

A large, faint watermark of the YellowDog logo is visible in the background. It depicts a stylized dog's head in profile, facing right, with a prominent ear and a circular eye. The logo is rendered in a light blue color against the dark blue background.

YellowDog

Designing sustainable buildings
globally with Hybrid Cloud



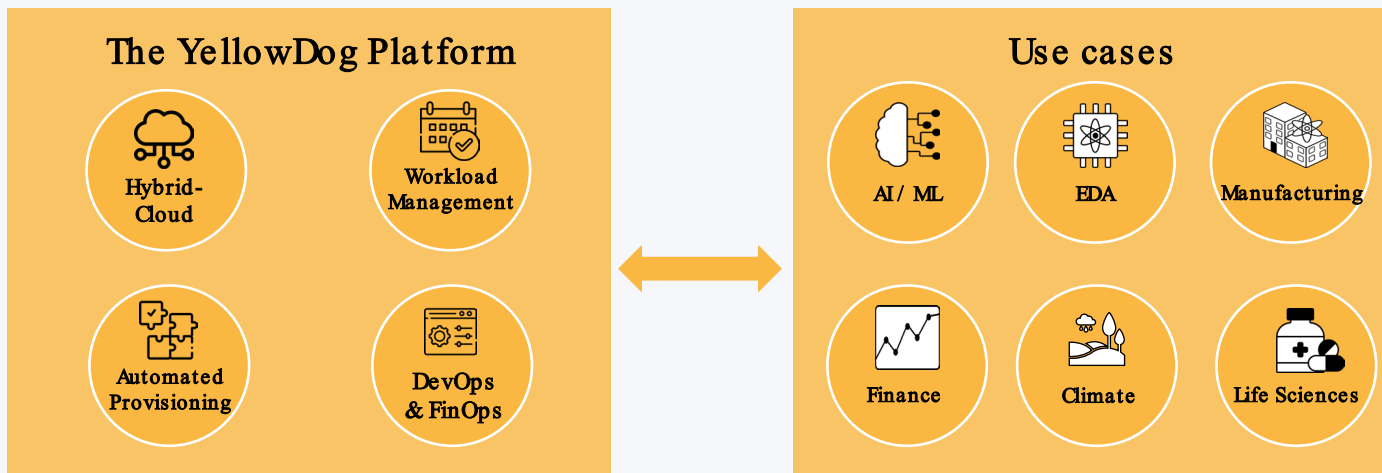
Presenter

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Product Director at YellowDog

