Sustainable Research IT
University of York

Emma Barnes
Head of Research and Faculty IT

Introduction

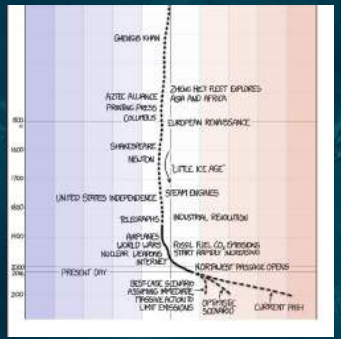
https://www.militaria-history.co.uk/articles/jorvik-viking-festival-kicks-off-yorks-year-of-the-viking-in-epic/

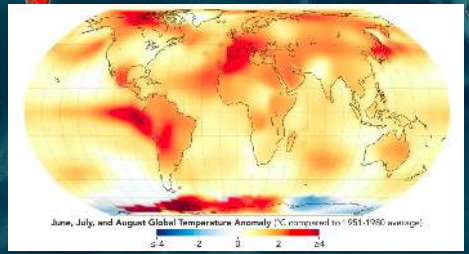
UNIVERSITY of York

Image Credit: Shutterstock

UNIVERSITY of York

https://xkcd.com/1732





https://firms.modaps.eosdis.nasa.gov/map/#d:today;@12.2,7.9,3.0z

Image credit: NASA Earth Observatory/Lauren Dauphin

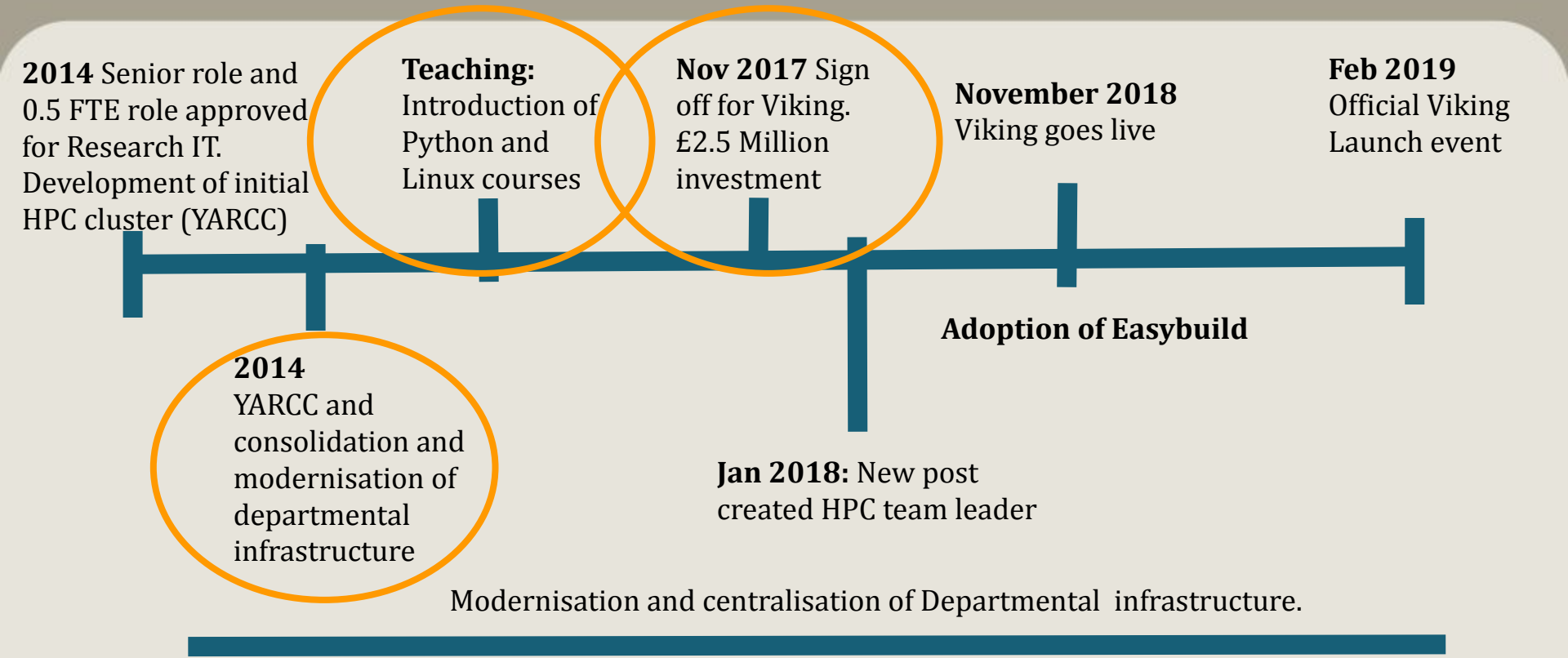
Sustainable, Accessible Research IT?

