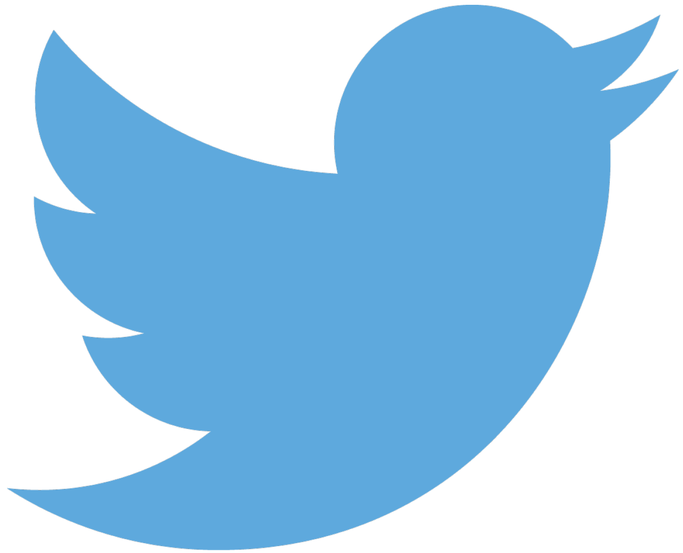
#JFOKUS

WHO AM I?



+

@CHRISTHALINGER

COMPILER ENGINEER

@CHRISTHALINGER

compiler | kəm'pīlər |

noun

1 a person who produces a list or book by assembling information or written material collected from other sources: *this passage was revised in different ways by later compilers*.

compiler | kəm'pīlər |

noun

1 a person who produces a list or book by assembling information or written material collected from other sources: *this passage was revised in different ways by later compilers*.

2 *Computing* a program that converts instructions into a machine-code or lower-level form so that they can be read and executed by a computer: *conversion would require more than just running it through a different compiler*.

Optimizing compiler

From Wikipedia, the free encyclopedia

In computing, an **optimizing compiler** is a compiler that tries to minimize or maximize some attributes of an executable computer program. Common requirements are to minimize a program's execution time, memory requirement, and power consumption (the last two being popular for portable computers).

P E R F O R M A N C E

PERFORMANCE AND OUR IMPACT

SOFTWARE DEVELOPMENT TODAY

What are sprints?

A sprint is a short, time-boxed period when a scrum team works to complete a set amount of work. Sprints are at the very heart of scrum and agile methodologies, and getting sprints right will help your agile team ship better software with fewer headaches.

"Sprints make projects more manageable, allow teams to ship high-quality work faster and more frequently, and gives them more flexibility to adapt to change."

HTTPS://WWW.ATLASSIAN.COM/AGILE/SCRUM/SPRINTS

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HTTPS://WWW.ATLASSIAN.COM/AGILE/SCRUM/SPRINTS

A STORY...

ZERO

Escape analysis

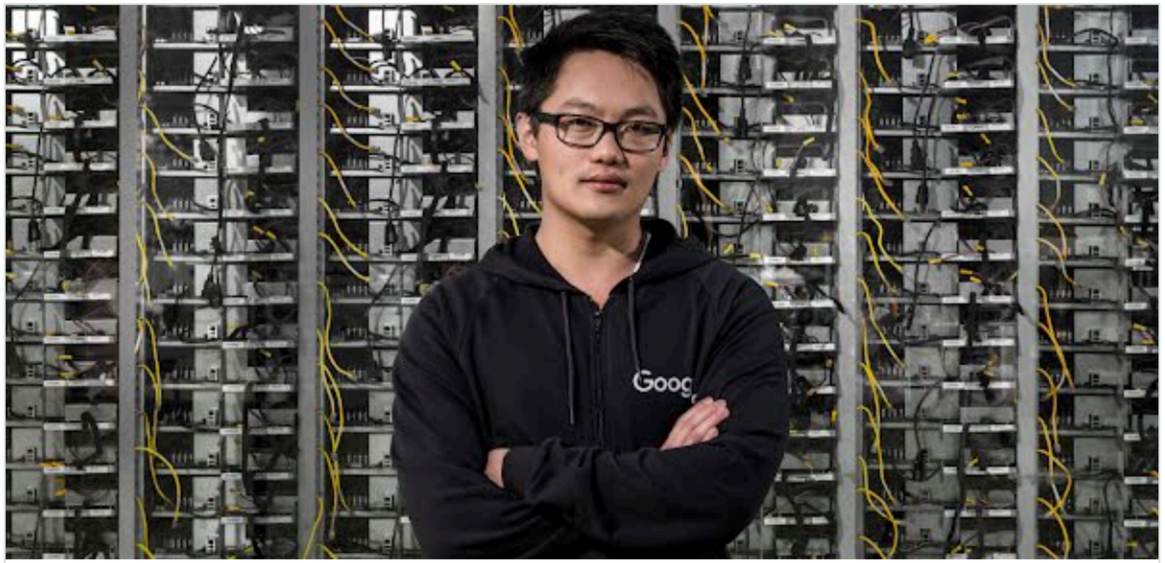
From Wikipedia, the free encyclopedia

In compiler optimization, **escape analysis** is a method for determining the dynamic scope of pointers – where in the program a pointer can be accessed. It is related to pointer analysis and shape analysis.

KNOW YOUR COMPILER OPTIMIZATIONS
AND
DON’T BE TOO SMART

HTTPS://EN.WIKIPEDIA.ORG/WIKI/OPTIMIZING_COMPILER

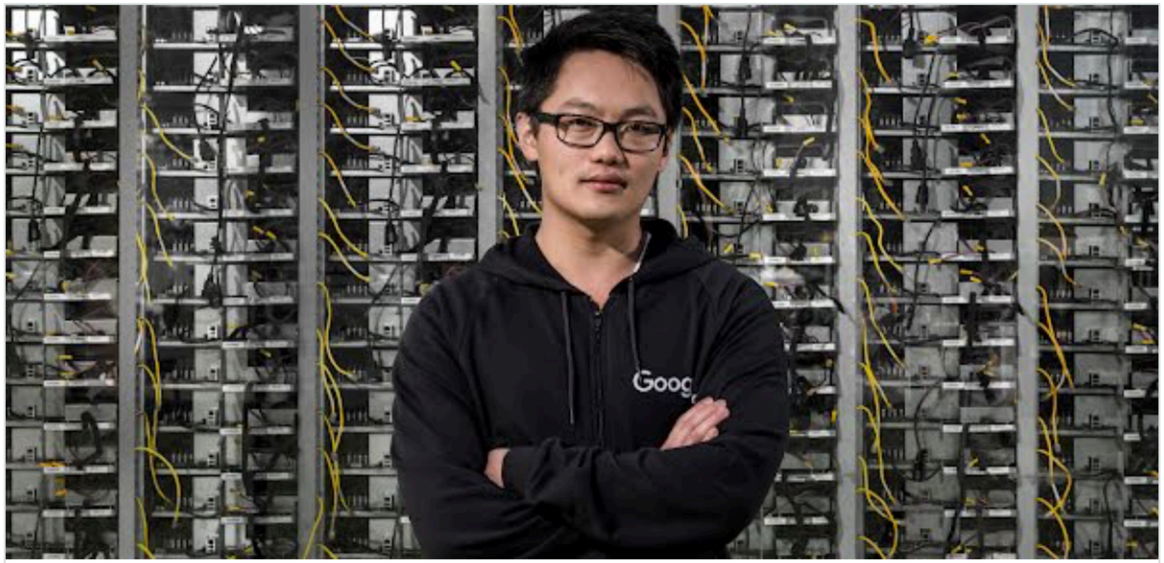
DATA CENTER ELECTRICITY USAGE



Data centers and machine learning

The virtual world is built on physical infrastructure, and all those racks of humming servers use vast amounts of energy. Together, all existing data centers use roughly 2% of the world's electricity; if left unchecked, this energy demand could grow as rapidly as internet use. So making data centers run as efficiently as possible is a very big deal — and that's what we set out to do.

