key organizations. SAE of US has rereased SAE J2954 at Oct 2020 for light duty vehicle.

Standardization of IEC for DWPT has started at 2019. IEC PT63243 and IEC PT63381 are working for the purpose.SAE is also set task force for DWPT.

First social evaluation for DWPT wsa 1996 at USA named PATH project but not succeeded. From 2013 to 2018, FABRIC program supported by EU FP7 have experiencd at France and Italia. After FABRIC, INCIT-EV succeeded and continue evaluation at SATORI and urban Paris. Stellantis Italia has constructed test course at Trino and starated evaluation using 1MW power supply and 5G communication for the test course.

In Japan two FS reports have released and some trials are ongoing supported by NEDO etc. Osaka Expo 2025 will be a first showcase for DWPT in Japan.

The important issue to solve for social implementation of DWPT are 5 points;

1. Establish High Power WPT technique
2. Safty issue; Avoid Human hazard,keep safty
3. Co-exsistig with other radio services
4. Control & Communication System using local 5G
5. Optimize Cost of total infrastructure

Important directionality to fix such issue, all relating engineers and managiments should made one team to do best action.

Item	Org.	Activity
International Standards (IS) for System	IEC TC69 WG7	IS;IEC61980-1 ed2 Oct.2020
		IS; IEC61980-2 will be Mid..2022
		IS;IEC61980-3 will be Mid..2022
		WD;IEC61980-4 Under Discuss
		WD;IEC61980-5(IEC63243)Under Discuss
		WD;IEC61980-6(IEC63381) will prerpare
IS for Vehicle	ISO TC22 SC37	IS;ISO19363-2020 at Oct 2020
		CD; ISO5474 series Under Discuss
National Standard	SAE	STD; J2954 202010 at Oct 2020
		WG for High Power ,DWPT are working
	UL	Outline of Investigation; at March 2020
	China GB	GB; 20157675-t339
Freq. Manag.	ITU-R SG1	Rec.SM.2110-1 at Nov.2019
		Pending RR at WRC
EMC	CISPR/B/ WG1 AHG4	CD; CISPR11/FRAG1 ed7 under circulate
Human Safty	ICNIRP	Blue book released April 1998 Revised for 1kHz to 100kHz at 2010
	IEC TC106	TR62905(under 10MHz) at Feb 2018
		PT63184 for Basic Rec under discuss

Table 1 Activity of International Organization (at June 2021)