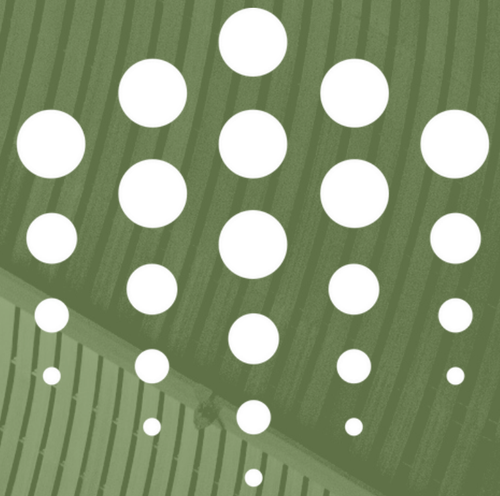


OCEAN PROTOCOL

STORAGE NETWORK ENERGY CONSUMPTION DATA CHALLENGE

by Nicolas Landry

OUTLINE OF THE REPORT

1. CLEANING AND SHAPING THE DATA
2. GLOBAL ANALYSIS
3. CORRELATIONS
4. MACHINE LEARNING ALGORITHM
5. ADDITIONAL DATA SET

1

CLEANING AND SHAPING THE DATA

CLEANING THE DATA AND SHAPING IT

Filecoin

NOT JUST A HOME, BUT A WAY OF LIFE

Presentations are communication tools that can be used as demonstrations, lectures, speeches, reports, and more. Most of the time, they’re presented before an audience. It serves a variety of purposes, making them powerful tools for convincing and teaching.

To create a stunning presentation, it's best to simplify your thoughts. Start with an outline of topics and identify highlights, which can be applied to whatever subject you plan on discussing.

GLOBAL ANALYSIS APPROACH

CONTEXT

Energy consumption in storage networks is a global issue because of the constant increase of digital transactions. With this in mind, Filecoin has chosen to use renewable energy for all its data centers and to create a measurement tool verifying the sustainability of IT infrastructures under the name of Filecoin Green.

Filecoin storage will be analysed following two axis : the energy consumption of data centers and its impact on the $fil token price.

INDICATORS

For the global analysis, 8 main indicators provided by the Filecoin Green Energy Consumption Dataset will be used find interesting insights related to the data storage capacity, share of renewable energy and energy consuption.

