The State of Carbon Credits 2022

Volume 1. Spotlight on REDD+

Sylvera

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Introduction

This is our first annual report on The State of Carbon Credits. It aims to provide an extensive analysis of the market, using global data on the carbon projects and credits that make up the voluntary carbon markets (VCMs).

Data has been sourced from Berkeley Voluntary Registry Offsets Database and Sylvera's proprietary database (where applicable), and includes project information for Reducing Emissions from Deforestation and Degradation (REDD+), Afforestation, Reforestation and Revegetation (ARR), Improved Forest Management (IFM) and Renewable Energy Sources (RES).

Our 2022 report starts with a deep dive into REDD+ credits, and includes insights from Sylvera's ratings data. Nature-based solutions (NBS) represent one of the largest categories (45%) of carbon credits available in VCMs, and REDD+ credits make up the lion's share of NBS credits. That's why we started with this project type. Next year, this report will expand our deep dive analyses to the other project types, and will be inclusive of Sylvera ratings insights.

Our aim is to increase transparency and trust into carbon offsetting projects.

Because there has historically been a lack of transparency around the quality of carbon projects, buyers have been left uncertain about what they're actually buying. Consequently, opportunities to invest in high quality credits have been missed, and misguided investments into poor quality projects have been made, which ultimately hinders our ability to collectively combat the worst effects of the climate crisis.

Our data and this report reveals, contrary to popular belief, that there are quality REDD+ credits available in the market today.

In fact, almost a third (31%) of the REDD+ credits we rated are considered high quality and low risk investments. They receive high scores in key areas like carbon performance, additionality, permanence and co-benefits. Companies with science-based climate commitments, that want to genuinely offset their emissions and avoid being called out for greenwashing, do have quality options. But they must do the work and actively seek out legitimate projects. Sylvera's data can help guide them in the right direction.

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About Sylvera

Sylvera is a carbon intelligence platform that helps corporate sustainability teams, traders and asset managers invest in legitimate and impactful carbon credits.

Our carbon credit rating system was developed to provide investors with a fair reflection of carbon credit quality, regardless of the type of carbon project.

Sylvera offers unrivaled depth in carbon project ratings; no other platform provides the level of detail and nuance in project assessments. To achieve this, we first build rigorous ratings frameworks and production systems for every project type. Then we apply the framework to rate individual projects. Each rating takes approximately 60-120 hours to complete. We believe this rigor is requisite in order to ensure the rating is accurate.

6-16 hours

Data Extraction

Project documentation is collated and input into Sylvera's systems.

4-16 hours

Shapefile Extraction

GIS shapefiles are processed for ML processing. We construct them internally if they aren't available.

10-16 hours

Machine Learning

Proprietary machine learning algorithms are run for a specific shapefile over time to infer, for example, the state and change for forests.

2-9 hours

Internal Review

Our ratings are reviewed internally by our subject matter experts.

26-40 hours

Ratings Production

Outputs of our ML processes are compared to a project's carbon data. We also run additional qualitative and quantitative tests.

6-16 hours

Machine Learning QA

Outputs of our ML processes are checked against remote-sensed data.

3-9 hours

Developer Engagement

Questions raised during the rating and review processes are raised with developers. Any responses are assessed and reflected in rating.

2-4 hours

Ratings Publication

The Sylvera rating is posted on the platform, ready for customers to access.

Ongoing

Continuous Monitoring

Our ratings are updated every quarter or after a significant event.

