

Annexure: Data analysis

Objective

The data analysis aims to examine procedural inefficiencies and registration delays within India's VCM using data from the Verra VCS registry. It estimates registration timelines for sector-specific project activities in India, benchmarking these timelines against those for the ROA to identify and compare delays, evaluate sectoral vulnerabilities, and assess participation across 16 Verra-defined sectors. The study provides data-driven insights to facilitate a deeper and qualitative understanding of these inefficiencies by uncovering procedural bottlenecks and highlighting sectoral challenges. These learnings can be used to provide actionable insights for the development of the CCTS offset mechanism.

Methodological framework

Data collection

- The master data set from the Verra VCS Registry, containing information on 2,800 projects across 80 countries, was downloaded.
- Project listing dates were extracted for all projects in Asia by applying a filter for the region and retrieving the listing date for each unique project ID.
- A new column was added to the data set to record the listing dates for projects where this information was available.

Data cleaning and validation

1. **Master data set cleaning:** The global master data set was first cleaned by removing all rows with missing information.
2. **Asia data set preparation:** A duplicate of the Asia-specific data subset was created, and all projects lacking a listing date were excluded.
3. **Calculation of project duration:** A new column, 'project duration', was added to the Asia data set:
 - For registered projects, the duration was calculated as the difference between the registration and listing dates.
 - For unregistered projects, the duration was calculated as the difference between the current date (24 January 2024) and the listing date.
4. **India data set extraction:** The India-specific data set was extracted from the cleaned Asia data set by applying a country filter.
5. **Cleaned data sets**
 - **Global master data set:** Cleaned and validated global data.
 - **India data set:** Cleaned and validated data specific to India.
 - **ROA data set:** Cleaned and validated data for projects in the rest of Asia.
6. **Retained data columns:** The following columns were retained across the cleaned data sets to ensure the availability of essential information for analysis:
 - **ID:** Unique identifier for each project.

- **Name:** Project title.
- **Proponent:** Project proponent or developer.
- **Project type:** Category or type of project (main category retained)
- **Methodology:** Approved methodology used for project implementation.
- **Status:** Current stage in the project lifecycle.
- **Country:** The country where the project is implemented.
- **Estimated annual emission reduction:** Annual reductions are estimated for the crediting period using the approved methodology.
- **Region:** The continental region where the project is located.
- **Registration date:** Date of project registration (applicable for registered projects).
- **Project listing date/earliest available date:** Initial date when the project was listed in the Verra VCS issuance cycle.
- **Project duration:** Calculated duration of the project lifecycle based on registration or current date.

Statistical analysis

For determining sectoral vulnerabilities

An analysis was conducted using the master data set to identify sectoral vulnerabilities within the VCM globally. The data set was filtered to focus on projects categorised as ‘on-hold’ and ‘rejected’; their distribution across various project types was examined thereafter. This approach provided data-driven insights into the sectors' likelihood of suspension or rejection.

For the estimation of registration delays

- (a) **Identification of key sectors and data sets:** The analysis began by identifying the dominant sectors in India and determining the project types with the highest number of projects. The key sectors identified were AFOLU, energy industries, and energy demand. These sectors were also examined within the ROA data set to enable comparative analysis and delay testing.

Data set scope

- **Registered projects:** Projects from both the India and ROA data sets were analysed to compare registration timelines between the two samples.
- **Unregistered projects:** Only unregistered projects from India were analysed to assess project cycle delays by benchmarking them against the registration timelines of successfully registered projects.

The analysis was conducted with the dataset given below in Table 5

Table 5: Dataset used for Delay Benchmarking

Sector	Registered projects		Unregistered projects
	India	ROA	India
AFOLU	10	55	108
Energy industries	75	152	60

Energy demand	31	30	102
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(b) Setting the benchmark values for delay testing: Benchmark values for delay testing were determined using the IQR method. Project duration data for registered projects in India and the ROA datasets were analysed. The IQR method calculated the project durations' mean, median, and Q3 values. These values served as benchmarks to identify and compare delays in unregistered projects in India against registered project timelines. The values listed in Table 6 were estimated.

Table 6 Calculated Benchmarks for each sector

Sector	Median values (project duration) days		Q3 values (project duration): Benchmark (BM) days	
	India	ROA	India	ROA
AFOLU	796	514	1,689	623
Energy industries	445	429	360	427
Energy demand	292	299	536	534

The Q3 values from the ROA data set were used as benchmarks for delay testing. This approach was selected for the following reasons:

(i) Q3 liberal benchmark with buffer time

- The Q3 values provide a more lenient benchmark, accounting for potential administrative delays that may affect project timelines.
- Using the median value would be overly conservative, leaving no allowance for the complexities and buffer times necessary for managing large project volumes, as often required by certification bodies during different stages of the project cycle.