Filecoin

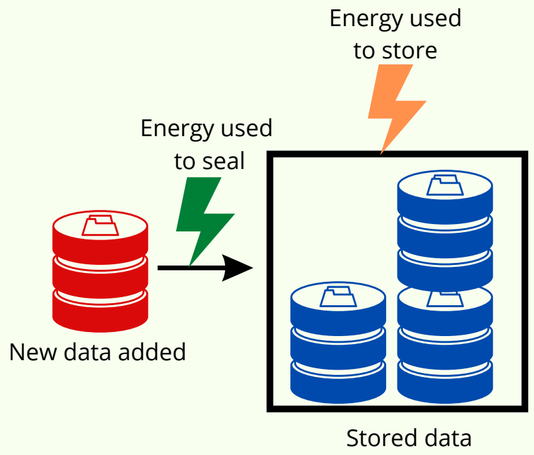
GRAPHICAL ANALYSIS

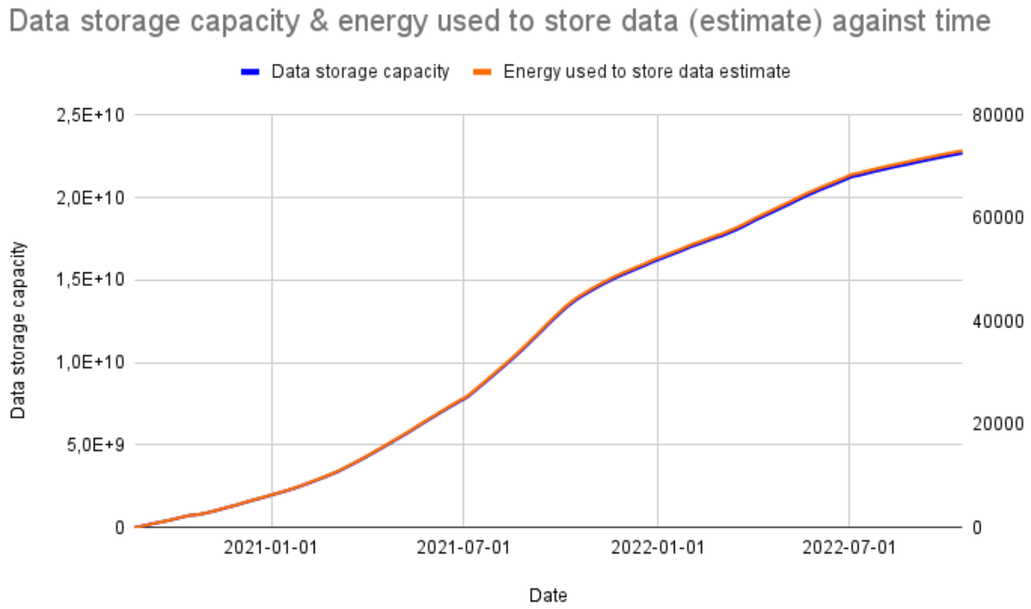
ENERGY PERFORMANCE & EVOLUTION OF FILECOIN'S STORAGE

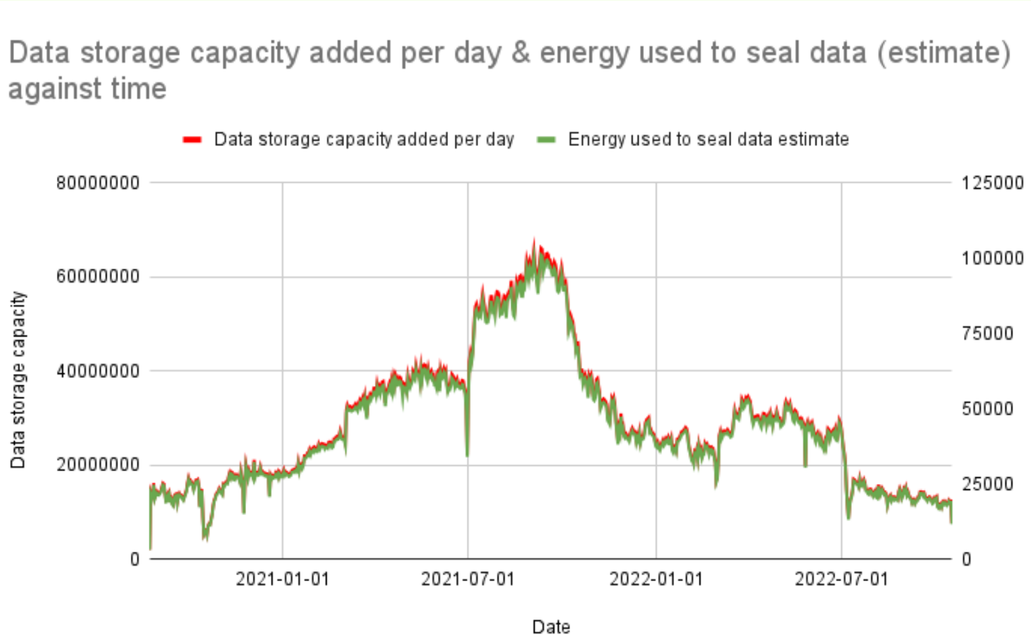
The energy consumption of Filecoin's installations has two components : the energy used to store the data, and the energy used to seal the data once it arrives into the storage center.

The energy used to store the data is completely proportional to the data storage capacity (graph 1). Indeed, each kW of stored data uses a certain amount of energy. As the amount of data stored is added day by day, the storage energy is multiplied by the total amount of data.

The energy used to seal the data is proportional to the data storage capacity added per day (graph2). Since data is only sealed once, the energy required to seal data per day is equivalent to the amount of data added per day multiplied by the energy required to seal one unit of data.