- Sustainable ways to power HPC
- Efficient compute
- Accessible/reusable and clear code
- Creative ways to empower research through technology
- Being open minded

OPEN OnDemand

UOY Journey to sustainable research IT

Research IT


2014 Senior role and 0.5 FTE role approved for Research IT. Development of initial HPC cluster (YARCC)
Teaching: Introduction of Python and Linux courses
Nov 2017 Sign off for Viking. £2.5 Million investment
November 2018 Viking goes live
Feb 2019 Official Viking Launch event
Adoption of Easybuild
2014 YARCC and consolidation and modernisation of departmental infrastructure
Jan 2018: New post created HPC team leader
Modernisation and centralisation of Departmental infrastructure.

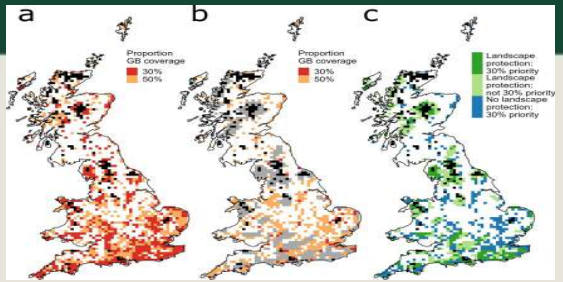
Viking Service

£2.5 million pound investment by the university

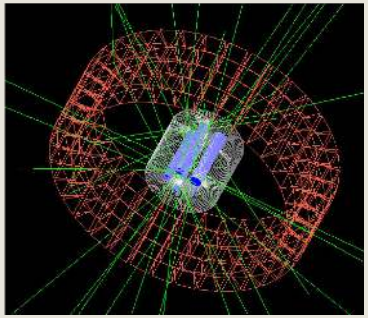
Free to use by all staff and students

Viking Service

A facility that caters for the research performed at the University.
Over almost 5 years
1300 Registered users
350 Separate projects
>190 research outputs (papers, articles, datasets, software etc.)
At least **£20 million** in grant funding where Viking has contributed
University first: using an external service provider to run our HPC facility
University first: using an external Datacentre (Leeds - AQL) to host the hardware

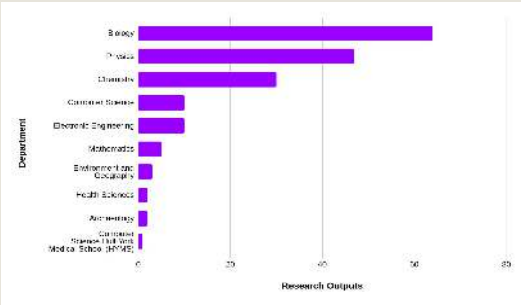


Translating area-based conservation pledges into efficient biodiversity protection outcomes *Cunningham, C.A., Crick, H.Q.P., Morecroft, M.D. et al. Commun Biol* ***4,*** *1043 (2021). https://doi.org/10.1038/s42003-021-02590-4*



Photon quantum entanglement in the MeV regime and its application in PET imaging

Watts, D.P., Bordes, J., Brown, J.R. et al. Nat Commun ***12,*** *2646 (2021). https://doi.org/10.1038/s41467-021-22907-5*



Eleanor Joan Green,
Department of Archeology

Current Era

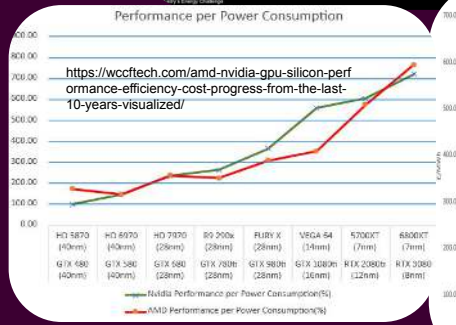
Powering HPC

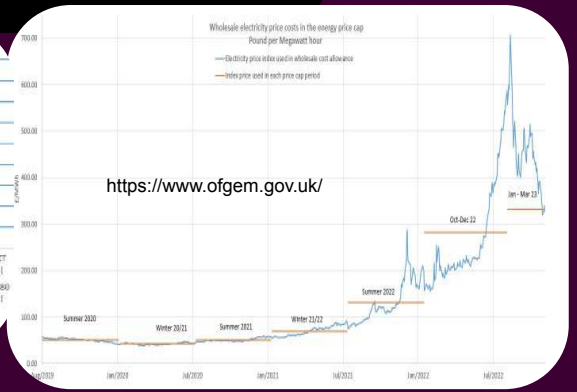
CPUs and GPUs demand more power as they grow with performance.

University Data centres are not always viable.

- Not enough power
- Inappropriate cooling options
- Push to move kit from university owned DCs

Electricity Pricing has significantly increased





What can we do?

Cloud?

Work with vendors?