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What YellowDog does



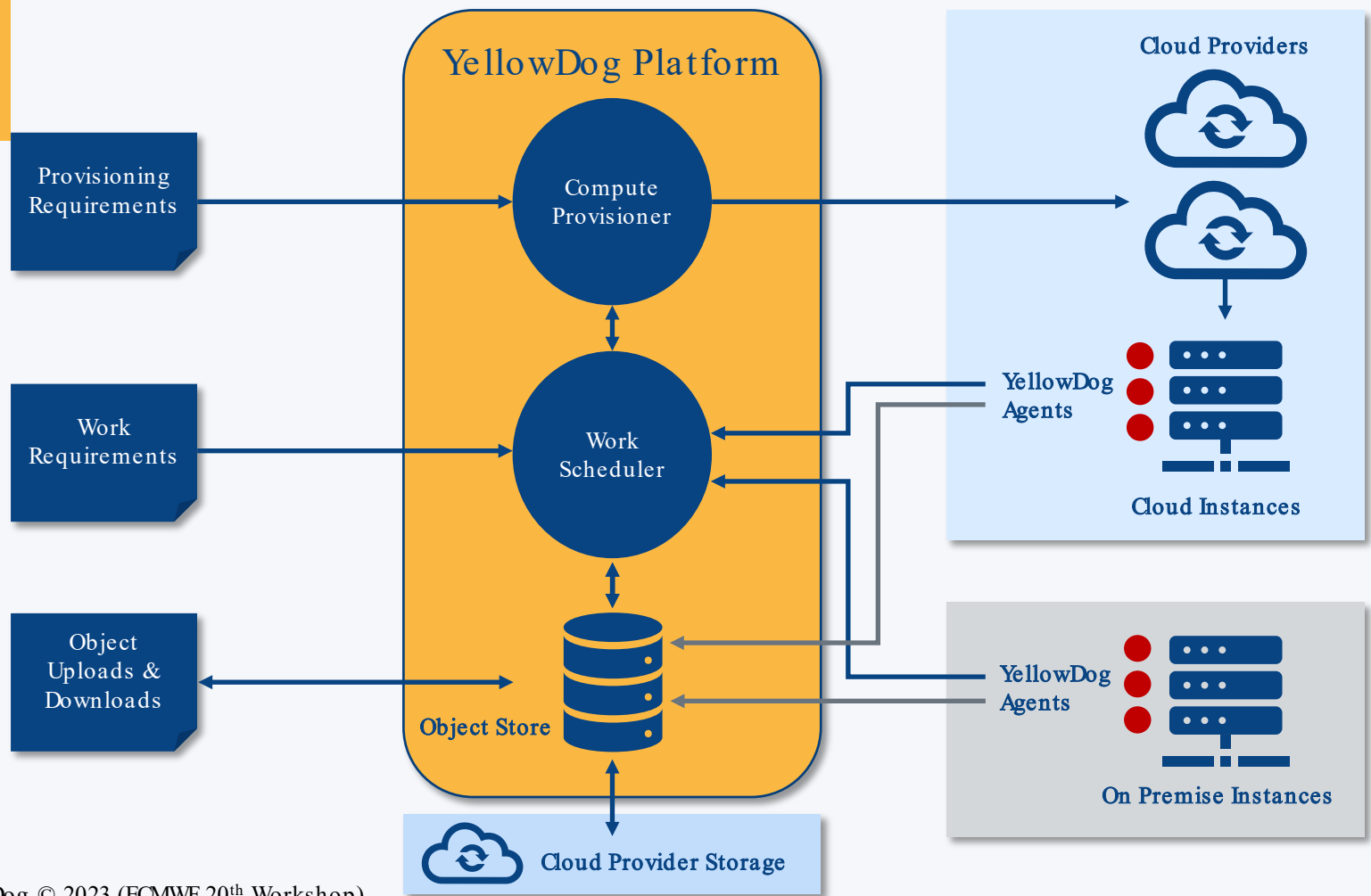
YellowDog enables management of the most demanding workloads for customers of all sizes across any infrastructure

These use cases have complex needs across price, scale, flexibility and accessibility.

Underpinned by:



This requires a **highly reliable and flexible capability**, which balances variable computing demand and supply.



Hybrid Cloud definitions

 <https://cloud.google.com > learn > what-is-hybrid-cloud>

What is a Hybrid Cloud? | Google Cloud

A **hybrid cloud** is a mixed computing environment where applications are run using a combination of computing, storage, and services in different environments—public **clouds** and private **clouds**, including on-premises data centers or edge locations. Learn how **hybrid cloud** works, what are the benefits and disadvantages, and how to adopt it for your business needs.

 <https://azure.microsoft.com > en-us > resources > cloud-computing-dictionary > what-is-hybrid-clo...>

What is a Hybrid Cloud? | Microsoft Azure

A **hybrid cloud** is a computing environment that combines an on-premises datacenter with a public **cloud**, allowing data and applications to be shared between them. Learn about the benefits, regulatory issues, and security issues of using **hybrid cloud** with Azure products and services.

 <https://www.ibm.com > topics > hybrid-cloud>

What is Hybrid Cloud? | IBM

Hybrid cloud combines and unifies public **cloud**, private **cloud** and on-premises infrastructure to create a single, flexible, cost-optimal IT infrastructure. Learn how **hybrid cloud** works, what are the benefits of a unified **hybrid** multicloud platform, and how IBM offers **hybrid cloud** solutions.