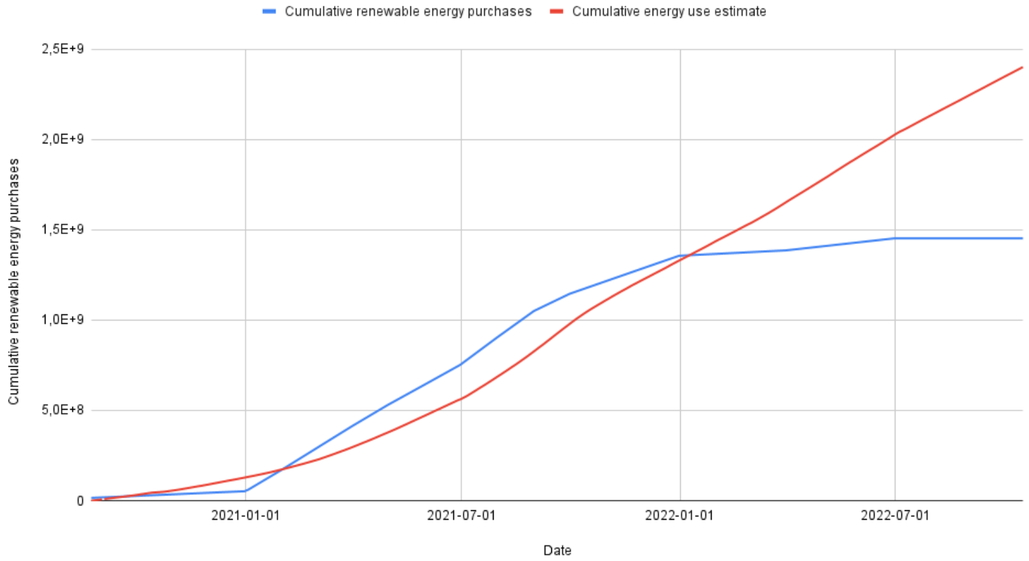
GRAPHICAL ANALYSIS

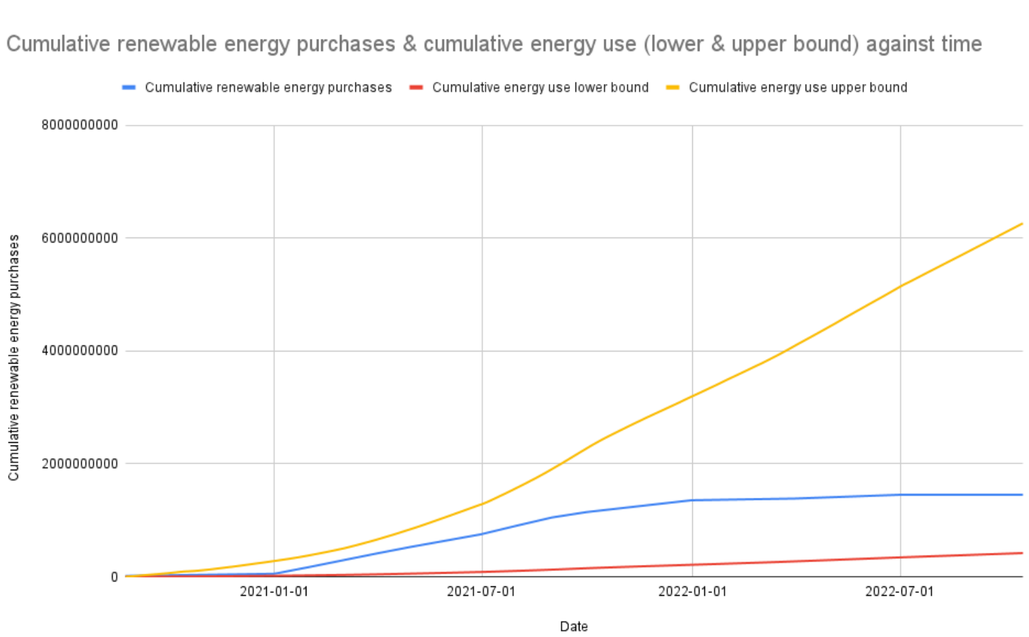
EVOLUTION OF THE SHARE OF RENEWABLE ENERGY USED BY FILECOIN

Filecoin buys renewable energy from generators in the region where the node is located in order to power all its data centers. It has also invested since 2021 to create its own green energy source : the built of new solar generation in the US.

