A cool system to make E-waste great again.

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ABSTRACT

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In todays society electronics become a more and more crucial part of our lives. The demand for electronic devices increases and so does the amount of waste we produce with them. E-waste is a term used for old electronic devices that are of no use anymore and thus become scrap. This causes

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serious pollution to our surroundings and other countries since most of the e-waste is being exported to third world countries.

Our goal is to find a solution to this pollution problem. Our plan is to create a trading system similar to the CO2 trading system of the European Union. Countries are allowed to only export a certain amount of e-waste. This amount can be increased if they either buy allowances from other countries or if they invest in recycling of e-waste. The global e-waste export limits will be lowered year by year, thus lowering global pollution created by no longer used electronics.

CCS CONCEPTS

• **Computer systems organization** → **Embedded systems**; *Redundancy*; Robotics; • **Networks** → Network reliability;

KEYWORDS

Authors' choice; of terms; separated; by semicolons; include commas, within terms only; required.

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INTRODUCTION

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RELATED WORK

We don't work on the main file. Everybody includes his own .tex file :) Robinson [6] pointed out that most of the E-waste isn't even getting collected and just thrown into the household waste. 80% of the E-waste which got collected is then getting exported in poor countries. The recycling in these countries is problematic because E-waste contains lots of environmental contaminants and the facilities doesn't take proper care of this. This is why these contaminants are found around these premises. E-waste has already caused a "'considerable environmental degradation"'[6] in these countries. Also the workers are suffering from health problems because barely protected against the dangerous fluids and gasses. According to the current european WEEE-directive, manufacturers, sellers and distributors need to provide a return point for electronical and electrical devices. The aim is amongst others the

reinforcement of recycling upon responsibility of the producer, which are also in charge of bearing the costs, while the end consumer has the responsibility of proper waste separation [3]. Specifically for smartphones, the German Goverment rejects a deposit at the expense of the final consumer on the national implementation [1]. There are also existing several non-profit projects, which accept mobile phones in order to reuse and recycle them [2, 4].

> "*Cumulatively, about 500 million PCs reached the end of their service lives between 1994 and 2003. 500 million PCs contain approximately 2,872,000 t of plastics, 718,000 t of lead, 1363 t of cadmium and 287 t of mercury*" [7]

According to [7] this already huge amount of e-waste is going to increase even further as electronics keep advancing and the need for new electronics keeps increasing. Exporting e-waste to poor countries would make sense for first world countries according to Larry Summers (back in 1991) since third world countries don't have an industry that already pollutes their air, water and ground so heavily, so they can deal with that problem more easily. Plus since mortality rates are already so high in these areas, the added pollution would not affect these countries that much.
This thinking started to change with the Basel Convention in 1989. It limits how much e-waste can be moved to what parts of the world, trying to save the environment and also trying to push the companies towards recycling.

Large household appliances and IT and telecommunications equipment made up three quarters of all e-waste back in 2002. This e-waste was mainly generated by countries of the OECD. Overall numbers are going to keep on increasing.

Although it is hard to track down how and where e-waste is going, there have to be put some restrictions into action on where e-waste is going. To solve the problem of this steadily increasing waste, recycling should become more important and more commonly used. But even for this solution, there are environmental hazards that come along with recycling.
To prevent e-waste from even becoming a problem, products should also be designed in such a way that they thrown away in a relatively short time span. From the regulation aspect, Plambeck and Wang [5] investigates the influence of how e-waste regulation types (Fee Upon Sale and Fee Upon Disposal) and market structure (Duopoly and Monopoly) affects related four aspects of new production indtroduction: the quantify of e-waste, manufacturers' profits, consumer surplus and social welfare. As instance, they considered the California's Advanced Recovery Fee (ARF) which is a fee-upon-sale strategy that forces customer pay for the collection and recycling of all used electronics when they buy an new product. For analysis, their models explained the fee-upon-disposal extended producer

responsibility motivate design for recyclability which is benefits for consumers but fail to reduce the frequency of new products launching. In consequences, optimally induces electronics manufactures to both slow research/development and design benign products is the further challenge for our future form invention of e-waste regulation. The EU emissions trading system (EU ETS)[**?**], also known as the European Union Emissions Trading Scheme, was the first large greenhouse gas emissions trading scheme in the world, and now it's still the biggest one. The EU ETS works on the 'cap and trade' principle. A cap is set on the total amount of certain greenhouse gases that can be emitted by installations covered by the system. The total emissions will fall if the cap is reduced over time.

Under the 'cap and trade' principle, a maximum (cap) is set on the total amount of greenhouse gases that can be emitted by all participating installations. 'Allowances' for emissions are then auctioned off or allocated for free, and can subsequently be traded. Companies receive or buy emission allowances which they can trade with one another as needed. They can also buy limited amounts of international credits from emission-saving projects around the world. Trading brings flexibility that ensures emissions are cut where it costs least to do so. A robust carbon price also promotes investment in clean, low-carbon technologies.

Installations must monitor and report their CO2 emissions, ensuring they hand in enough allowances to the authorities to cover their emissions. If emission exceeds what is permitted by its allowances, an installation must purchase allowances from others.

The system covers the following sectors and gases with the focus on emissions that can be measured, reported and verified with a high level of accuracy: carbon dioxide (CO2), nitrous oxide (N2O), perfluorocarbons (PFCs).

According to the European Commission, in 2010 greenhouse gas emissions from big emitters covered by the EU ETS had decreased by an average of more than 17,000 tonnes per installation from 2005, a decrease of more than 8 percent since 2005.

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