SIGPLAN and Climate Change

A report from SIGPLAN’s ad hoc committee on climate change

Michael Hicks  Crista Lopes
Jens Palsberg  Benjamin Pierce
Annual global temperatures from 1850 to 2017
Projected Impacts of Climate Change

| Global temperature change (relative to pre-industrial level) |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | 0°C             | 1°C             | 2°C             | 3°C             | 4°C             | 5°C             |
| Food            |                 |                 |                 |                 |                 |                 |
|                 |                 |                 |                 |                 |                 |                 |
| Water           |                 |                 |                 |                 |                 |                 |
|                 | Glaciers disappear | Decreases in water availability |                 |                 | Sea level rise threatens major coastal cities |                 |
| Ecosystems      | Damage to coral reefs |                 |                 | Rising number of species face extinction |                 |                 |
| Extreme Weather Events | Rising intensity of storms, forest fires, droughts, flooding, and heat waves |                 |                 |                 |                 |                 |
| Risk of Irreversible Changes | Increasing risk of abrupt, large-scale climatic shifts |                 |                 |                 |                 |                 |

adapted from Stern, 2006)
For a 66% chance of keeping global temperature below 2°C above pre-industrial levels, we can emit 2900 billion tons of CO2e total.

We’ve already emitted 2100 billion tons.

We have 800 billion left.

Source: IPCC AR5 SYR (Table 2.2)
800,000,000 t

How much is that?
As of the start of 2017, how many years of current emissions would use up the IPCC’s carbon budgets for different levels of warming?

https://www.carbonbrief.org/analysis-four-years-left-one-point-five-carbon-budget
800 Gt

7 G people

= 114 t / person

How fast am I using up my budget?
19 t / year
\[
\frac{114 \text{ t}}{19 \text{ t/year}} = 6 \text{ years}
\]
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\]
What to do?

Nothing?

Hope for a technological breakthrough?

Vote?

Figure out what action I can take that will make the most difference
Average American Carbon Footprint (2010)  **Total: 19t CO$_2$e**

Note: these are emissions from personal consumption. Government and capital expenditure account for a further 5 t CO$_2$e.
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shrinkthatfootprint.com
.6 t ?
<table>
<thead>
<tr>
<th>City Pair</th>
<th>Distance (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philly ↔ Chicago</td>
<td>0.5 t</td>
</tr>
<tr>
<td>Philly ↔ San Francisco</td>
<td>1.2 t</td>
</tr>
<tr>
<td>Philly ↔ Paris</td>
<td>1.7 t</td>
</tr>
<tr>
<td>Philly ↔ Tokyo</td>
<td>3 t</td>
</tr>
<tr>
<td>Philly ↔ Melbourne</td>
<td>4.7 t</td>
</tr>
</tbody>
</table>
Grand total: 11t
Is SIGPLAN the right place to address this problem? a useful
The SIGPLAN climate committee
Engaging with Climate Change: Possible Steps for SIGPLAN

Preliminary Report of the SIGPLAN Climate Committee

Michael Hicks  Crista Lopes  Benjamin C. Pierce

Carbon Offsets
An Overview for Scientific Societies

Richard Kim and Benjamin C. Pierce
What are carbon offsets?

- An offset provider is willing to do something that will *prevent* $X$ tons (of CO2 or other greenhouse gases) from being emitted or *capture* $X$ tons from the atmosphere
  - plant trees, capture methane from cows or natural gas extraction, give people cookstoves that they can use instead of open fires, etc., etc.
- I want to take a flight, which is going to emit $X$ tons
- I pay them $Y and take my flight
What are carbon offsets?

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- An offset verifier certifies that the offset is real (i.e., permanent, additional, and verifiable)

- An offset vendor aggregates these offset projects and collects money from individuals and organization that want to fund them

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How would it work for SIGPLAN?

• PLDI registration fee is increased by (say) $40, with an option to opt-out

• General chair chooses a carbon vendor and gives them this money

• PLDI 2019 is carbon-neutral
Why is this a good idea?

• Short-term action that makes a concrete difference
• Buys time for developing longer-term strategies
• No other way for (physical) conferences to get to zero net emissions
• Puts a price on carbon emissions
SIGPLAN and ACM have a responsibility and an opportunity to lead in this area…

- Because our scientific activities have a significant carbon footprint, which must be balanced against the benefits of what we’re doing
- Because we as scientists have a special responsibility to take the warnings of other scientists seriously, as well as a special ability to evaluate them
- Because we can be a model for other scientific (and non-scientific) organizations
How can I help?

• Talk to us!
  • Especially if you disagree with any or all of the above!!

• Fill out the post-PLDI survey (with support, concerns, suggestions, etc.)

• Take a look at our reports, leave comments, contribute ideas

• Join the acm-climate mailing list

• Calculate your own carbon footprint

• Offset your travel to PLDI

• Lots more / bigger projects… Talk to us!!