The Green Climate Fund Could Reshape the Economics of Sustainable Computing

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Sustainable computing has come so far. When I first presented my ideas on renewable-powered data centers in 2007, my peers literally laughed out loud [14]. Now, several communities have explored a wide range of sustainable computing issues. With projects like the NetZero Data Center [10], Parasol [6] and iSwitch [9], researchers have laid the intellectual ground work to manage the carbon emissions caused by a data center. Research on the intellectual basis for carbon-aware resource management has also blossomed [3], [11], [13], [2], [8], [15], [7], [5], [12].To be sure, this list is not nearly exhaustive, but it does highlight the diversity of top venues that look for papers on sustainable computing.

Even though sustainble computing is gaining steam intellectually. Critics on the business side of computer science research remain unconvinced. I am sure many of you have at some point received a critique like the following:

"I cannot assign merit to the work beyond the warm feeling of doing something for mother earth." – Anonymous reviewer

The critics of sustainable computing focus on three arguments. First, they claim that any expense put to lowering carbon emissions does not increase profit and therefore is purely an intellectual matter. Second, they feel there is no need for computer science reseachers to become experts on the subject, since presumably their are other researchers in the world that understand environment issues. Finally, and this is a big one, many reviewers will claim that energy prices are a small part of overall data center expenses. As a result, even efforts at energy efficiency can be viewed skeptically.

I believe all of these criticisms can be silenced by the Green Climate Fund [4] (GCF), a banking platform finalized during the 2015 Paris Climate talks. The GCF will manage roughly $100B per year, providing loans and grants for technologies in developing countries that reduce carbon emissions.

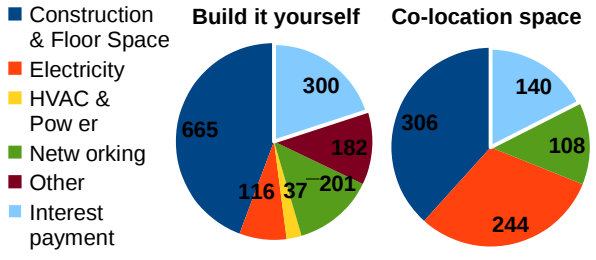

Fig. 1: The costs of hosting 10 computing racks, estimated by The Cloud Calculator.

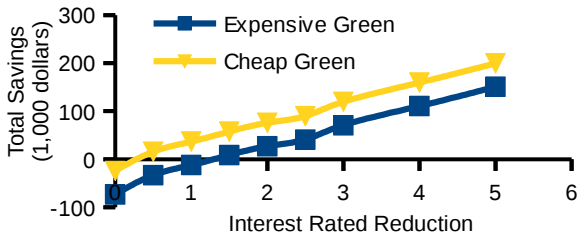

Fig. 2: Cost savings as a function of interest rate.

Figure 1 plots costs to (1) build a 10-rack data center and (2) lease co-location space for 10 racks [1]. It highlights the role of interest. 7% interest over a 3-year evaluation period constitutes about 20% of total costs. The GCF will have the ability to alter its interest rates, providing considerable savings to sustainable data centers. Figure 2 plots the cost savings for the data center owner as a function of the GCF interest rate reduction. We assume (as critics wrongly claim) that sustainable data centers increase electricity costs by 30% (expensive) or 10% (cheap). A reduction of 1.5 basis points (i.e., an effective rate of 5.5%) is enough to justify the 30% increase in energy costs. Data center owners could save hundreds of thousands of dollars.

I hope the GCF considers data centers as it looks to influence the reduction of greenhouse gasses. We all know the IT sector contributes significantly to global emissions (well over 2% [11]). Reconsider Figure 1, the cost of building a data center from the ground up (excluding servers) is just over $1M. An investment of 2% by the GCF would cover nearly 2,000 data centers annually— that could spark and sustain a boom in sustainable data centers.

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