(ii) ROA as a comparative data set

- The ROA data set was chosen over India's registration durations to provide a more competitive and externally benchmarked comparison.
- While the ROA data set includes a significant number of projects from China – approximately 90 per cent – the China-specific data set was not used, as it lacked sufficient projects in the energy demand category, making it less representative of India's project portfolio.

(c) Delay testing: Delays were analysed for all unregistered projects across the three key sectors in the India data set. The Q3 values from the ROA data set were used as the benchmark. Projects exceeding the benchmark threshold were classified as delayed, and the percentage of delayed

projects was calculated for each sector. The delays estimated for unregistered projects are given under Table 7.

Table 7: Delays for unregistered projects tested for each sector against the BM

Project type	BM (days)	Delayed (% of projects in the sector)	Total data compared (unregistered projects in India)
AFOLU	623	25.0	108
Energy demand	427	66.7	102
Energy industries	534	71.7	60

For determining sectoral participation

To determine sectoral participation, we constructed a simple distribution table consisting of the number of all projects (both registered and non-registered) in India under each category and the volume of carbon emission reduction for each type. This was done for all 9 sectors with active participation across the Indian project portfolio. The distribution of offset projects in India, under each sector, is given in Table 8.

Table 8: Active Projects in the registry under each sector for India.

Project type	Number of projects
Energy distribution	1
Manufacturing industries	7
Livestock	3
Transport	11
Chemical Industry	3
Waste handling and disposal	13
Energy industries	275
Energy demand	141
AFOLU	143
Total	597

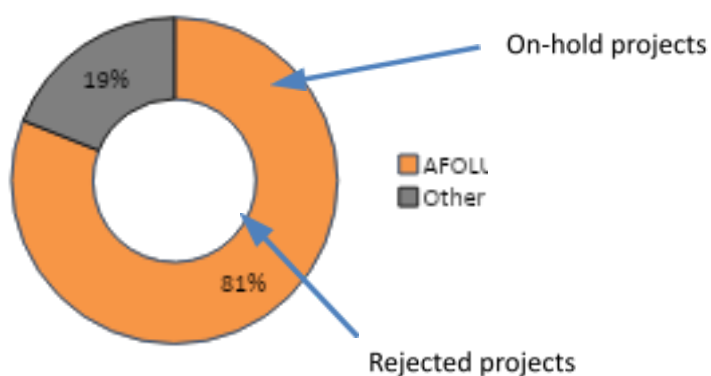
Key results and data visualisation

- a) AFOLU projects are highly susceptible to suspension and rejection globally, with over 93 per cent of all on-hold projects and 81 per cent of all rejected projects falling in this category. Table 9 shows the percentage of projects in the AFOLU category in the global dataset that have been put 'on hold' or rejected by the administrator.

Table 9: AFOLU projects in the Global Dataset, that have been either suspended or rejected

Attributes	Rejected	On hold
Projects globally	59	92
Projects in the AFOLU category	48	86
AFOLU projects (%)	81	94

Figure 9: AFOLU project representation in the on-hold and rejected categories



Source: Authors' analysis

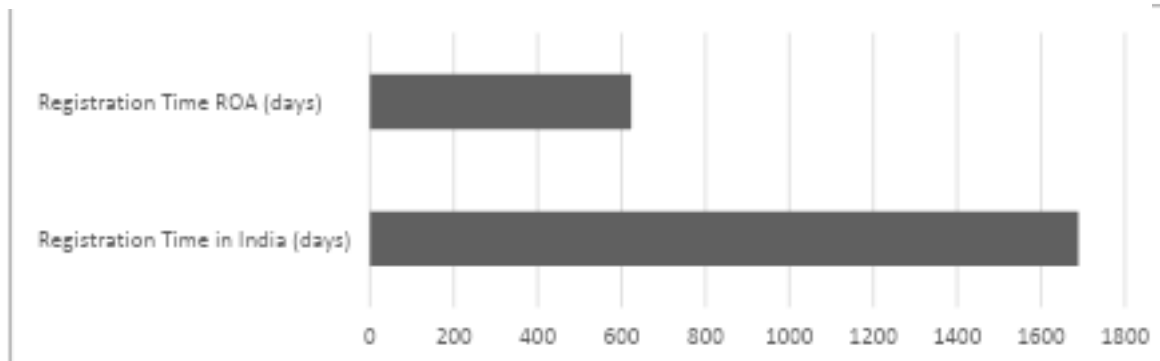
- b) AFOLU sector projects in India than in the ROA. registration time in India is 623 days.

generally take longer to register Table 10 shows the Q3 value for 1,689 days, and in the ROA it is

Table 10: Typically, longer registration timelines in India compared to the rest of Asia.

