

DUNE Resource Needs for 2022

Configuration: Parameters_2022-07-10-2040.json

Date: 2022-07-18 02:38TZ

This is an updated 2022 version of DUNE space needs projections [DUNE Docdb-23419 and Github].

The DUNE computing year is assumed to follow the UK fiscal year which starts on April 1, 2022.

- CPU contributions will be compared to pledges at the end of the fiscal year, i.e. April 1, 2023
- Disk contributions will be compared to pledges 1/2 way through the year, October 1, 2022
- Contributions are divided into FNAL, CERN and collaboration and differ for different types of data.

Fiscal year starts: April 1

Tape is accounted for at: end of fiscal year

Disk is accounted for on: October 1

CPU is accounted for at: end of fiscal year

Reco passes per Year: 1

Sim passes per Year: 1

Analysis relative to Sim+Reco: 1

For data type Raw

Raw Tape lifetime 100.0 in years

Raw Tape Copies 2.0

Raw FNAL Tape fraction for PD 0.50

Raw FNAL Tape fraction for DUNE 0.50

Raw CERN Tape fraction for PD 0.50

Raw CERN Tape fraction for DUNE 0.00

Raw Collaboration Tape fraction for PD 0.00

Raw Collaboration Tape fraction for DUNE 0.50

Raw Disk lifetime 1.0 in years

Raw Disk Copies 1.0

Raw FNAL Disk fraction for PD 0.50

Raw FNAL Disk fraction for DUNE 1.00

Raw CERN Disk fraction for PD 0.50

Raw CERNDisk fraction for DUNE 0.00

Raw Collaboration Disk fraction for PD 0.00

Raw Collaboration Disk fraction for DUNE 0.00

For data type Test

Test Tape lifetime 0.5 in years

Test Tape Copies 1.0

Test FNAL Tape fraction for PD 0.50

Test FNAL Tape fraction for DUNE 0.50

Test CERN Tape fraction for PD 0.50

Test CERN Tape fraction for DUNE 0.00

Test Collaboration Tape fraction for PD 0.00

Test Collaboration Tape fraction for DUNE 0.50

Test Disk lifetime 0.5 in years

Test Disk Copies 0.5

Test FNAL Disk fraction for PD 0.50

Test FNAL Disk fraction for DUNE 0.50

Test CERN Disk fraction for PD 0.50

Test CERNDisk fraction for DUNE 0.00

Test Collaboration Disk fraction for PD 0.00

Test Collaboration Disk fraction for DUNE 0.50

For data type Reco

Reco Tape lifetime 15.0 in years

Reco Tape Copies 1.0

Reco FNAL Tape fraction for PD 0.75

Reco FNAL Tape fraction for DUNE 0.50

Reco CERN Tape fraction for PD 0.00

Reco CERN Tape fraction for DUNE 0.00

Reco Collaboration Tape fraction for PD 0.25

Reco Collaboration Tape fraction for DUNE 0.50

Reco Disk lifetime 2.0 in years

Reco Disk Copies 2.0

Reco FNAL Disk fraction for PD 0.25

Reco FNAL Disk fraction for DUNE 0.25

Reco CERN Disk fraction for PD 0.00

Reco CERNDisk fraction for DUNE 0.00

Reco Collaboration Disk fraction for PD 0.75

Reco Collaboration Disk fraction for DUNE 0.75

For data type Sim

Sim Tape lifetime 15.0 in years

Sim Tape Copies 1.0

Sim FNAL Tape fraction for PD 0.75

Sim FNAL Tape fraction for DUNE 0.50

Sim CERN Tape fraction for PD 0.00

Sim CERN Tape fraction for DUNE 0.00

Sim Collaboration Tape fraction for PD 0.25

Sim Collaboration Tape fraction for DUNE 0.50

Sim Disk lifetime 2.0 in years

Sim Disk Copies 2.0