The amount of energy used increases almost linearly (graph 1) as the amount of data stored also increases.However, the quantity of renewable energy purchased does not follow the same trend (graph 1) : from January 2022, its growth slows down sharply and becomes almost non-existent in July 2022. As a result, shortly after January 2022, the energy requirement exceeds the amount of renewable energy purchased. FIlecoin data centers must therefore be supplied with non-renewable energy.

It should be noted that the amount of energy purchased is always below the high bound and above the low bound of energy used(graph 2). This limits an over- or under-purchasing of energy.



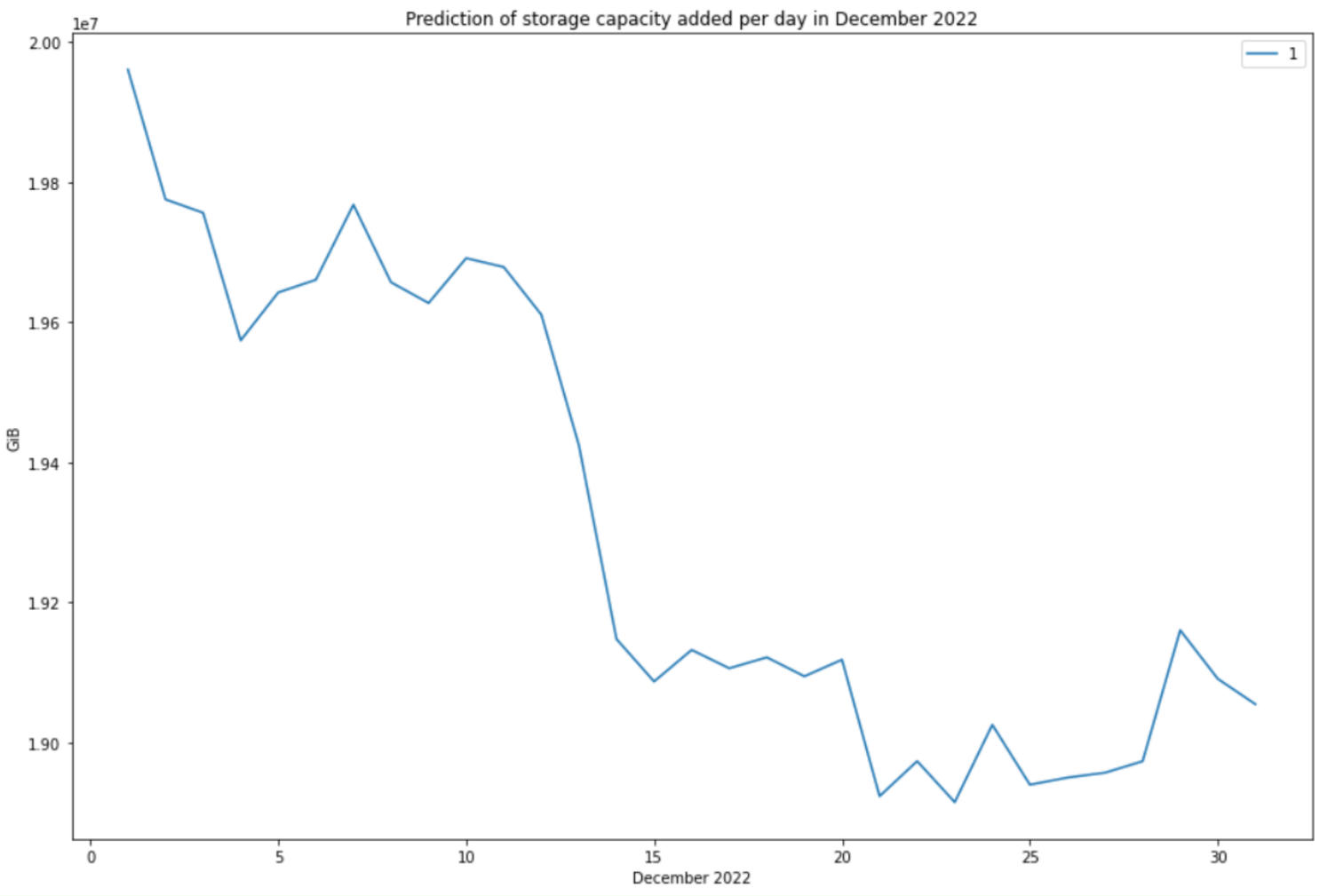


4

MACHINE LEARNING ALGORITHM

THE MACHINE LEARNING ALGORITHM THAT PREDICTS THE STORAGE CAPACITY ADDED PER DAY FOR THE MONTH OF DECEMBER 2022 CAN BE FOUND ON THE GITHUB UNDER THE NAME "MACHINE_LEARNING_MODELS_FILECOIN_DATA_STORAGE.IPYNB".

THIS CODE INCLUDES ALL INSIGHTS RELATED TO THIS PREDICTION.



THE MODEL PREDICTS AN AVERAGE DAILY ADDED STORAGE CAPACITY OF 17805245.70830726 GIB FOR DECEMBER 2022.

DIFFICULTY TO FIND AN ADDITIONAL DATASET