READ MORE



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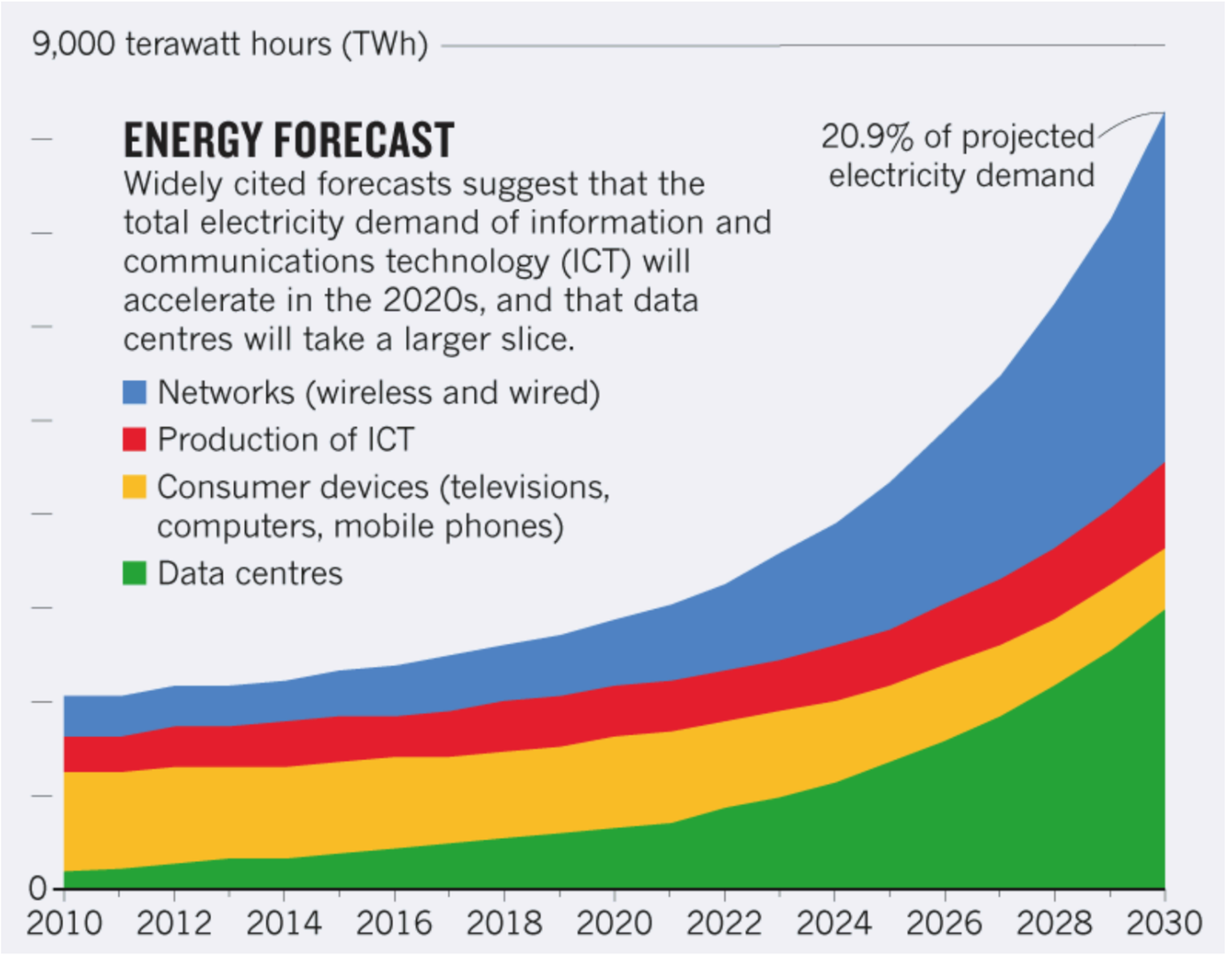

HTTPS://WWW.NATURE.COM/ARTICLES/D41586-018-06610-Y

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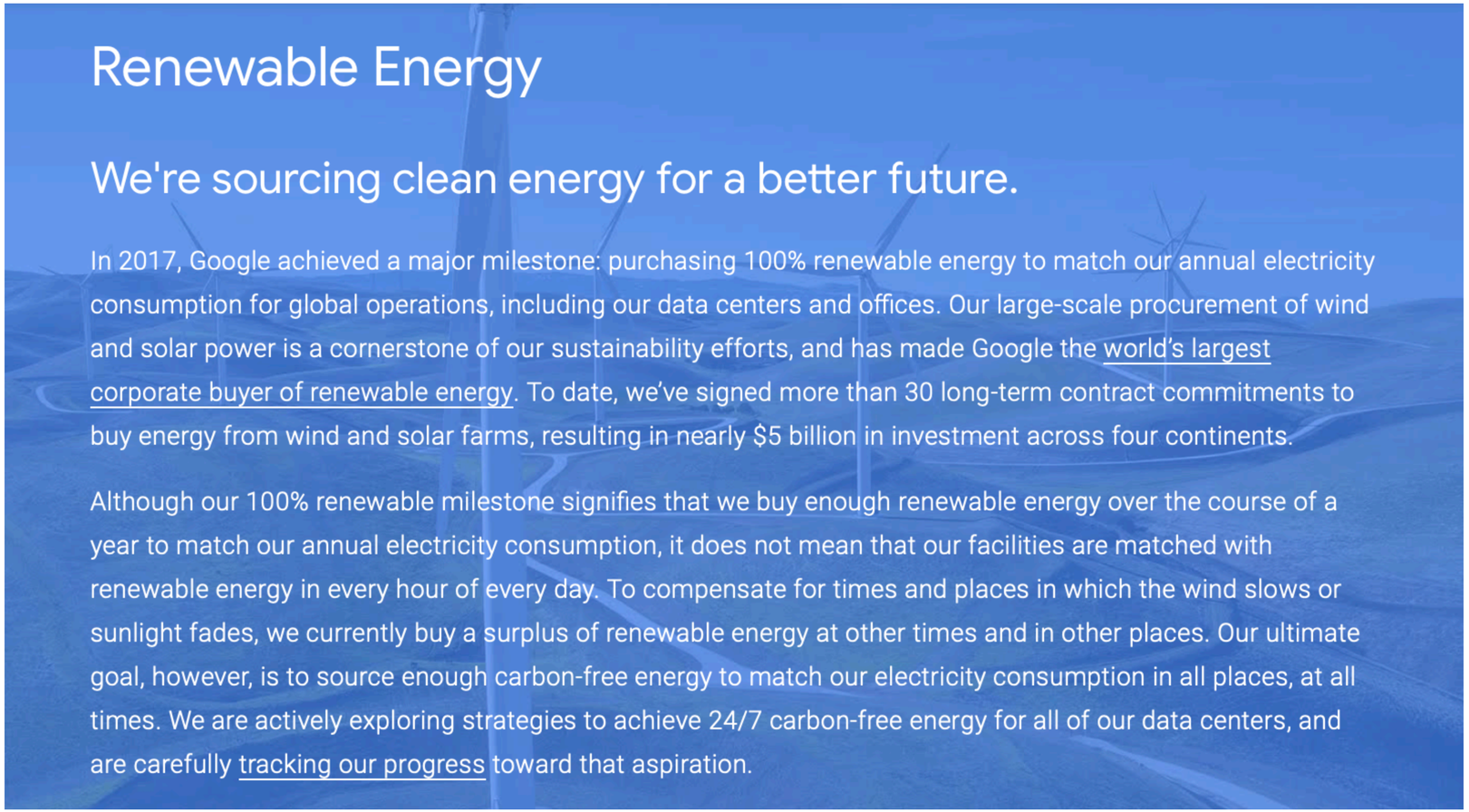
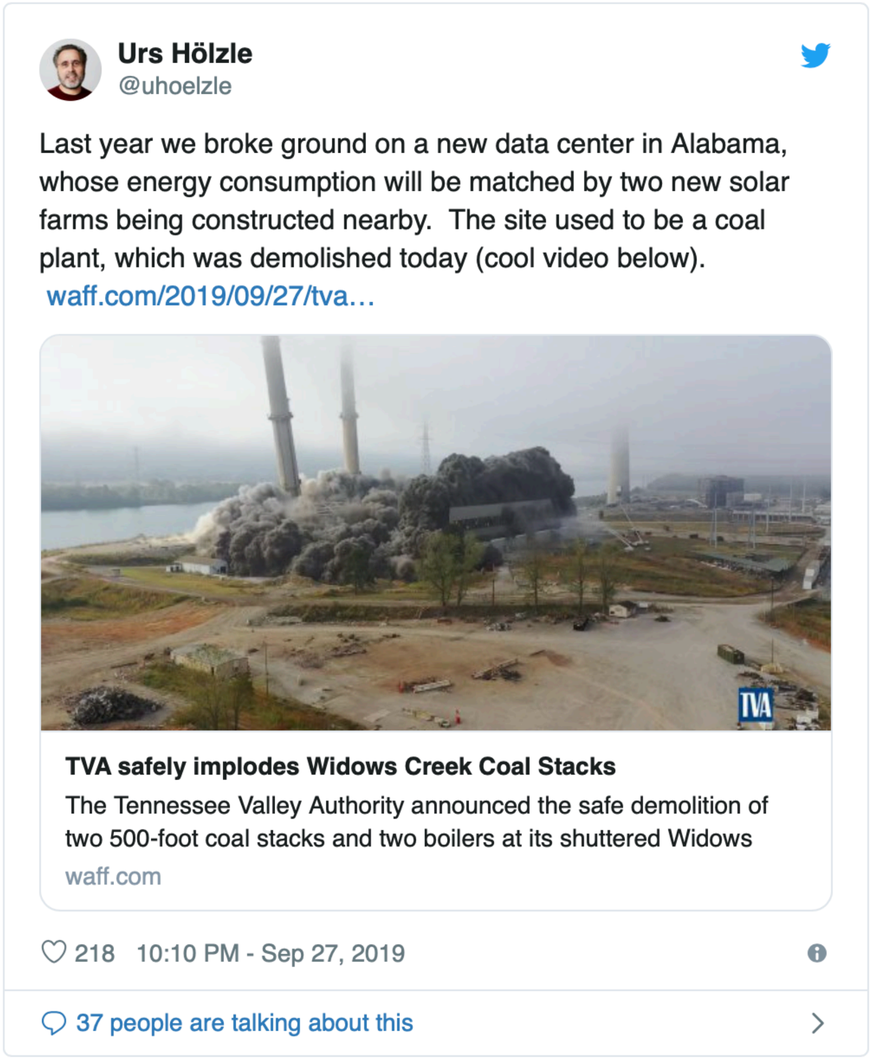
THE GOOD...