AA

Sylvera Rating

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The Sylvera Rating System

Sylvera carbon credit ratings assess the likelihood that the credits issued by a carbon project have delivered on their claims of avoiding or removing one metric ton of carbon dioxide (tCO2) or other greenhouse gasses (GHGs). Sylvera ratings are derived from the holistic analysis of a project's carbon performance, additionality and permanence. A separate score is provided based on analysis of the co-benefits the project brings to local communities and the environment.
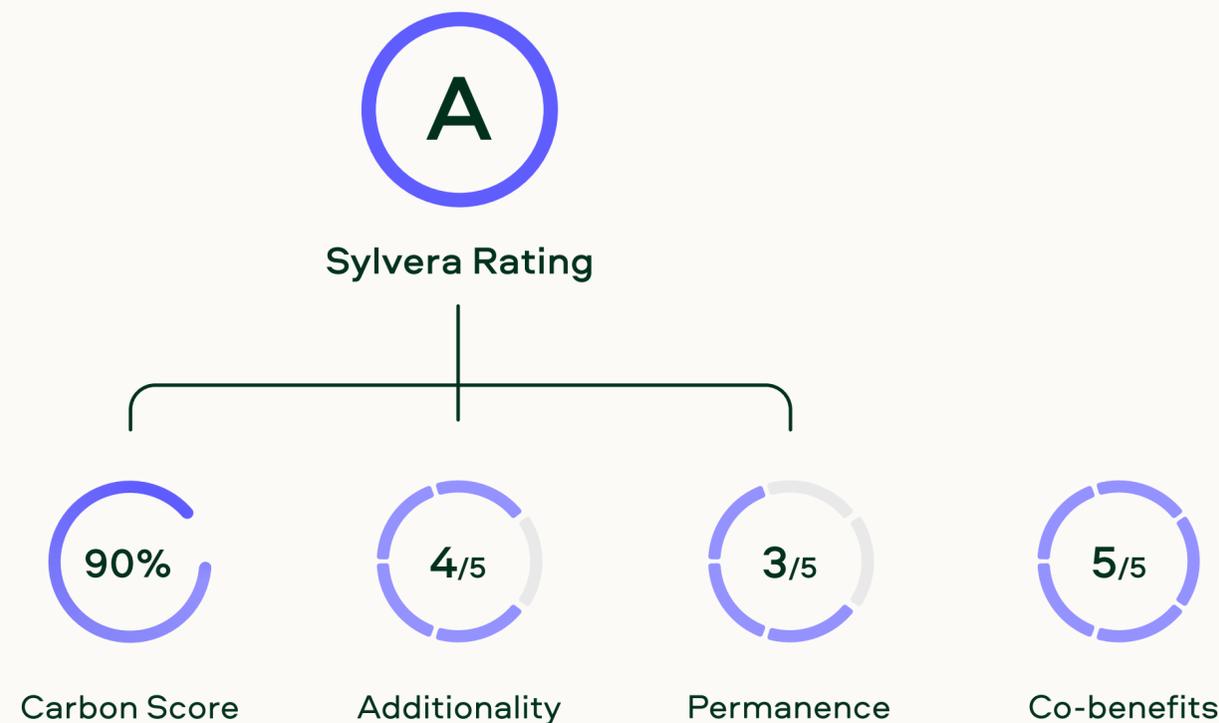
Each pillar is designed to answer fundamental questions about the project.

- **Carbon performance:** Is the project accurately reporting on its activities, which directly translate to its overall avoidance or removal of CO2e?
- **Additionality:** Would the emission reductions have occurred without the revenue derived from the offset project? Is there an over-crediting risk?
- **Permanence:** Are the avoided or removed GHGs likely to be maintained for an atmospherically significant period of time?
- **Co-benefits:** Are there additional benefits the project brings to local communities and biodiversity?

Each project we rate receives a discrete letter rating (AAA-D).

When we don't have access to all the key project data required to evaluate the carbon performance, additionality and permanence of a project, we cannot publish a complete Sylvera rating. Instead, we issue a Provisional Rating (P) based on the best data currently available. When new data is issued and when it satisfies all our criteria for rigorous analysis, we will reassess the project and issue a complete Sylvera rating.

A

Sylvera Rating

90%	4/5	3/5	5/5
Carbon Score	Additionality	Permanence	Co-benefits

AAA AA A BBB BB B C D

Highest Rating → Lowest Rating

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The Sylvera Rating System Continued

ON WATCH If we become aware of any circumstances that could lead to a material change to a project rating and/or assessment, including its withdrawal, the project will be placed "On Watch" until the review process has been completed. "On Watch" signals to buyers that forthcoming information will likely change (positively or negatively) the current rating.

For the purpose of our deep-dive analysis of REDD+ projects, here is a breakdown of the Sylvera ratings:

tier **1**

tier **2**

tier **3**

P

AAA, AA, A:
Indicates that there is little risk that the project claims are overstated.

A-On Watch, BBB, BBB-On Watch, BB, B:
Indicates that the claims may be overstated and that the buyers should analyze the project and carbon credit costs in detail when considering investment.

B-On Watch, BB-On Watch, C, D, C-On Watch, D-On Watch:
Indicates that there is a very high risk that the project claims are not justified.

P:
Due to insufficient data - such as relating to Earth Observation or Measuring, Reporting and Verification (MRV) - that is required for Sylvera to evaluate a project's claim, a complete letter rating cannot be provided. Instead, Sylvera has issued a Provisional rating (P) based on the data available.

