Though I had been engaged in high tech and complex Electronics & Communication equipments in Aviation & aerospace systems, I had an abiding interest to develop something for the society since my childhood. My curiosity was amply awarded in 207 when I got an opportunity to register for PhD to develop a green grading system in electronic pollution for sustainability.

Electronics and ICT products have stormed in to society with tremendous advantages but also brought taken environment and human health in opposite direction. When I used to read about conflicts between environmentalists, consumers and cellular mobile service providers I conceived an opportunity of my interest to do a comprehensive study, research and develop universal standards for electronic pollution for sustainable environmental safety and human health.

Environmental electronic pollution at present is regulated in different standards in different departments in different countries. For example ICNIRP Guidelines on EMF radiation limits, adopted with different levels by various countries. The significance of electronic pollution gained increasing impetus in 1990s, with a huge exodus to urban living and exponential growth in electronic devices especially mobile technologies.

United Nations Framework Convention on Climate Change (UNFCCC) lays down the greenhouse gases(GHG) emission levels to be reduced by 55% by 2008-2012 from existing 1990 levels. Greenpeace International (207), EPEAT and Energy Star rating systems for green electronic devices consider power consumption and hazardous material content along with corporate responsibilities as parameters of e-pollution. Hence, need for this research to find out e-pollution parameters comprehensively and evolve a single national green grading system which can be made applicable universally to entire globe.

Layout of this thesis is elaborated in succeeding paragraphs.

Chapter 1 briefly introduces electronic pollution, green electronics, necessity for controlling and reducing e-pollution due to exponential growth in mobile telephony and ICT. Chapter 2 consists of critical review of existing literature on various green rating systems. Chapter 3 describes the necessity, significance, scope, objectives and problem formulation. Chapter 4 includes the investigated and identified e-pollution parameters comprehensively. Also included is the sampling and growth projections of population, mobiles and computer monitors for India, China, USA and world for 2050.

Chapter 5 comprises of the experiments on EMF radiations by mobiles at 800MHz, 1800MHz, 900MHz and in 300KHz-50GHz band. It also includes experimental determination of heat generation by mobiles and monitors. It comprises of CO2 emissions experiments on mobiles and monitors. Further it consists of experiments on power
consumption by mobiles and monitors. This is for experimental determination of primary data of mobiles and monitors in various modes of operation for bench marking.

Chapter 6 comprises of secondary data study and collection on hazardous material content and E-waste generation by electronics devices, scalability, bio degradability and Ethics and self discipline towards reduction and controlling of ever growing e-pollution.

Chapter 7 Elaborates the results calculated for India, China, USA and world for 2050 for mobiles and monitors in various modes of operation. This includes detailed analysis and discussions also. Exclusively devoted to findings of this thesis work along with conceptualised and formulated solutions for EMF monitoring, design considerations for reducing hazardous material in the design stage itself and ideal way out for e-waste reverse engineering. Chapter 8 describes and presents the newly conceptualised, benchmarked and developed National Green Grading system, named as Hind Greener Electronics Grading Process, Guidelines for greener electronics products for sustainability. This comprises of the entire journey of this research work leading to e-pollution parameters and development of National Green Grading system, Guidelines for greener electronics.

Finally to conclude Chapter 9, the thesis contains a wealth of information, makes it a “Gold Mine”, for e-pollution parameters, their present and future projections for 2050 of experimentally determined values of EMF radiation, heat generation, CO$_2$ emission and power consumption in various modes of operation of mobiles and monitors (EMF radiation excluded). Inclusion of ethics and self discipline of all players from designers, corporate to consumers as a e-pollution parameter is necessity of the hour in present day society. This also includes ideal technical solutions in the form of Diagnostic tool and Monitoring system for EMF radiation on line, design considerations for usage of non hazardous materials and e-waste reverse engineering to recover all materials leading to nil or minimal e-waste. Finally development of national green Grading system , Guidelines for greener electronic products which can be regulated and implemented by UNO/WHO/Environment ministries/Ministry of Communications and IT as a single widow system goes a long way in ensuring balanced development and sustainable environmental safety.

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