GOOGLE



HTTPS://WWW.GOOGLE.COM/ABOUT/DATACENTERS/RENEWABLE


Urs Hölzle
@uhoelzle
Last year we broke ground on a new data center in Alabama, whose energy consumption will be matched by two new solar farms being constructed nearby. The site used to be a coal plant, which was demolished today (cool video below).
waff.com/2019/09/27/tva…
TVA
TVA safely implodes Widows Creek Coal Stacks
The Tennessee Valley Authority announced the safe demolition of two 500-foot coal stacks and two boilers at its shuttered Widows
waff.com
218 10:10 PM - Sep 27, 2019
37 people are talking about this

AMAZON

Keeping up with our commitment to 100% renewable energy

We've made a lot of progress on this commitment. AWS exceeded 50% renewable energy usage for 2018.

In addition to the renewable energy projects below, AWS has announced four new wind farms and one new solar farm. These projects – two in Ireland, one in Sweden, and two in the United States – will total over 297 megawatts (MW), with expected generation of over 830,000 megawatt hours (MWh) of renewable energy annually.

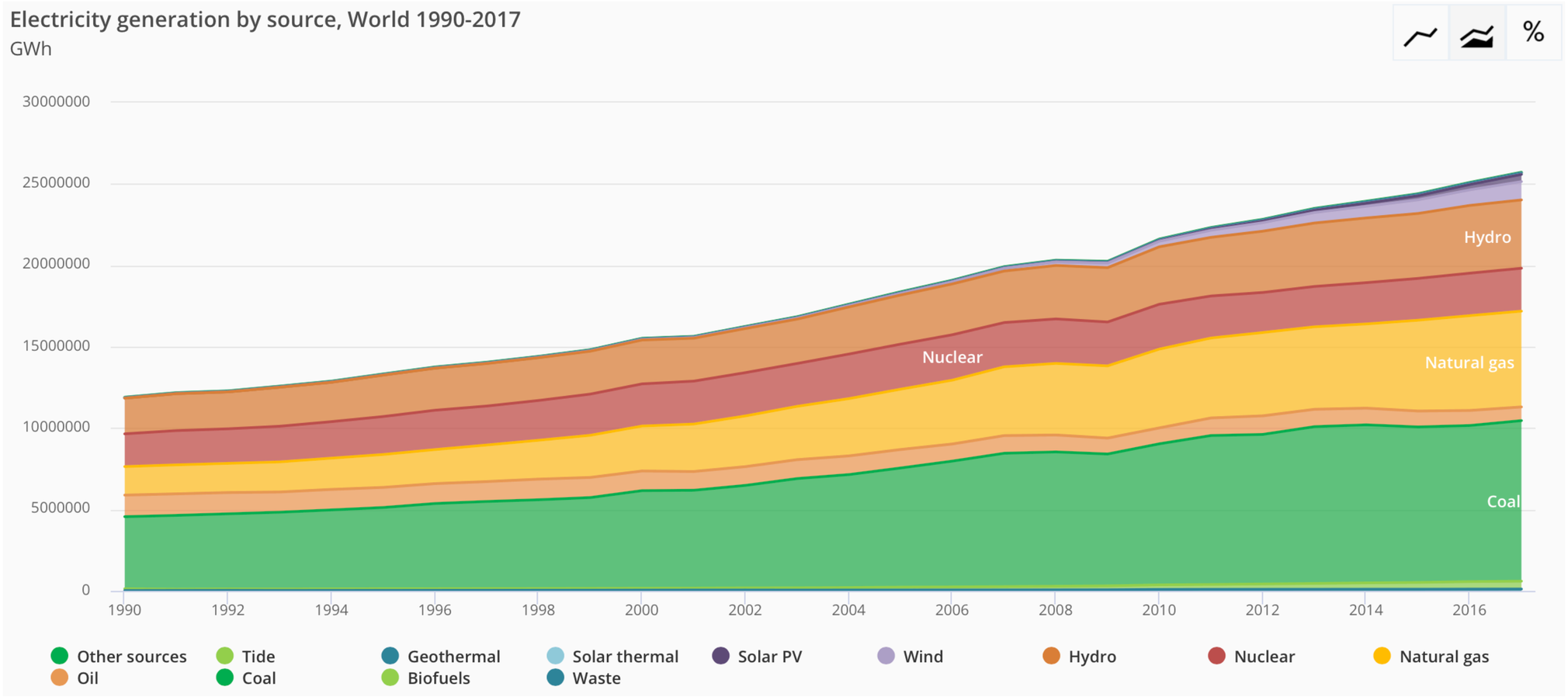
Once complete, these wind and solar farms, combined with AWS's nine previous renewable energy projects, are expected to generate more than 2,900,000 MWh of renewable energy annually.

MICROSOFT

Today, we are announcing that we will nearly double our internal carbon fee to $15 per metric ton on all carbon emissions. This internal Microsoft “tax” was established in 2012 to hold our business divisions financially responsible for reducing their carbon emissions.

THE BAD...