Outcomes

Hybrid Cloud definition is important, but the
"terms of engagement" and outcomes are
more so

Do we see a typical pattern?

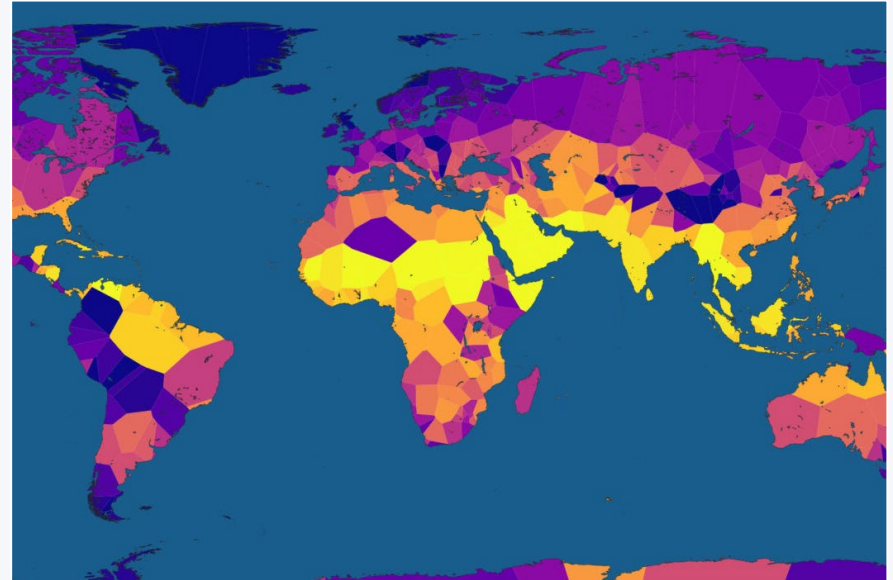
Portable workload, scarce on-prem
resources, resulting in constrained analyses
and therefore constrained results