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The Sylvera Rating System Continued

Highest

5/5

4/5

3/5

2/5

1/5

Lowest

Also included in this report – specifically for REDD+ projects – are Sylvera sub-scores for:

Additionality of project activities

For additionality of activities, Sylvera tests the likelihood that the project required the revenue from carbon credits to conduct its activities and subsequent emissions reductions/removals. We assess additionality of activities across financial, policy, regulatory and common practice.

- 1 indicates a project's activities do not result in carbon sequestration or avoided emissions beyond a "business as usual scenario." For a REDD+ project, this would mean forest protection was legally mandated in the absence of the carbon project, and carbon revenues did not result in implementation of activities above what is common practice in the region.

- 5 indicates very high confidence that carbon revenues enabled carbon sequestration or avoided emissions beyond a "business as usual scenario." In a REDD+ project, this would mean there is no legal requirement, institutional support or financial incentive to constrain deforestation and that carbon revenues enable a project to implement activities beyond what is common practice in the region.

Over-crediting Risk

Sylvera analyzes the sources of potentially inflated issuance volumes that are relevant to the project type. The amount of credits a project can issue is determined by projected emissions that would have occurred if the project did not exist (also called baseline emissions). **For REDD+ projects our assessment is referred to as the strength of baseline.** Using geospatial data, we compare the baseline deforestation rates set by the project to observed deforestation in proxy areas, as well as scrutinize modeling assumptions for deforestation to quantify the potential extent of over-crediting.

- 1 indicates Sylvera finds serious risk of over-crediting. In a REDD+ project, this would mean the projection of deforestation that would occur in the absence of the project, or baseline emissions, is inflated and similar rates of deforestation are not observed in the project region. Inflated baseline emissions reduce the likelihood that one carbon credit is equal to one metric ton of emissions avoided.

- 5 indicates very low risk of over-crediting. In a REDD+ project, this would mean the baseline emissions defined by the project are conservative and that deforestation rates observed in the project region are consistently higher than the deforestation defined in the baseline emissions.

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Credit Issuance by Project Type

	Project type	Number of issuing projects	Issued credits	Average issuance / project	Average issuance / year (excluding non-issuing years)
Nature-Based Solutions	REDD+	78	397,324,507	5,093,904	973,835
	ARR	94	47,273,388	502,908	120,595
	IFM	175	87,455,062	499,743	134,546
Technology-Based Solutions	Solar renewables	128	59,664,734	463,826	136,221
	Wind renewables	642	209,972,203	327,060	75,584
	Hydropower renewables	282	144,688,072	513,078	111,815

Although REDD+ has the smallest number of issuing projects on the VCMs, it has the highest credit issuance in comparison to the other projects. This is followed by Wind renewables (which has 8x more projects than REDD+).

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Why do certain projects have more credits?

REDD+

REDD+ projects have issuance volumes that are generally higher than other nature-based project types. The predominant activity is the abatement of deforestation of primary forests; these projects are saving large volumes of pre-existing biomass from being lost and emitted into the atmosphere. In other words, REDD+ projects protect vast swathes of at-risk mature forests, or old trees, that store a significant amount of carbon per hectare. This deforestation mitigation has been, and can be, effectively implemented with a relatively low carbon credit price.