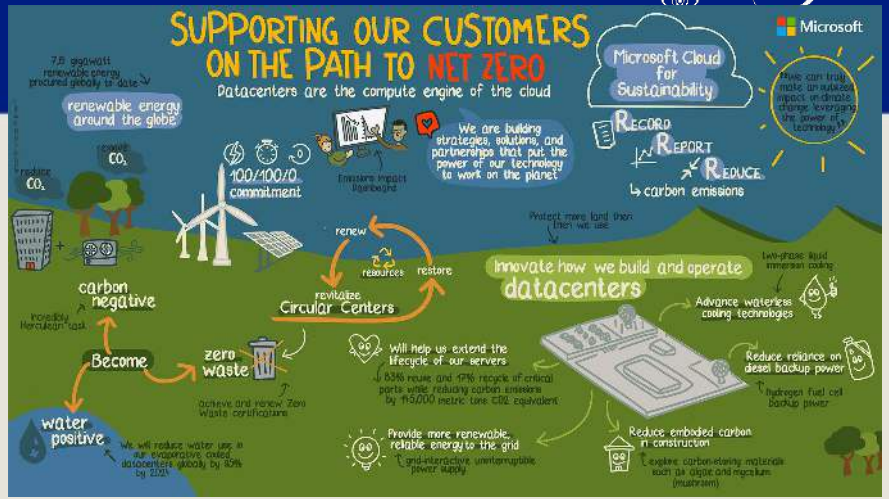
Write more efficient code?

Work with and lobby the government?

Cloud

- Great sustainability initiatives
- Flexibility in terms of resources and hardware.
- Can be expensive
- Barrier to entry can be steep

https://aws.amazon.com/compliance/data-center/environmental-layer/



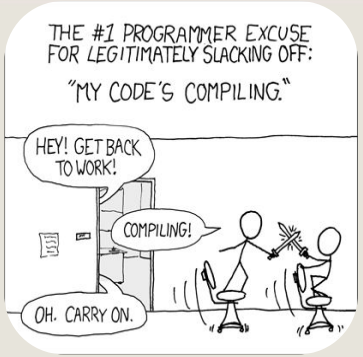
https://blogs.microsoft.com/blog/2021/10/27/supporting-our-customers-on-the-path-to-net-zero-the-microsoft-cloud-and-decarbonization/

Sustainable compute

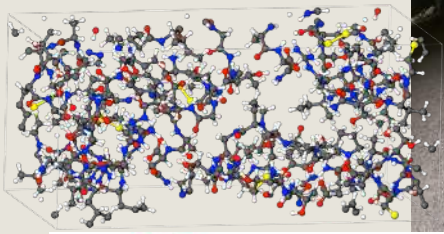
Sustainable Compute Research Software Engineers

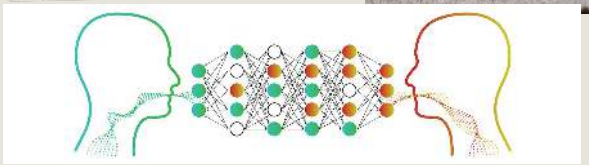
University of York

- Working efficiently with large volumes of data
- Improving existing software workflows
- Sustainable software practices
- Code optimisation & parallelisation
- Application profiling & benchmarking
- Data acquisition / storage / management
- Statistical modelling / machine learning
- Write better applications



GEOS Chem

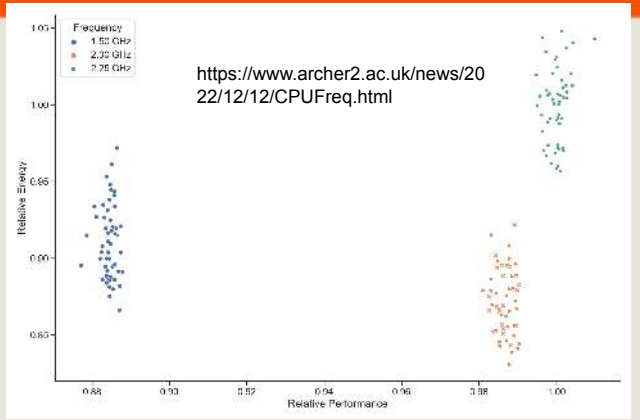




SOFTWARE SUSTAINABILITY INSTITUTE

Sustainable Compute - Infrastructure

- Schedulers
  - Supporting users with how they ultise scheduling their work.
  - Efficient ways of tuning/optimising our scheduler configuration
  - Work with users to be sensible with they usage.
- CPU frequency
- Cooling options
  - Air cooling
  - RDHX (air and water)
  - liquid cooling
  - immersive
- Data centre location



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SWEDEN
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LITHUANIA
BELARUS
POLAND
GERMANY
CZECH REP.
Slovakia
UKRAI

What are we doing?

- Procured Viking2 with a focus on sustainability.
- Located in a Datacenter with very strong eco credentials.
- Chipset choice with a focus on TDP vs Performance
- Continue to move workloads to Viking2
- Improved Data management

EcoDataCenter

How did we do it?

Some thoughts

Many institutions may start to find we do not have the power and cooling to run modern HPC environments.

It may also make it more difficult to build HPC environments in a sustainable manner.

Not all commercial Data Centers are well placed for hosting HPC.

Do we need to work together more to push building a sustainable HPC Data centre

Thank you for listening.