Case study: Designing sustainable buildings globally with Hybrid-Cloud

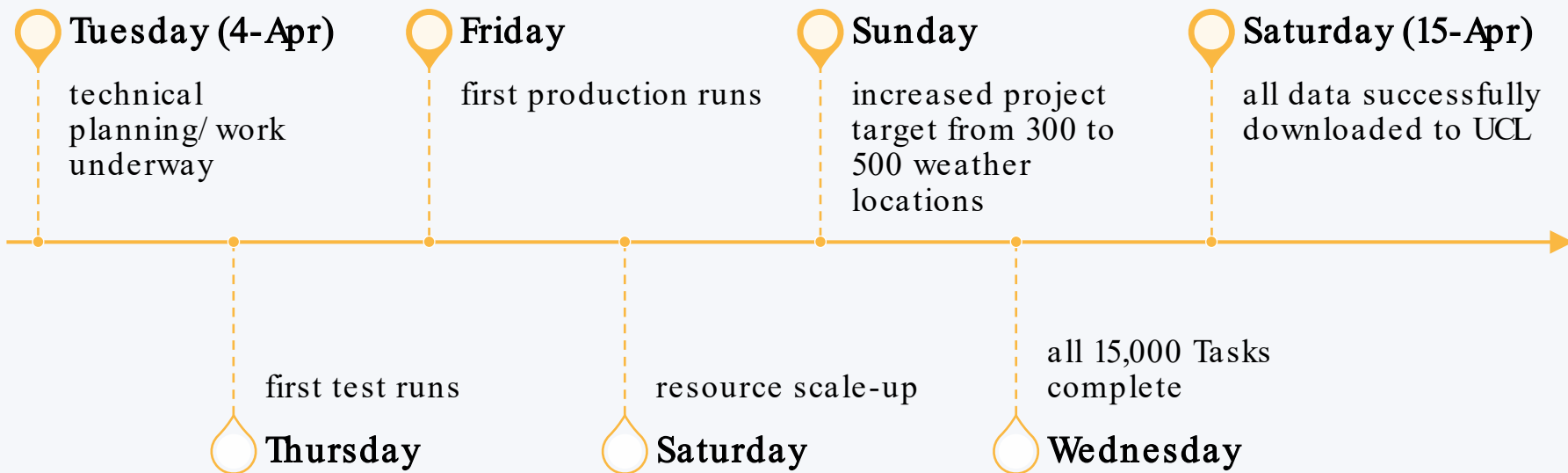
With FCB Studios and UCL

- The building industry accounts for 39% of global energy-related carbon emissions. Any sustainable future must find a way to reduce this to zero
- Using simulations to enable sustainable buildings design in any climate, but the compute resource required for these simulations was scarce
- YellowDog ran 354 million Energy+ simulations, simulating 708,000 building construction properties against annual weather records in

Zero Carbon Buildings

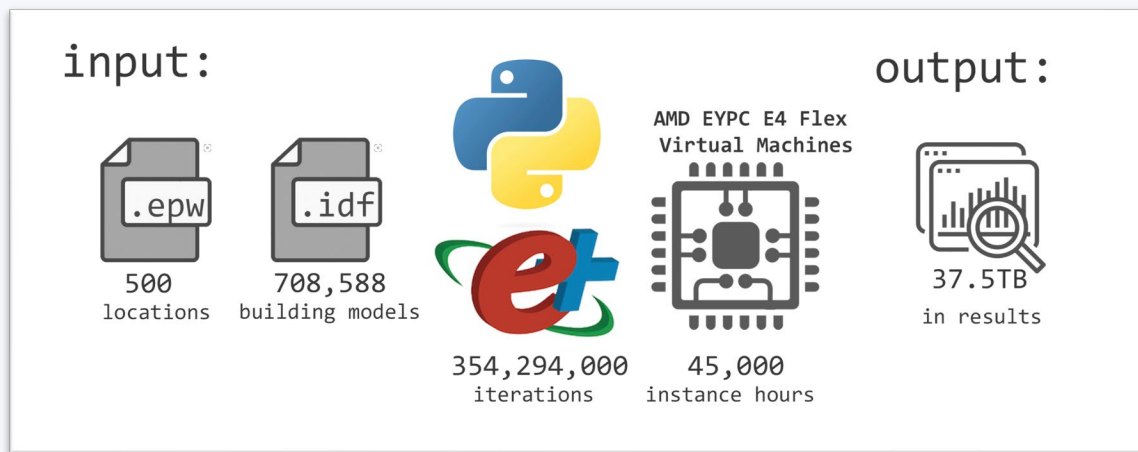


Timeline of implementation and execution



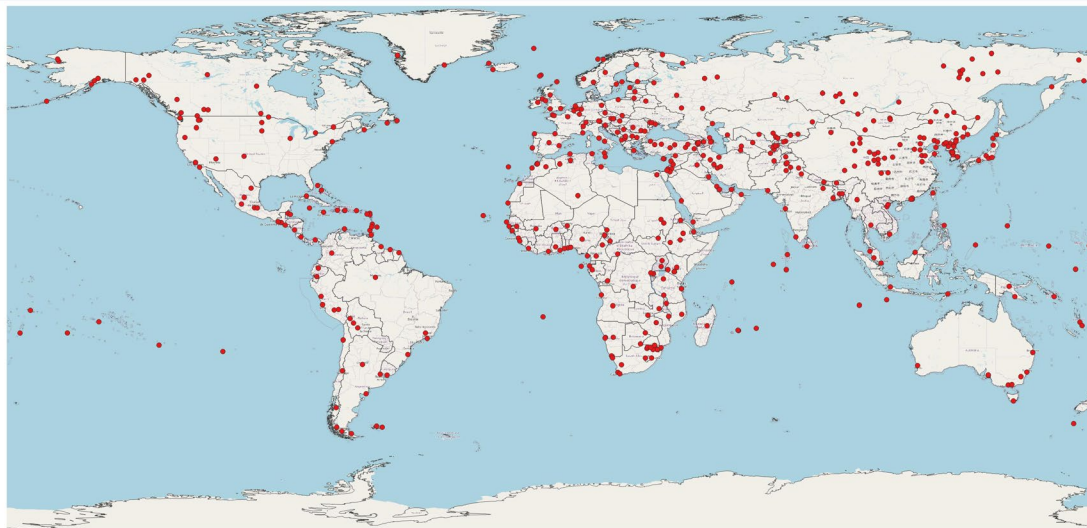
Instances and Applications

In 6 days, YellowDog scheduled 354 million simulations on AMD EYPC processors in Oracle Cloud