INTERNATIONAL ENERGY AGENCY



HTTPS://WWW.IEA.ORG/STATISTICS/

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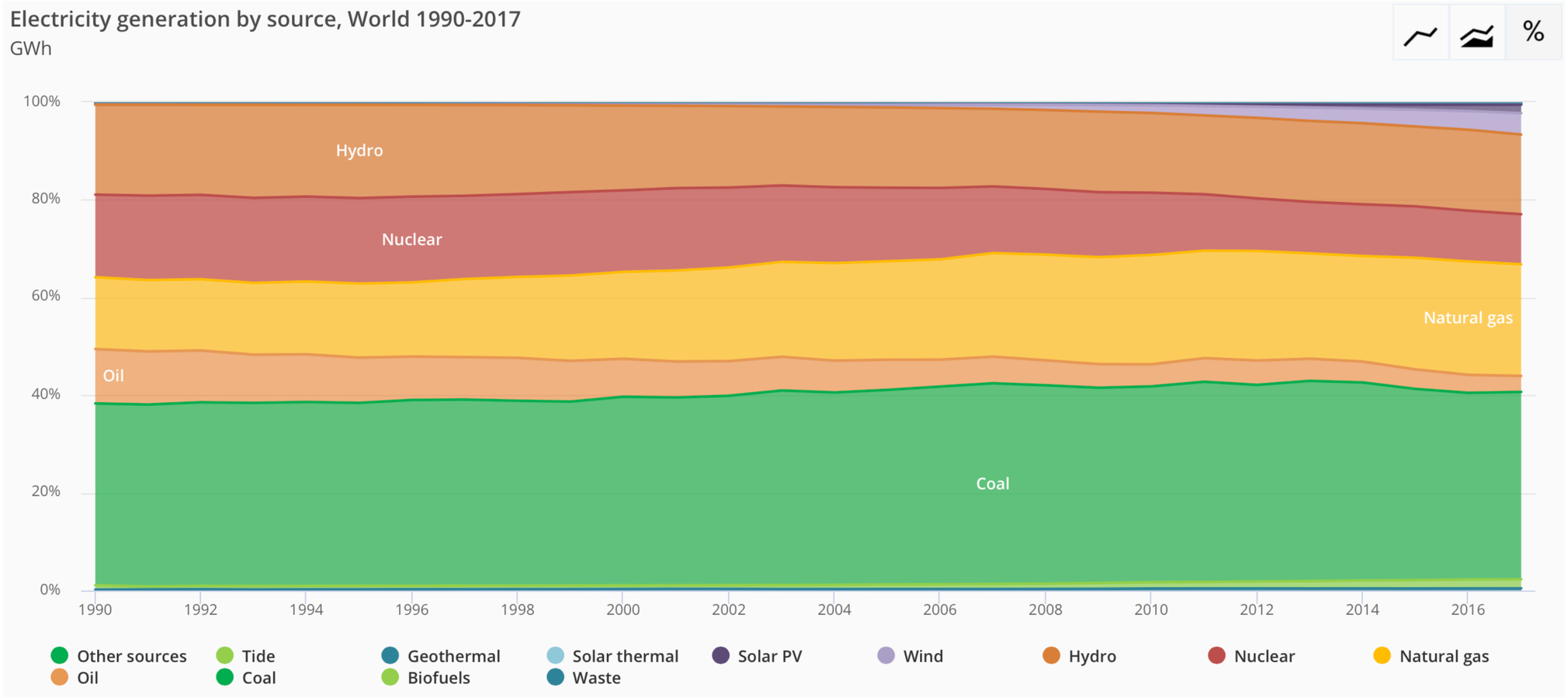
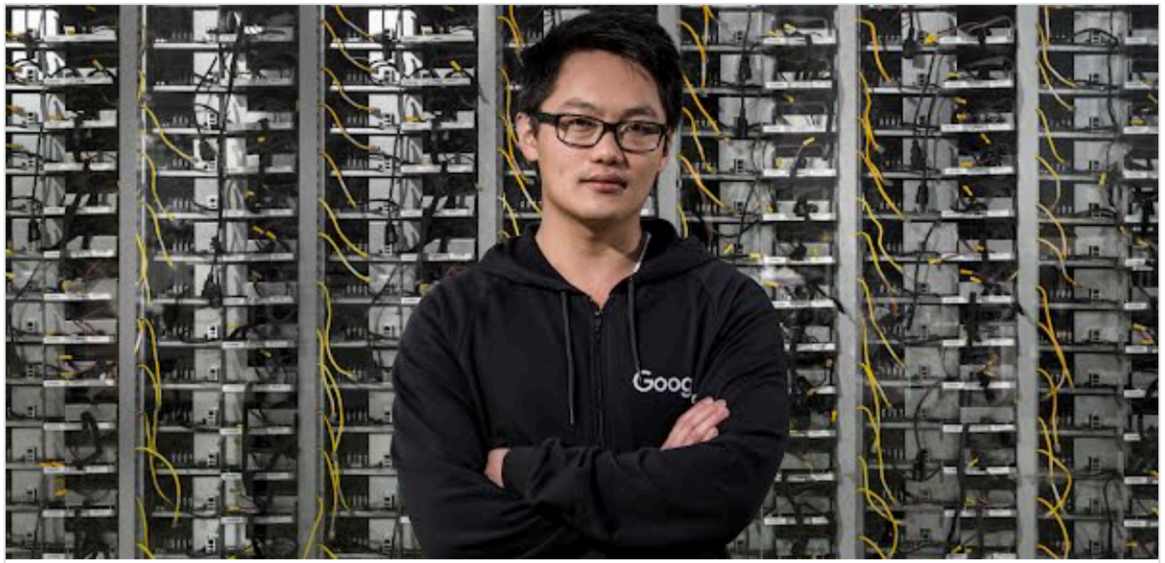
INTERNATIONAL ENERGY AGENCY



HTTPS://WWW.IEA.ORG/STATISTICS/

@CHRISTHALINGER



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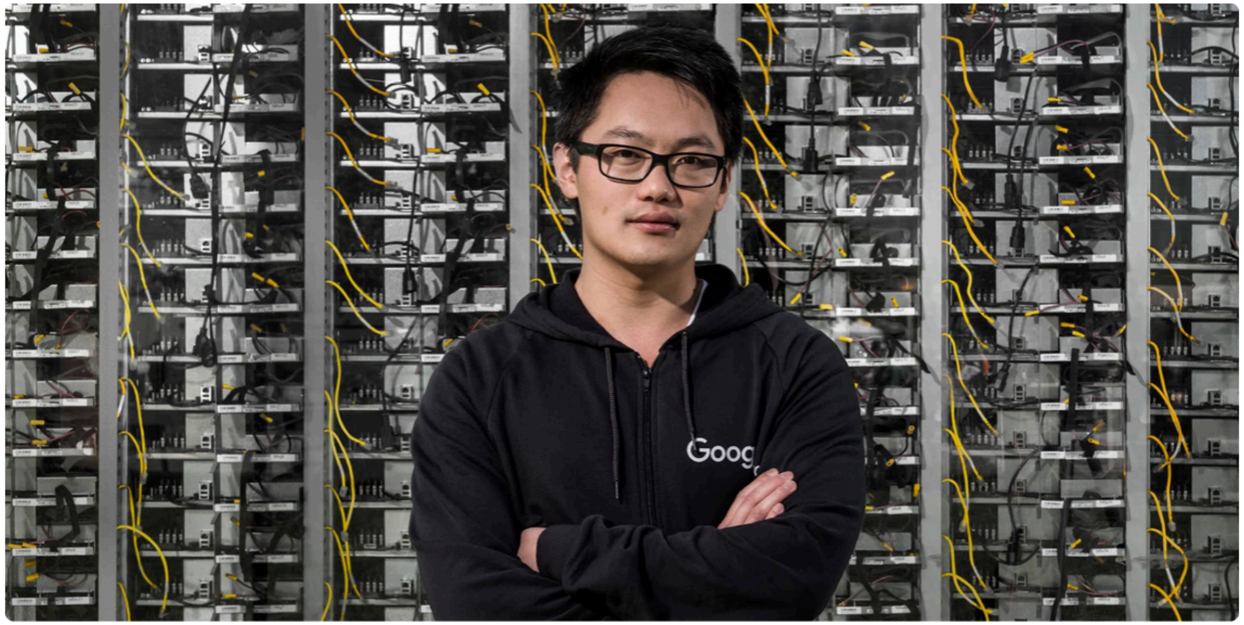
READ MORE

Machine learning finds new ways for our data centers to save energy



HTTPS://SUSTAINABILITY.GOOGLE/PROJECTS/MACHINE-LEARNING/

@CHRISTHALINGER

By spring 2014, Google data centers used 50% less energy than the industry average. Which of course meant the next question was whether they could run even leaner. An efficiency engineer named Jim Gao, his interest piqued by an online class on machine learning, decided to find out.

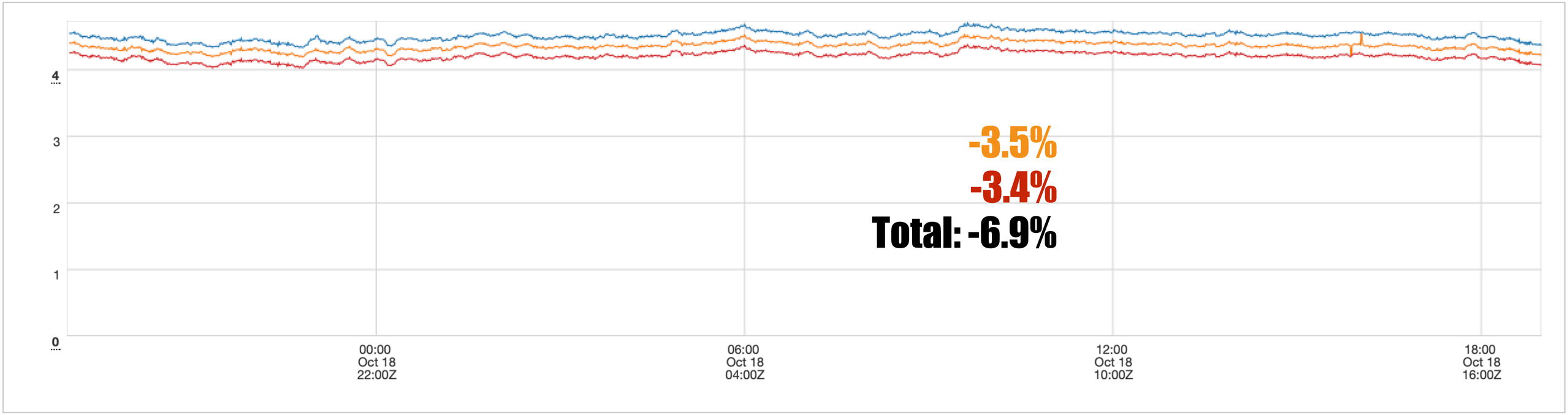
Just 10 pieces of equipment, each with 10 settings, would have 10 to the 10th power, or 10 billion, possible configurations — a set of possibilities far beyond the ability of anyone to test for real.