ARR

ARR projects involve the planting and/or restoration of previously non-forested lands, which means the source of crediting volume is the slow accumulation of biomass over time. ARR projects typically take place over smaller project areas and have a lower average of tons of carbon equivalent (tCO2e) per hectare when compared to REDD+ projects.
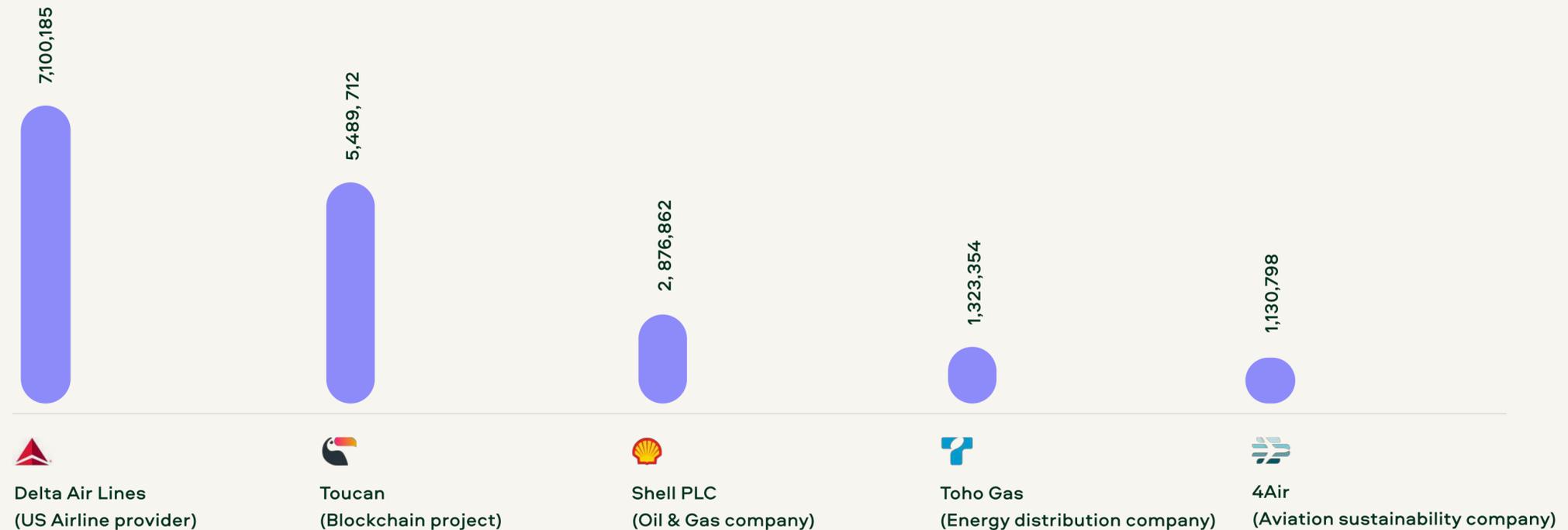
IFM

IFM projects issue credits on the basis of forest management activities, which cause biomass to accrue over time in pre-existing managed forests compared to the business as usual scenario.
The change in management activity, such as extending harvest rotation cycles, does not lead to a significant difference to the project biomass. Therefore, the small difference between business as usual and with-project scenario biomass means an IFM project will have smaller crediting volume when compared to a REDD+ project.

Each project type has unique attributes that must be considered when assessing credit integrity. Credit volume per project should not be used in isolation as a proxy for quality.

REDD+
Crediting volume

IFM
Crediting volume

ARR
Crediting volume
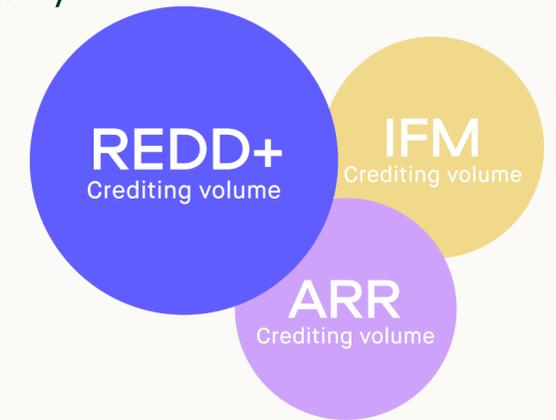
Top 5

companies that have retired credits in 2022 (Verra specific):

Top 5 organizations that have retired credits in 2022 and the number of retired credits YTD

7,100,185

5,489,712

2,876,862

1,323,354

1,130,798

Delta Air Lines
(US Airline provider)

Toucan
(Blockchain project)

Shell PLC
(Oil & Gas company)

Toho Gas
(Energy distribution company)

4Air
(Aviation sustainability company)

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Global Distribution of Issuing Carbon Projects