Project Outcomes

Accelerating research and having a lasting impact on international sustainability efforts



Happy Customer

“The possibility to use cloud computing changes the whole timing of the project.

Instead of thinking about carrying out a reduced version of the analysis over months, we are thinking about a much bigger and more ambitious, experimental campaign in weeks.”

Daniel Zepeda-Rivas, Project Leader

Project Reflection

- Capacity of on-premise resource is often **fully allocated**
- Project with a **sporadic nature** in the use of compute
- Impossible to purchase on-premise machines to **satisfy all users** at once.

The solution:

- Fungible and portable workloads are ideal for Hybrid Cloud
- Design/ Analyses space can be extended
- Projects can be unblocked
- Projects become flexible

YellowDog

Assessing the carbon impact
of the project

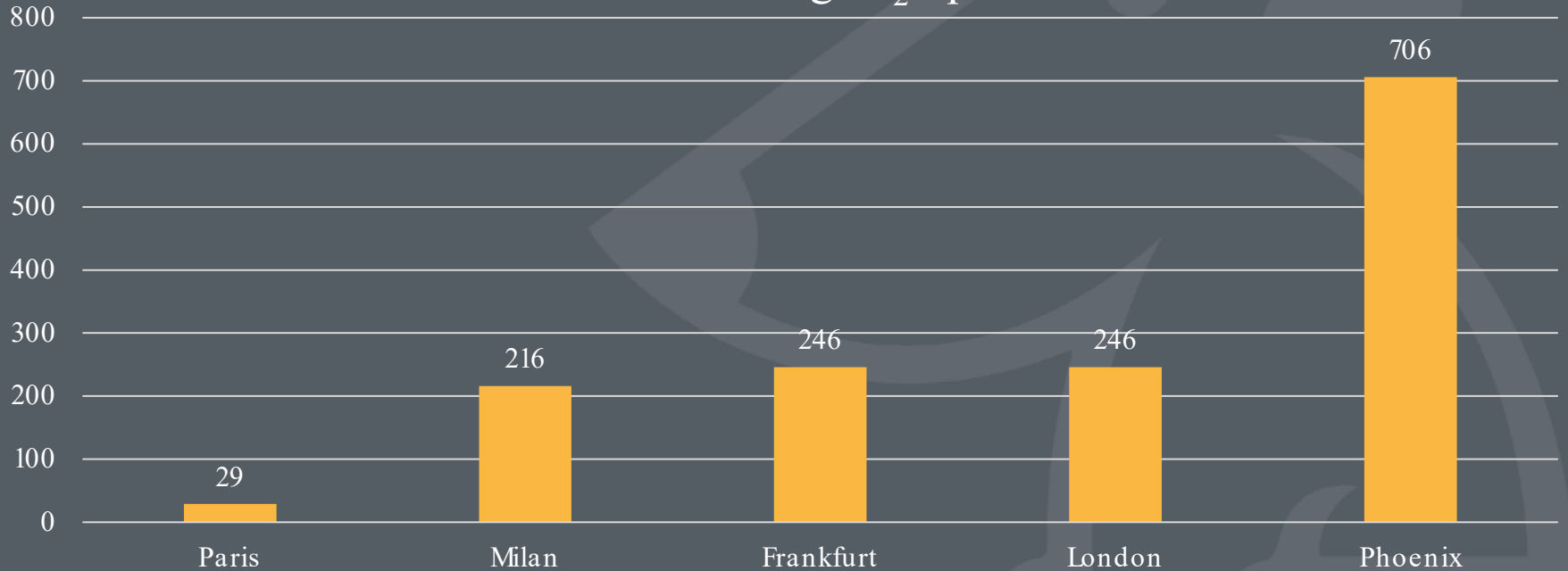
Instance specification and Datacentre PUE