Eighteen months later, the models have been piloted at multiple facilities and have produced a 40% reduction in energy used for cooling and 15% reduction in overall energy overhead. Although one of these pilots has already succeeded in bringing the PUE at one of Google's test data centers to a new low, the growing DCIQ team believes it has only scratched the surface of machine learning's more general applications.

A TWITTER EXAMPLE...

TWEET SERVICE: ALLOCATED BYTES/TWEET

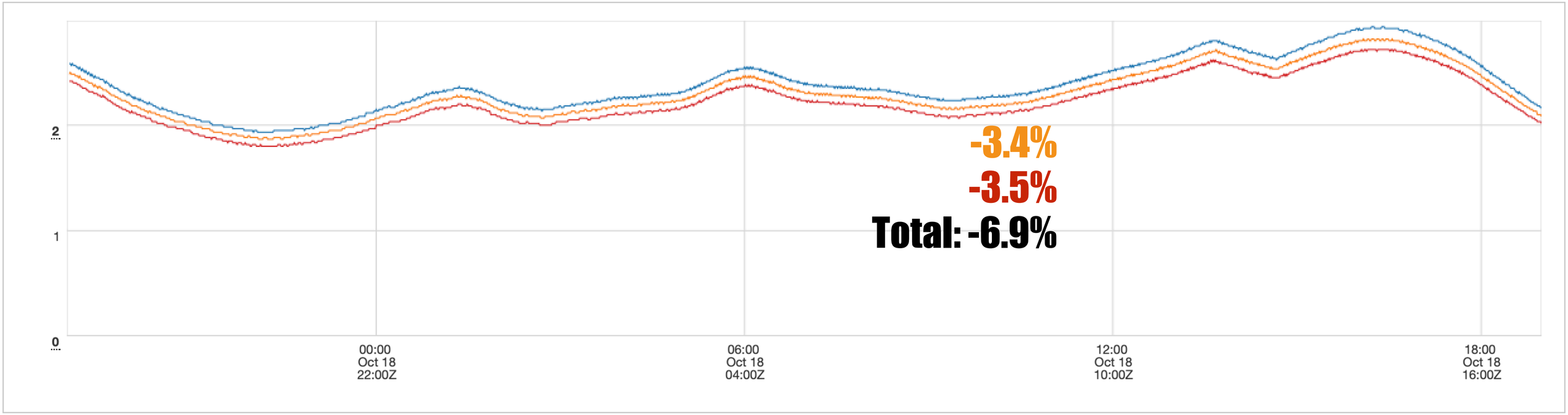
movingavg(10)



C2 Graal Autotune

TWEET SERVICE: PS SCAVENGE CYCLES

movingavg(60)

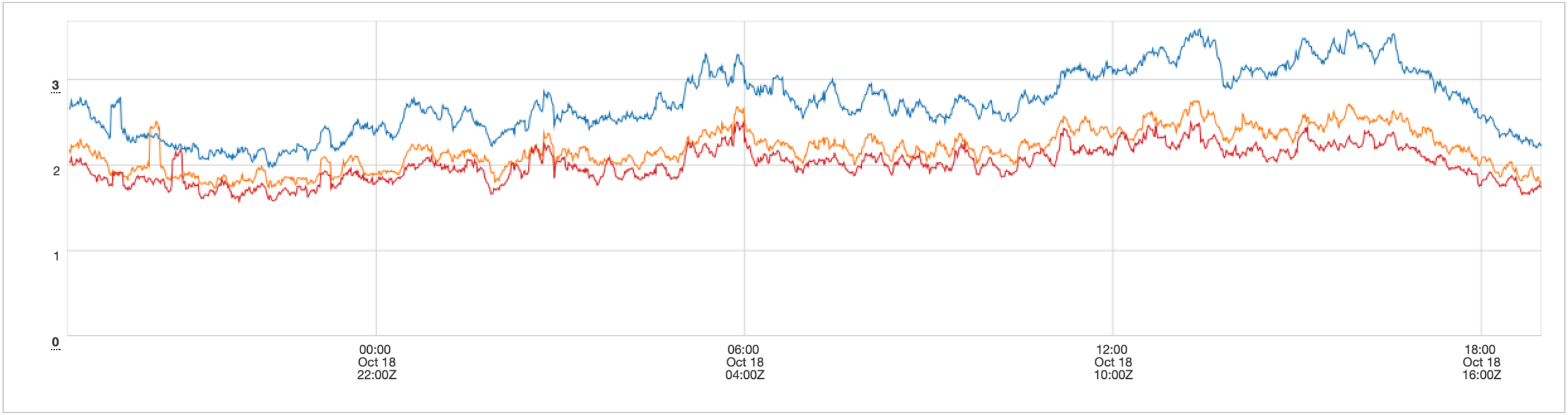


C2 Graal Autotune

@CHRISTHALINGER

TWEET SERVICE: LATENCY P99

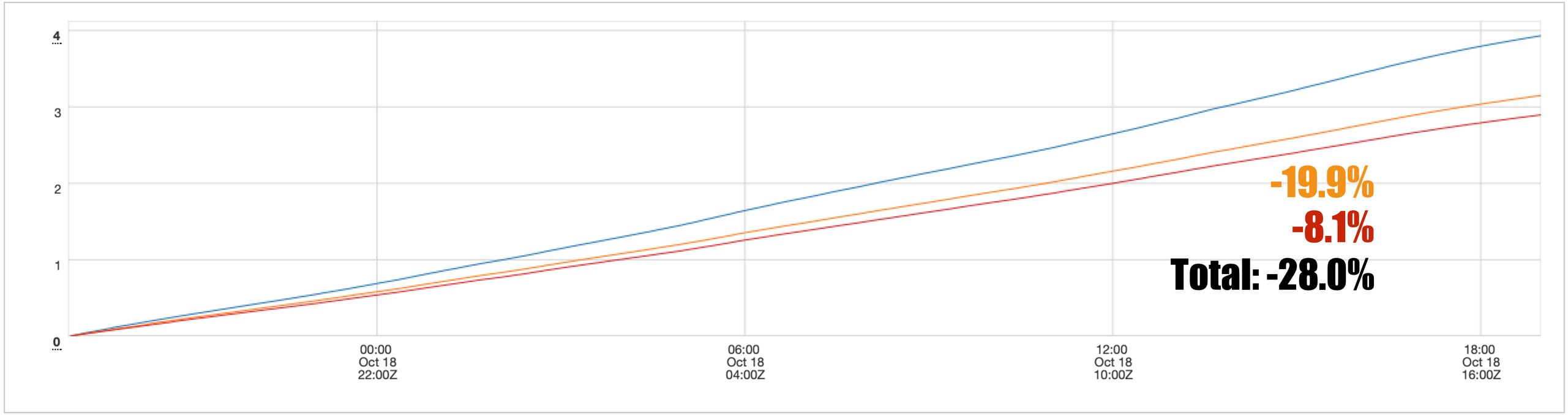
movingavg(10)