13%
North America
- ARR: 5
- IFM: 161
- Renewables: 14

8%
South America
- REDD+: 44
- ARR: 21
- Renewables: 39

2%
Central America
- REDD+: 6
- ARR: 9
- Renewables: 14

0.1%
Europe
- IFM: 1
- Renewables: 2

13%
Middle East
- Renewables: 181

5%
Africa
- REDD+: 19
- ARR: 28
- Renewables: 28

59%
Asia-Pacific (APAC)
- REDD+: 9
- ARR: 31
- IFM: 13
- Renewables: 774

Number of projects

high   low

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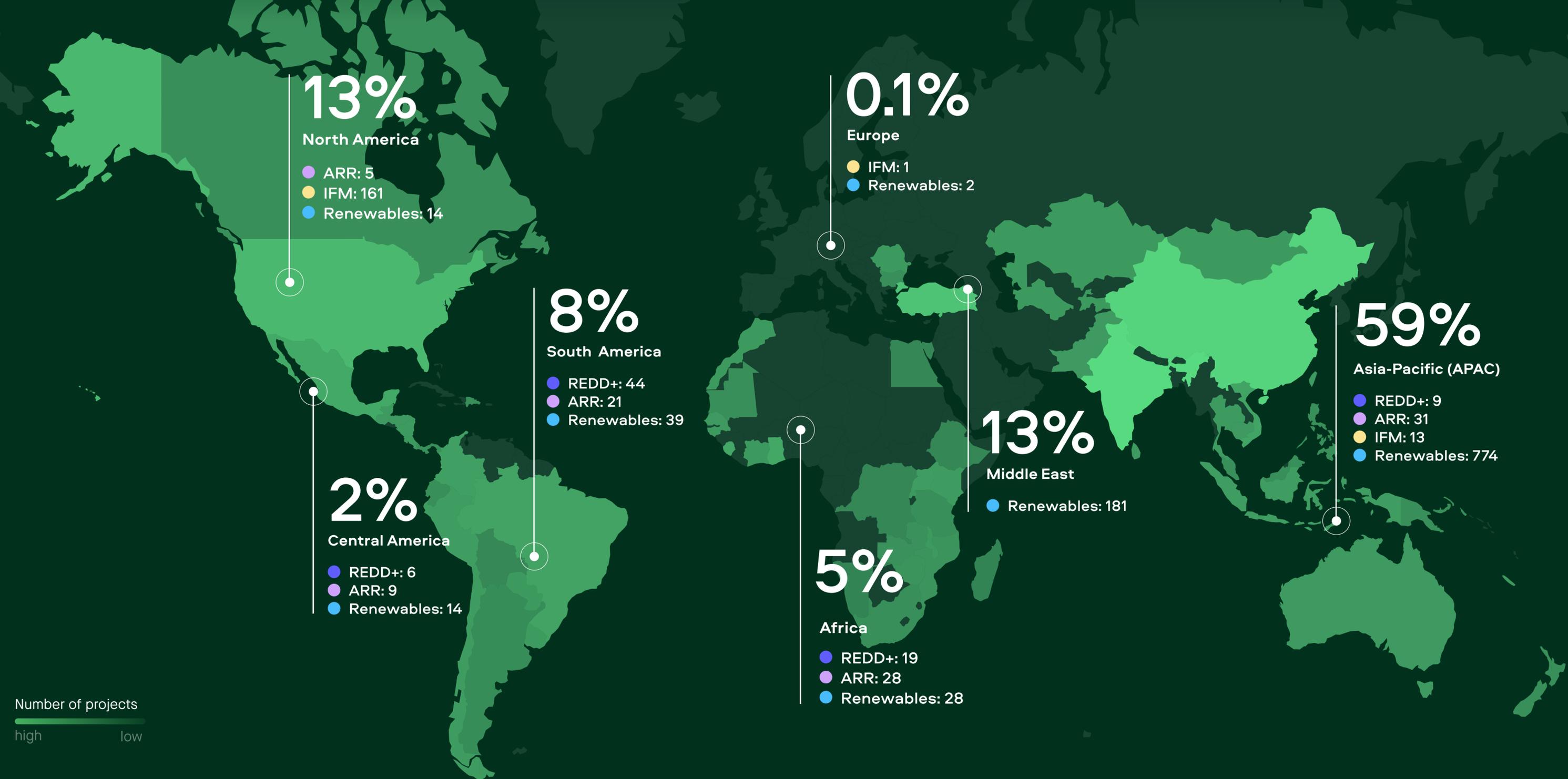
Nature-Based Solutions

Carbon Credit Breakdown (%)

REDD+ 75%

Number of credits: 397,324,507
Total issuing projects: 78

ARR 9%

Number of credits: 47,273,388
Total issuing projects: 94

IFM 16%

Number of credits: 87,455,062
Total issuing projects: 175

Introduction

Nature-based solutions (NBS) is one of the biggest categories of carbon credits available in the VCMs, which is why Sylvera started rating them first. What's more, NBS can have a significant impact on helping to mitigate climate change by reducing carbon in the atmosphere.

NBS also has other benefits, which are less likely to be seen with technological solutions: tackling biodiversity (fauna and flora) loss, for example with conservation projects, and supporting local and indigenous communities. This is an essential element when assessing the co-benefits of carbon crediting projects.

