# Green RSE and Green HPC Training

James Richings

EPCC, University of Edinburgh

j.richings@epcc.ed.ac.uk

archer2

epcc

# Green RSE in the UK

- Lots of interest and activity on this
- Relevant resources
  - NetDRIVE: https://eng.ox.ac.uk/netdrive
  - Environmentally Sustainable Computational Science (ESCS) Forum: https://forum.escs-community.org/
  - GreenRSE SIG within Society of RSE: https://socrse.github.io/green-sig/
  - Green DiSC: https://www.software.ac.uk/GreenDiSC
  - Digital Humanities Climate Coalition Toolkit: https://sas-dhrh.github.io/dhcc-toolkit/
- How do we coordinate better across different countries?

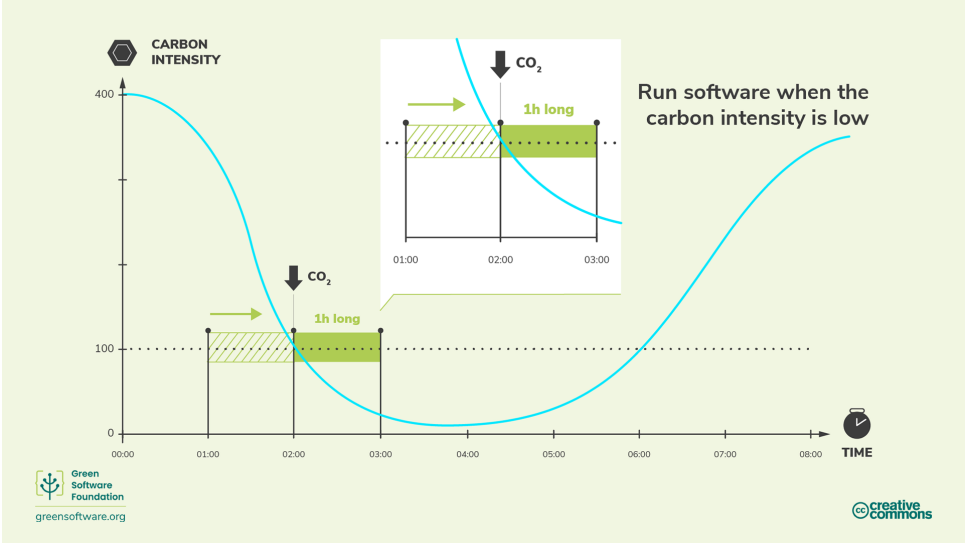
# Green HPC Training: Motivation and inception

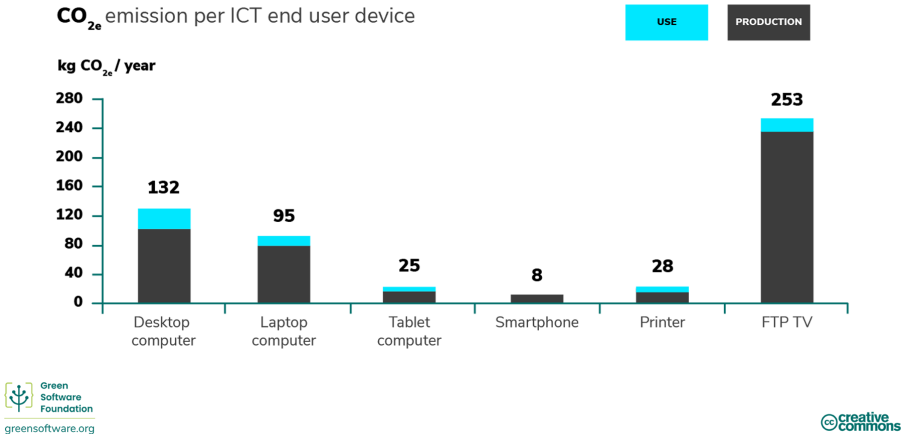

- Develop training materials to introduce greenhouse gas (GHG) emissions issues in the context of HPC systems
  - Accessible to all HPC stakeholders: researchers/users, RSE/RTP, service operations staff, people responsible for designing procurement processes
  - Not aiming for a technical course on programming for emissions efficiency
- Based on the existing, open-source Green Software Practitioner course from the Green Software Foundation: https://learn.greensoftware.foundation/
  - Modified and expanded to focus on HPC systems and use ARCHER2 as an example throughout

https://carpentries-incubator.github.io/green-software-hpc/

# Main topic areas

- **Energy Efficiency**
  - Scale of emissions from electricity generation
  - PUE and energy proportionality
- **Carbon Awareness**
  - Introduction to energy markets: dispatchability and curtailment
  - Demand shifting and demand shaping
- **Hardware Efficiency**
  - Embodied emissions and amortisation
  - Impact of increasing utilisation and performance on emissions efficiency
- **Measurement**
  - Approaches for measuring emissions (embodied and operational)
  - Defining metrics to measure, predict and quantify emissions reductions
- **Reducing Emissions**
  - Differences between carbon neutral and net zero
  - Carbon abatement and carbon offsets
  - Approaches to reducing emissions from HPC system use



# Summary

- Lots of work and interest in Green RSE topics in the UK
- ***How can we connect worldwide work in this area together?***

- Continuing to deliver Green HPC workshops
  - Gathering feedback and improving materials
  - Would be keen to hear back from others who have used/taught the material
- ***What other (training) resources are needed to support RSEs in understanding and reducing emissions?***

- If interested see Green RSE channel on RSE Society Slack workspace to connect with people