- Physical Server 2 x AMD EPYC 7J13 processors - 64 cores – 128 vCPUs and 128GB RAM, each server running 2 VMs
- 100% CPU utilization = 592 Watts
- Power Usage Effectiveness (PUE) = 1.4. So, actual power usage is 40% higher = 828.8W
- Halved to represent the virtual machines = 414.4W

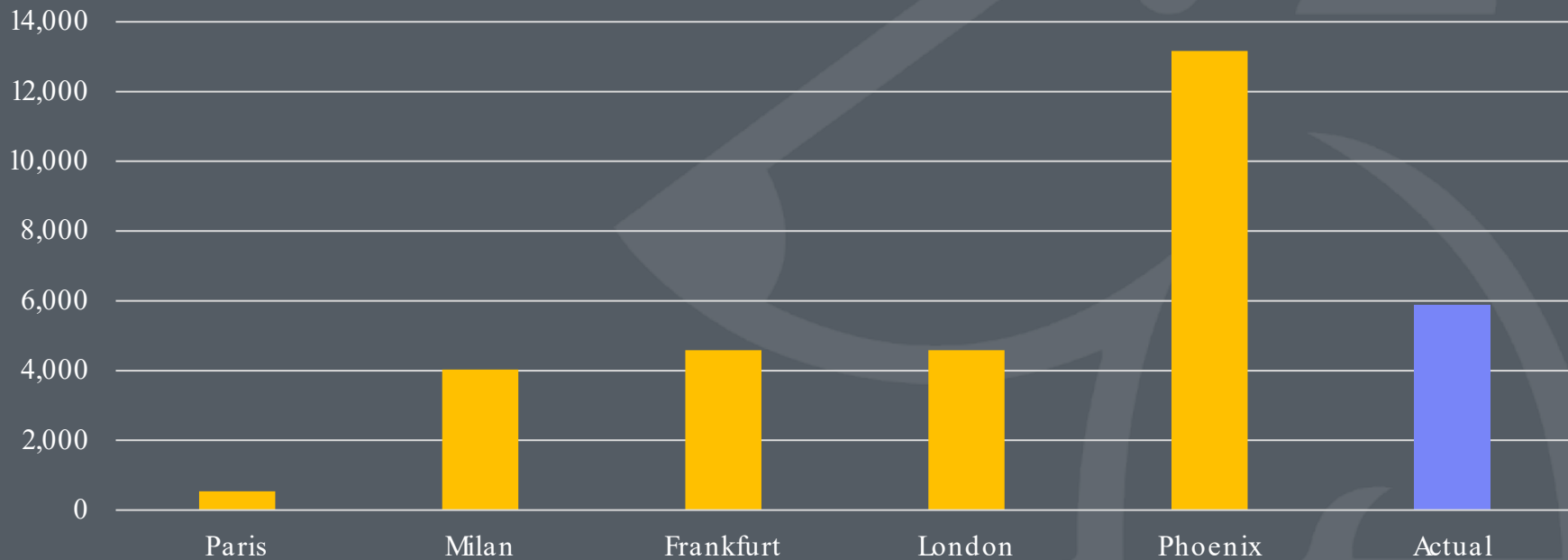
Differences in Cloud Regions

- Datacenter regions and gCO_2eqKwh at time of run based on grid mix:
 - London = 246, Phoenix = 706, Frankfurt = 246,
 - Paris = 29, Milan = 216
- Hours consumed = 45,000
- Had the job run entirely in the US Southwest, then the amount of carbon would have been 13,165 kg CO

Grid Mix - gCO₂eqKwh



Outcomes - kg CO₂





Thank you for listening! Any questions?

Niall Kennedy

Product Director at YellowDog

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