C2 Graal Autotune

TWEET SERVICE: LATENCY P99

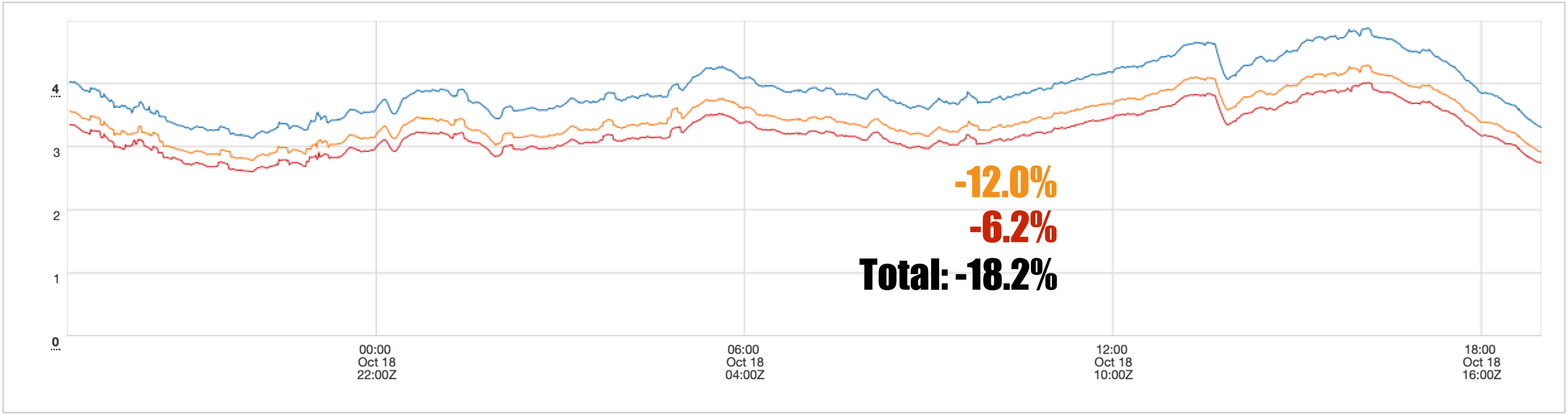
integrate()



C2 Graal Autotune

TWEET SERVICE: USER CPU TIME

movingavg(10)



C2 Graal Autotune

18% FEWER MACHINES AND LESS ELECTRICITY

HTTPS://WWW.CCN.COM/WP-CONTENT/UPLOADS/2018/05/BITCOIN-MINING-ASIC.JPG

Digiconomist
@DigiEconomist

The #energy footprint for one #Bitcoin transaction (606 KWh) equates to:
-1 US household 20 days (DE: 63, CN: 170)#CarbonFootprint
per TX: 288 KG
-720,021 VISA transactions
-48,001 hours of watching Youtube#Ewaste per TX: 94 gramsbitcoinenergyconsumption.com

Bitcoin Energy Consumption Index - Digico...
The Bitcoin Energy Consumption Index provides the latest estimate of the total energy consumption of the Bitcoin network.
digiconomist.net