Sim FNAL Disk fraction for PD 0.25

Sim FNAL Disk fraction for DUNE 0.25

Sim CERN Disk fraction for PD 0.00

Sim CERNDisk fraction for DUNE 0.00

Sim Collaboration Disk fraction for PD 0.75

Sim Collaboration Disk fraction for DUNE 0.75

Years	CPU (Mhrs)	Wall (Wall-Mhrs)	Wall F+MARS/Collab (Wall-Mhrs)	cores	Tape Total(PB)	Tape F/C/Collab	Disk Total(PB)	Disk F/C/Collab
2021	40	58	(14+ 0)/ 43	6594	21.1	14.1/ 3.6/ 3.5	20.4	5.3/ 0.4/ 14.7
2022	45	65	(16+ 0)/ 49	7399	35.1	22.6/ 7.4/ 5.0	28.0	8.0/ 2.0/ 17.9
2023	72	103	(26+ 0)/ 77	11747	58.9	36.9/ 14.6/ 7.4	39.3	11.8/ 3.9/ 23.6
2024	78	111	(28+ 0)/ 84	12710	76.2	48.0/ 18.2/ 9.9	43.3	11.9/ 2.1/ 29.3
2025	76	109	(27+ 0)/ 82	12438	86.1	55.5/ 18.2/ 12.4	40.5	10.2/ 0.2/ 30.1
2026	45	64	(16+ 0)/ 48	7320	91.7	59.8/ 17.9/ 14.0	32.4	8.1/ 0.0/ 24.2
2027	18	25	(6+ 0)/ 19	2862	96.7	48.4/ 0.0/ 48.4	18.6	5.0/ 0.0/ 13.6
2028	23	33	(8+ 0)/ 25	3759	118.7	59.3/ 0.0/ 59.3	21.7	12.3/ 0.0/ 9.4
2029	32	46	(11+ 0)/ 34	5194	156.9	78.4/ 0.0/ 78.4	32.7	21.7/ 0.0/ 11.0
2030	66	94	(23+ 0)/ 70	10690	217.8	108.9/ 0.0/108.9	53.5	33.5/ 0.0/ 19.9
2031	78	111	(28+ 0)/ 83	12663	279.1	139.5/ 0.0/139.5	65.5	36.6/ 0.0/ 29.0
2032	92	132	(33+ 0)/ 99	15044	342.0	171.0/ 0.0/171.0	69.9	37.8/ 0.0/ 32.0
2033	119	170	(42+ 0)/ 127	19398	457.8	228.9/ 0.0/228.9	102.4	65.3/ 0.0/ 37.0
2034	146	208	(52+ 0)/ 156	23752	573.3	286.7/ 0.0/286.7	110.5	67.4/ 0.0/ 43.1
2035	172	246	(62+ 0)/ 185	28107	690.1	345.1/ 0.0/345.1	118.7	69.4/ 0.0/ 49.3
2036	199	284	(71+ 0)/ 213	32461	807.2	403.6/ 0.0/403.6	126.8	71.5/ 0.0/ 55.4
2037	226	322	(81+ 0)/ 242	36815	920.9	460.5/ 0.0/460.5	132.5	72.2/ 0.0/ 60.2
2038	252	361	(90+ 0)/ 270	41169	1038.4	519.2/ 0.0/519.2	140.6	74.3/ 0.0/ 66.4
2039	279	399	(100+ 0)/ 299	45523	1157.3	578.6/ 0.0/578.6	148.8	76.3/ 0.0/ 72.5
2040	306	437	(109+ 0)/ 328	49878	1278.3	639.1/ 0.0/639.1	157.0	78.4/ 0.0/ 78.6

Table 1: Assume present core is 11 HS06. CPU number is real CPU. Cores and HS06 are Walltime with CPU/Walltime = 0.70. F means FNAL, C means CERN. Assume CERN storage is only for ProtoDUNE. CPU should be divided 25% FNAL, 75% Collab, MARS is not included in the 25% FNAL contribution.

model disk	2021	Sim: 6.9	Raw: 3.3	Reco: 3.5	Test: 0.0	Total:13.7
model tape	2021	Sim:10.0	Raw: 6.6	Test: 0.8	Reco: 4.3	Total:21.8
actual cpu	2021	Total:28.8	Analysis:10.3	MARS:12.0	Production: 6.5	
actual cores	2021	Total:4703.2	Analysis:1678.1	MARS:1963.5	Production:1061.6	
actual disk	2021	FNAL: 4.6	CERN: 1.0	UK: 2.2	CZ: 0.3	Total: 8.1
actual tape	2021	FNAL:19.8	CERN: 5.0	Total:24.8		

Table 2: Values for the points shown in the figures. Model disk and tape are the amounts we would project based on actual data cataloged if we had the number of copies expected in the model. This serves as a crosscheck on the inputs to the model but does not change its assumptions. The actual numbers are derived from wall time measured for 2021, the disk reported by rucio + FNAL disk cache and the total tape used at FNAL at CERN. Disk usage is lower as not all data have been copied. CPU usage is lower due to the delay in ProtoDUNE II running.