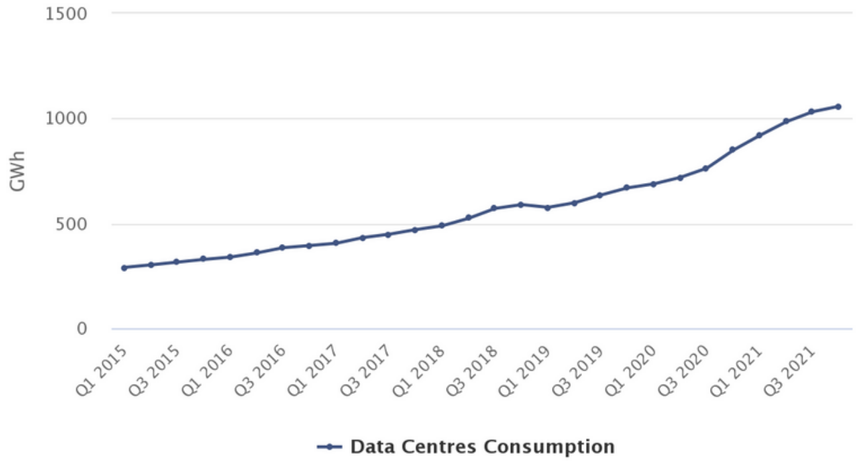
While Filecoin is very transparent on its consumption and the data is accesible very easily, it is not the fact for most datacenters. I found a table giving the Data Centres Metered Electricity Consumption for a few years from the Central Stastitics Office and published it on the Ocean Market.

WHAT DOES IT SHOW ?

Table 1 Metered Electricity Consumption 2015-2021

			Gigawatt hours	*% of Total*
Year	Data Centre	Other Metered Customers	Total	% Data Centre
2015	1 236	23 364	24 600	5
2016	1 477	23 879	25 356	6
2017	1 755	23 970	25 725	7
2018	2 172	24 558	26 730	8
2019	2 478	24 027	26 505	9
2020	3 019	24 037	27 056	11
2021	3 993	24 513	28 506	14

Figure 2 Data Centres Metered Electricity Consumption by Quarter 2015–2021 (GWh)



Source: CSO Ireland

The energy consumption of Filecoin's installations and the energy consumption of "traditionals" data centers is following the same trend, even though Filecoin would account for a gigantic datacenter (it is composed of a lot of them and is widely used).

CONTACT INFORMATION

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THANK YOU FOR READING THIS REPORT, I AM LOOKING FORWARD TO THE NEXT DATA CHALLENGE.