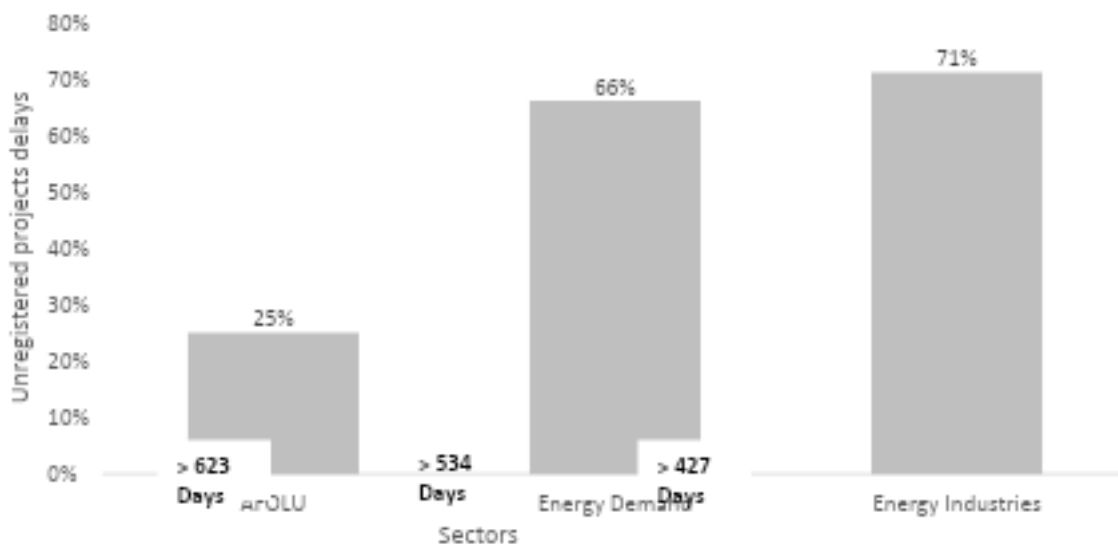
Attributes	AFOLU project registration time
Q3 value for registered projects in India	1,689 days
Q3 value for registered projects in ROA	623 days

Figure SEQ Figure 1* ARABIC 10: AFOLU projects in India take significantly longer to be registered when compared to the ROA



- c) Table 7 shows that 25 per cent of AFOLU projects within the Verra Registry have yet to be registered and have already crossed the BM value of 623 days. This indicates that at least 25 per cent of unregistered AFOLU projects in India are facing registration delays.
- d) Table 7 shows that energy industry projects in India are facing the most delays, with at least 71 per cent of projects in the pre-registration stage having already crossed the BM of 427 days. This indicates that a substantial number of unregistered energy industry projects are currently facing delays.
- e) Table 7 calculations show that amongst the unregistered Indian energy demand projects currently being implemented, 66 per cent have already crossed the BM threshold of 534 days.

Figure 12: Delays observed amongst 'unregistered' projects across sectors

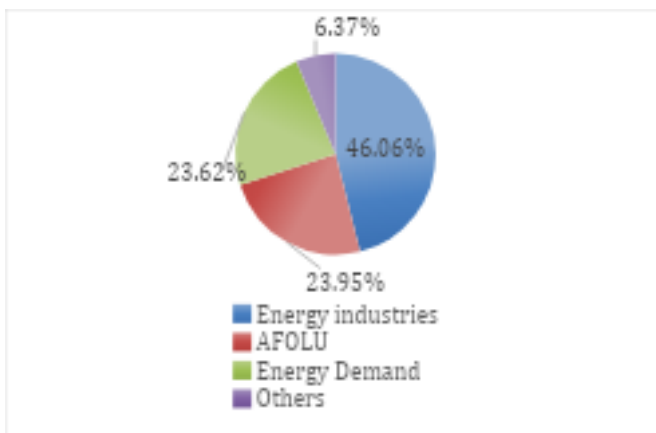


Source: Authors' analysis

- f)* Analysing all 597 projects listed in the Verra VCS Registry in India, including registered and unregistered projects, we found that most projects are concentrated in the energy industries and energy demand sectors, representing 46 per cent and 24 per cent of the portfolio, respectively. Figure 14 presents a pie chart with sectoral participation.

Discussion of results in detail in the main body of the study.

Figure SEQ Figure * ARABIC 14: Participation in project development across sectors in India



Source: Authors' analysis