♡ 2 3:53 PM - Sep 29, 2019

See Digiconomist's other Tweets

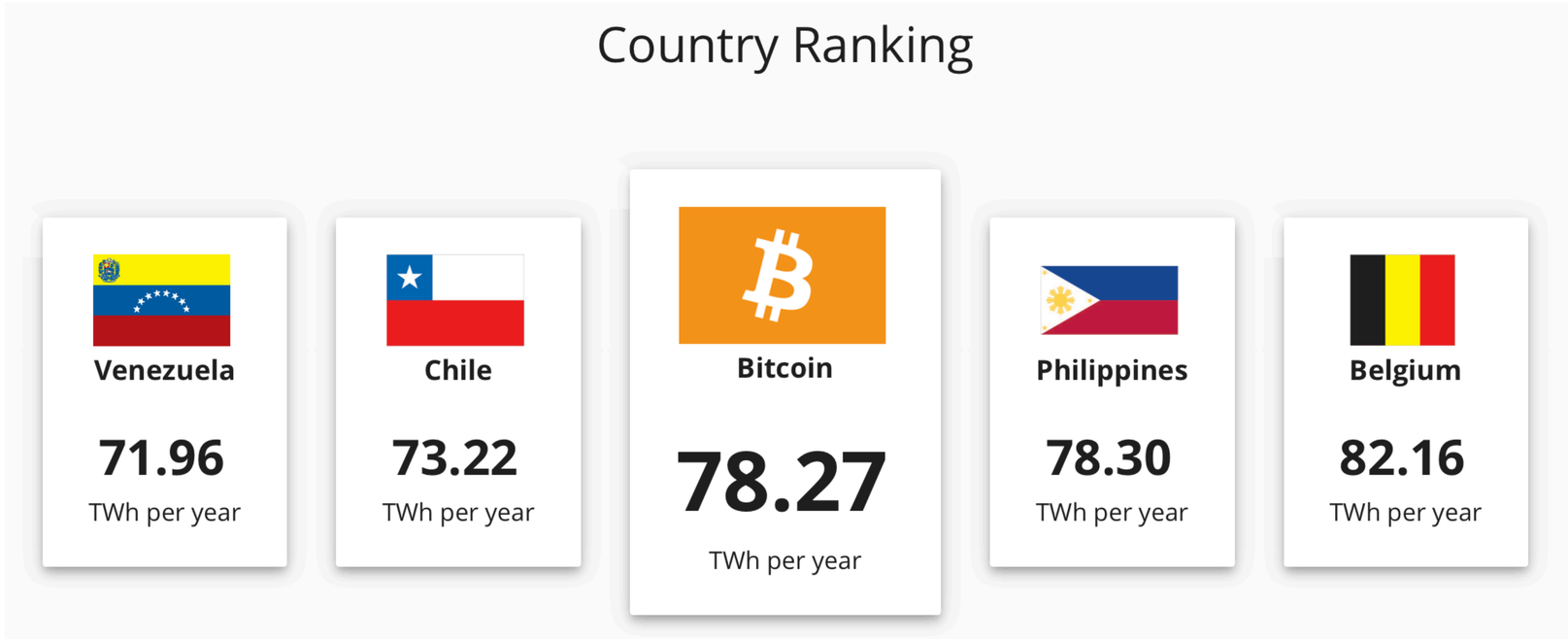
CAMBRIDGE BITCOIN ELECTRICITY CONSUMPTION INDEX

78.27 TWH PER YEAR

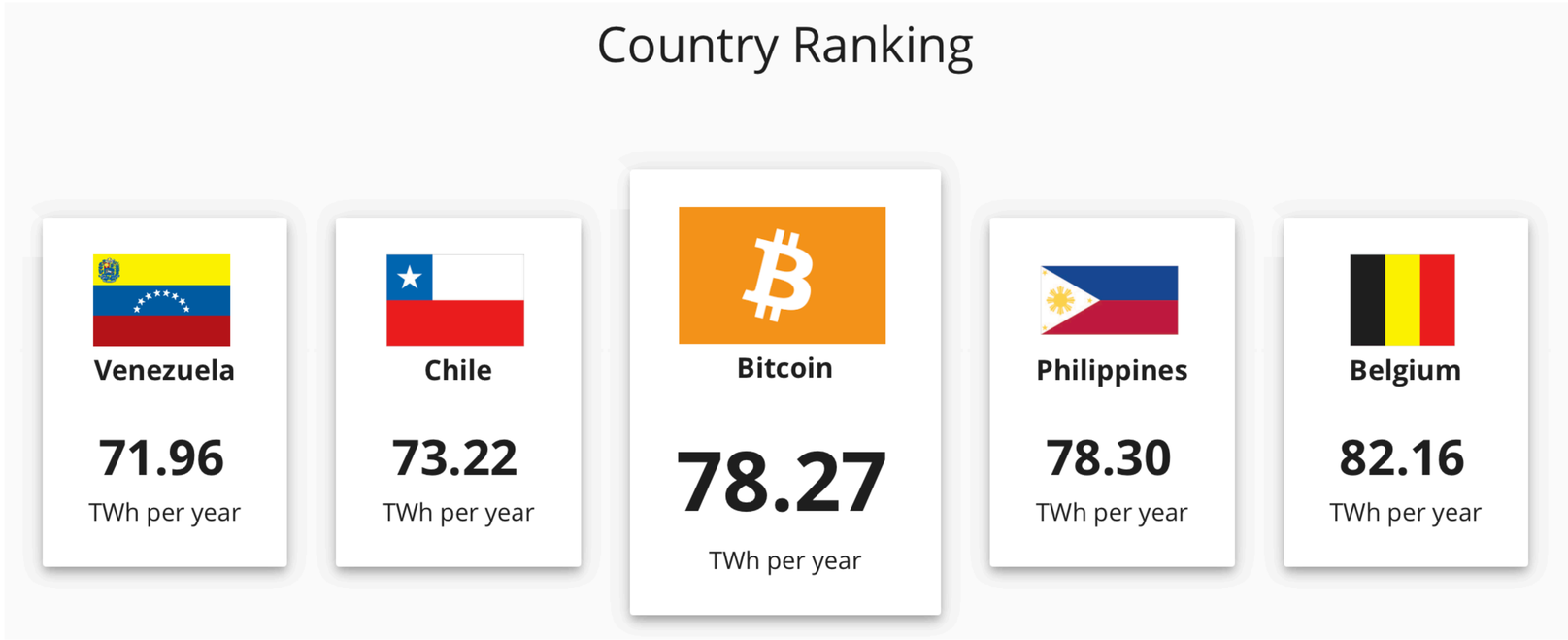
HTTPS://WWW.CBECI.ORG

@CHRISTHALINGER

CAMBRIDGE BITCOIN ELECTRICITY CONSUMPTION INDEX



CAMBRIDGE BITCOIN ELECTRICITY CONSUMPTION INDEX



17.4 million

101 million

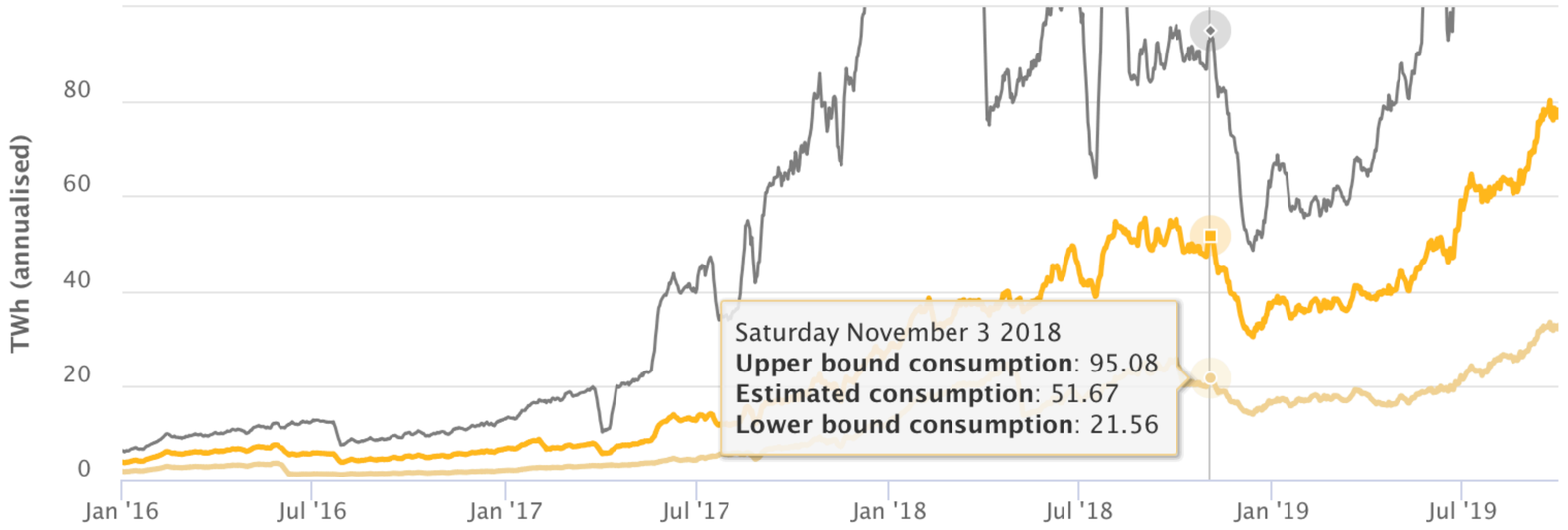
31.5 million

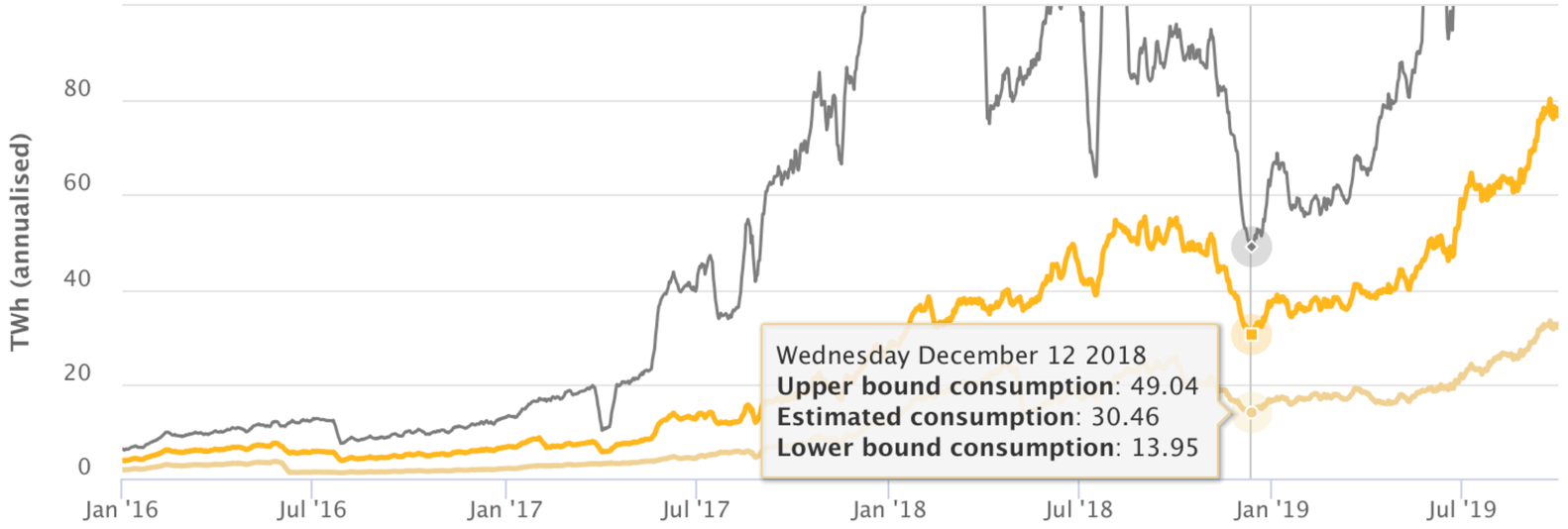
11.4 million

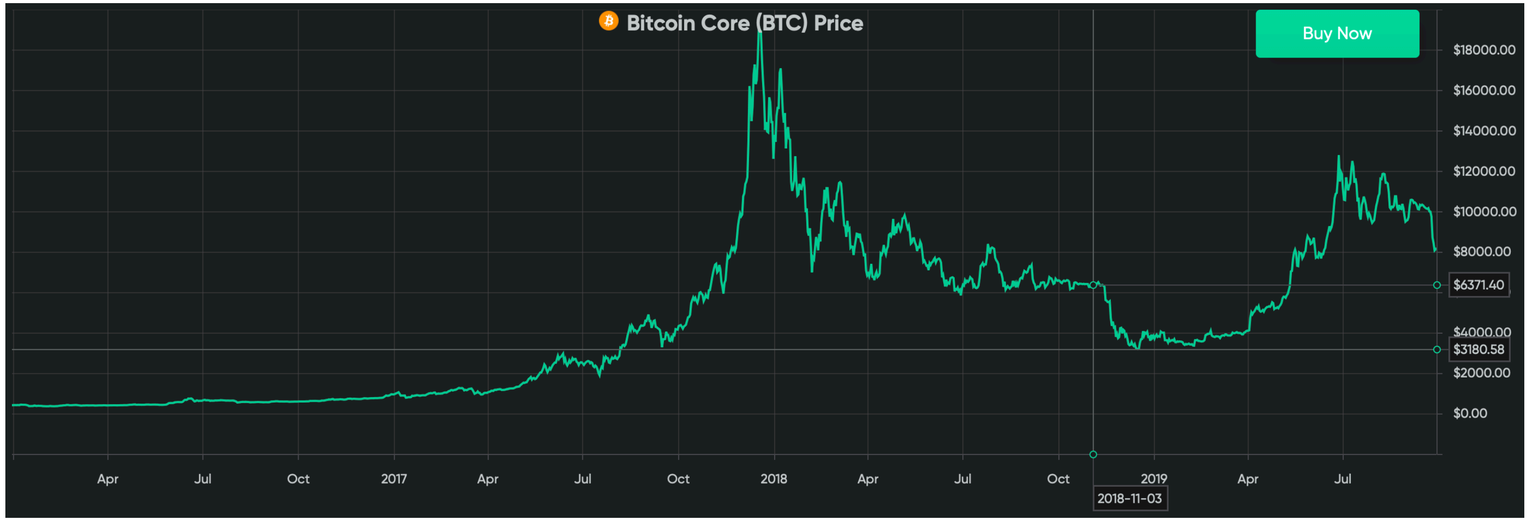
HTTPS://WWW.CBECI.ORG


TWh (annualised)
80
60
40
20
0
Jan '16
Jul '16
Jan '17
Jul '17
Jan '18
Jul '18
Jan '19
Jul '19