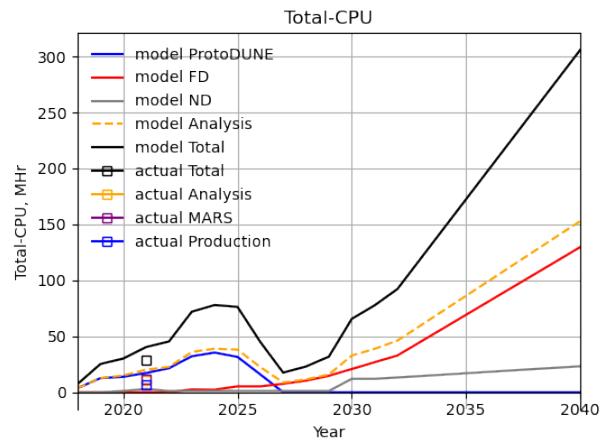


Figure 1: CPU time in Wall Hours/year. Squares are measured values for 2021.

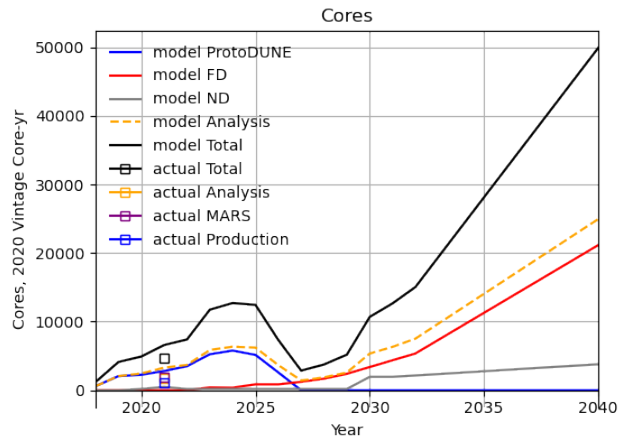


Figure 2: Cores needed, including efficiency loss. Squares are measured values for 2021.

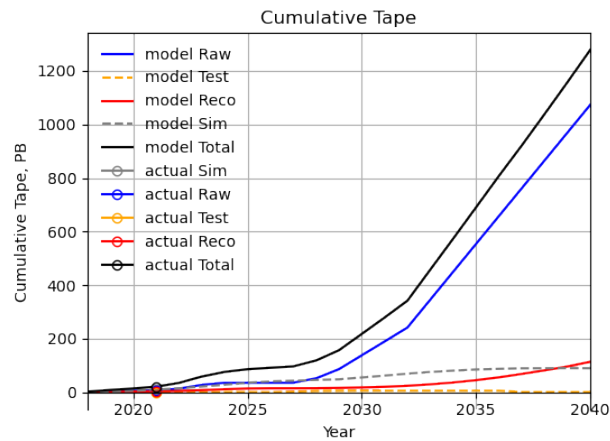


Figure 3: Projected tape needs, PB, all types are cumulative over tape lifetime. Open circles are model calculation based on actual data volumes in 2021. Closed squares are actual numbers by site. Offsets of square points are for clarity.

Change log:

2022-05-19 revert pre 2023 to CCB sim numbers but keep updated daq estimates
2022-05-18 add in MARS
2022-02-21 add in new numbers for PD2, FD sim, reflect daq document
2022-01-22 add actual numbers's
2022-01-14 updates for VD channels and new drift times.
2021-07-25 see effects of PD 2 delay
2021-04-27 change HSPEC06 to 11 from 15 per CMS numbers from Kirby
2021-04-21 clarify CERN vs Collab for first 10 years
2021-03-26 clearer plots, go to v3 of the code to preserve the RRB code in v2
2021-03-24 try with CERN/FNAL combined for raw and test.
2021-03-22 add Collab vs FNAL shares, restore sim disk lifetime to 2.

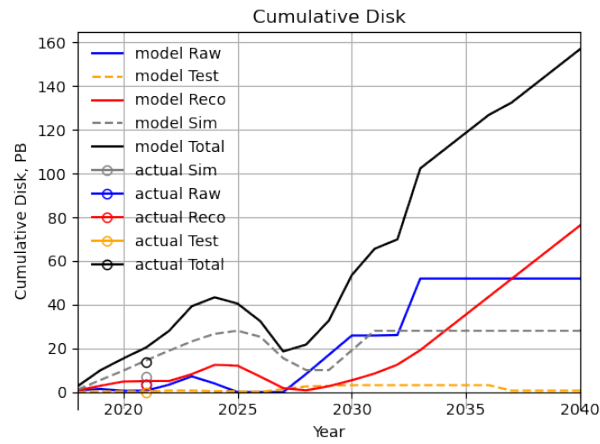


Figure 4: Disk needs, PB. Raw, Reco and Sim are cumulative over disk lifetime. Test has sub-year lifetime. Open circles are model calculation based on actual disk volumes in 2021. Closed squares are actual numbers from rucio as of 1/22/2022. Offsets of square points are for clarity.