TWh (annualised)
80
60
40
20
0
Jan '16
Jul '16
Jan '17
Jul '17
Jan '18
Jul '18
Jan '19
Jul '19


TWh (annualised)
80
60
40
20
0
Jan '16
Jul '16
Jan '17
Jul '17
Jan '18
Jul '18
Jan '19
Jul '19
Saturday November 3 2018
Upper bound consumption: 95.08
Estimated consumption: 51.67
Lower bound consumption: 21.56


TWh (annualised)
80
60
40
20
0
Jan '16
Jul '16
Jan '17
Jul '17
Jan '18
Jul '18
Jan '19
Jul '19
Wednesday December 12 2018
Upper bound consumption: 49.04
Estimated consumption: 30.46
Lower bound consumption: 13.95



HTTPS://CHARTS.BITCOIN.COM/BTC/CHART/PRICE

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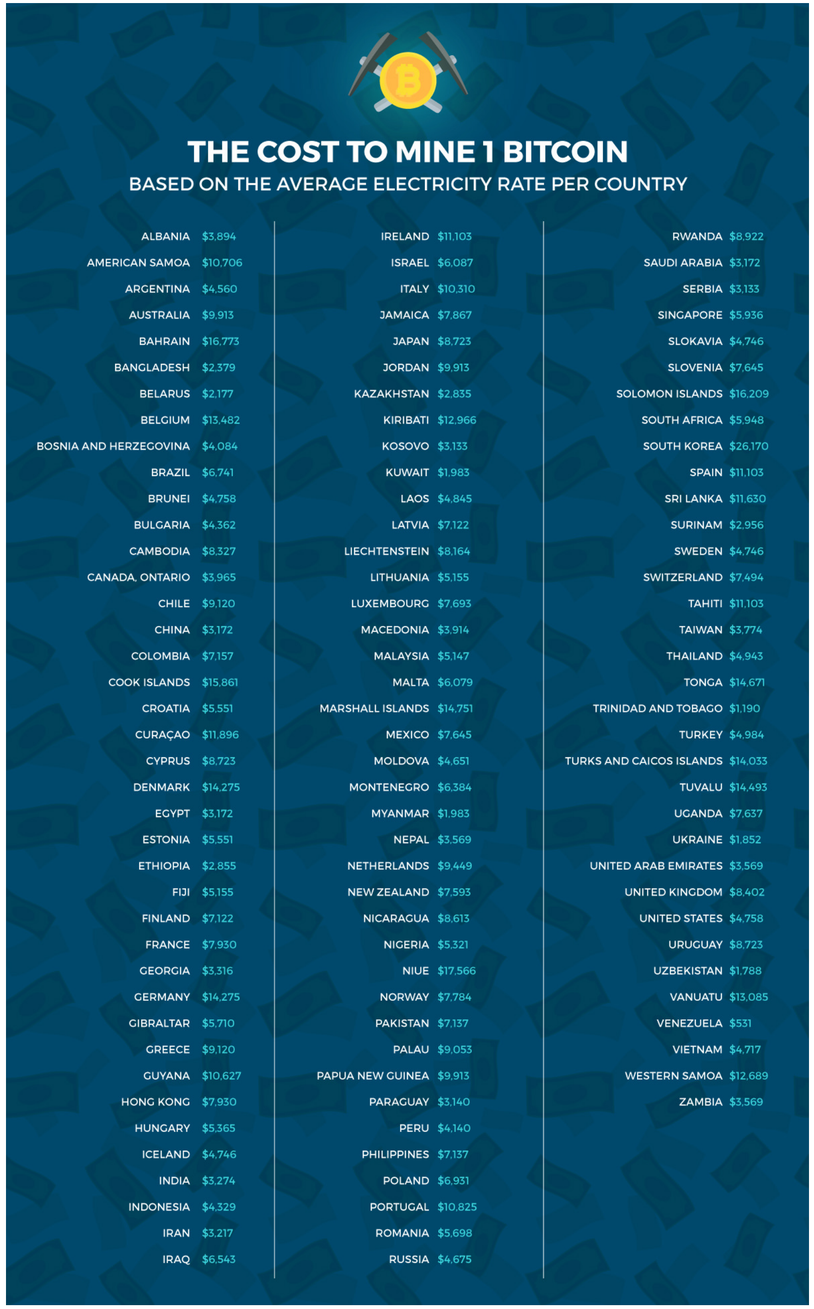

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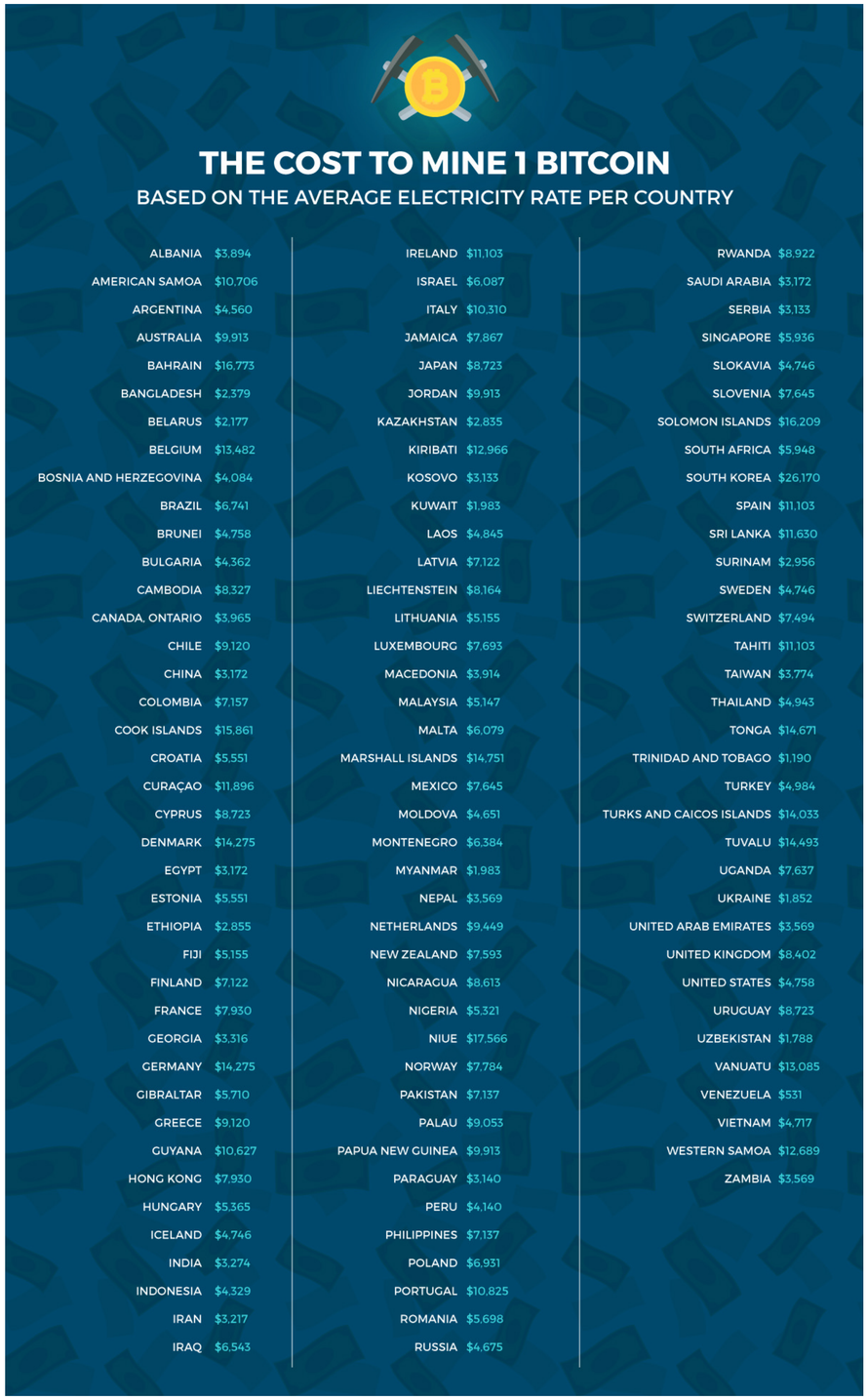

RANKING

1. Venezuela	$531
2. Trinidad and Tobago	$1,190
3. Uzbekistan	$1,788
…	…
n-2. Bahrain	$16,773
n-1. Niue	$17,566
n. South Korea	$26,170

@CHRISTHALINGER

PERFORMANCE TUNING HAS AN IMPACT

STOP EVERY NOW AND THEN
AND
THINK ABOUT THE IMPACT OF YOUR WORK