The diverse nature of these projects means that credits qualify as avoidance (REDD+), removals (ARR) or both (IFM). These projects vary from protecting our forests to restoring them, all of which are vital to achieving our climate goals.
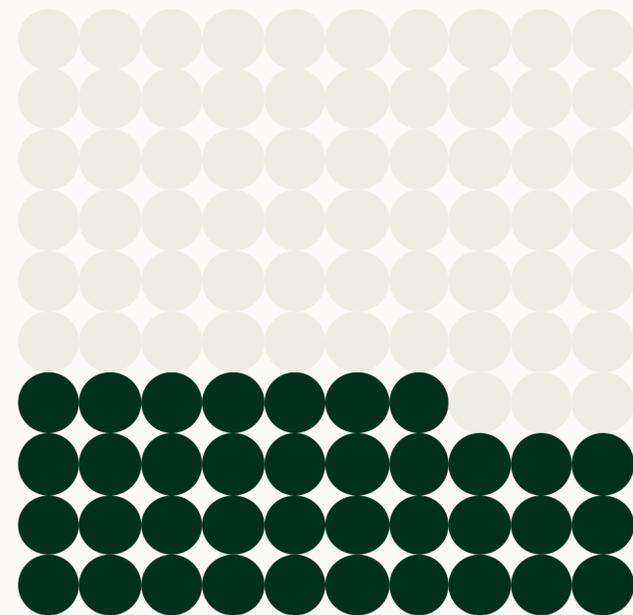
37%
of mitigation efforts needed by 2030 could come from NBS

Source: Bain & Company
April 18, 2022

Avoidance

REDD+
Reducing Emissions from Deforestation & Forest Degradation

Removals

ARR
Afforestation, Reforestation & Revegetation

Avoidance & Removals

IFM
Improved Forest Management

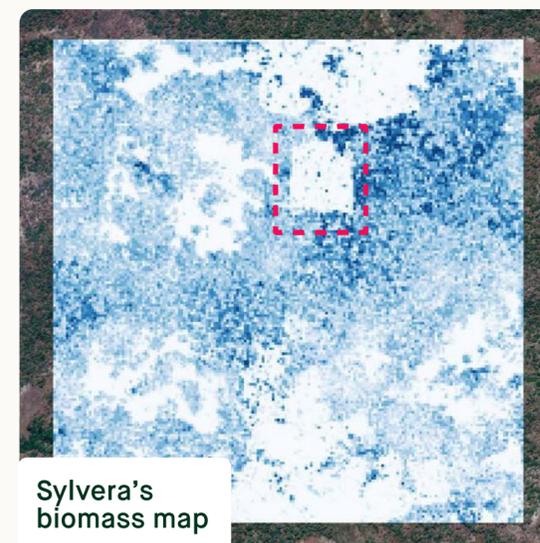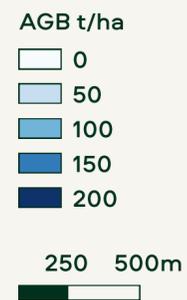Sylvera

Nature-based solutions

The Carbon Storage Capacity of Trees

Sylvera has been laser scanning forests in an effort to build the world's largest dataset of carbon stored in trees. By collecting vast quantities of 3D data around the world in different biomes, Sylvera can estimate both biomass and carbon stocks for forests at an unprecedented accuracy using satellite data.
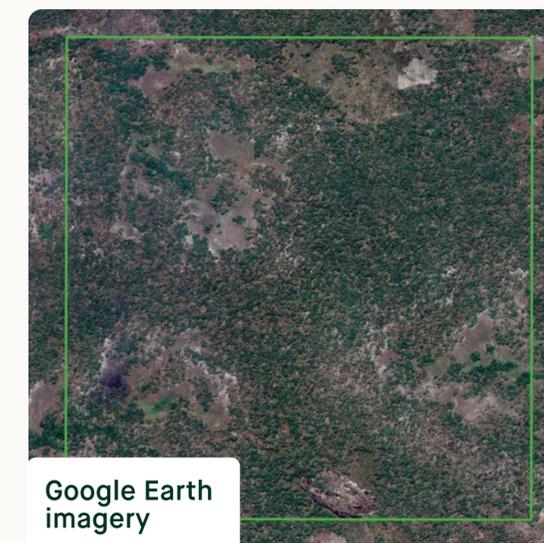
Terrestrial Laser Scanning (TLS)
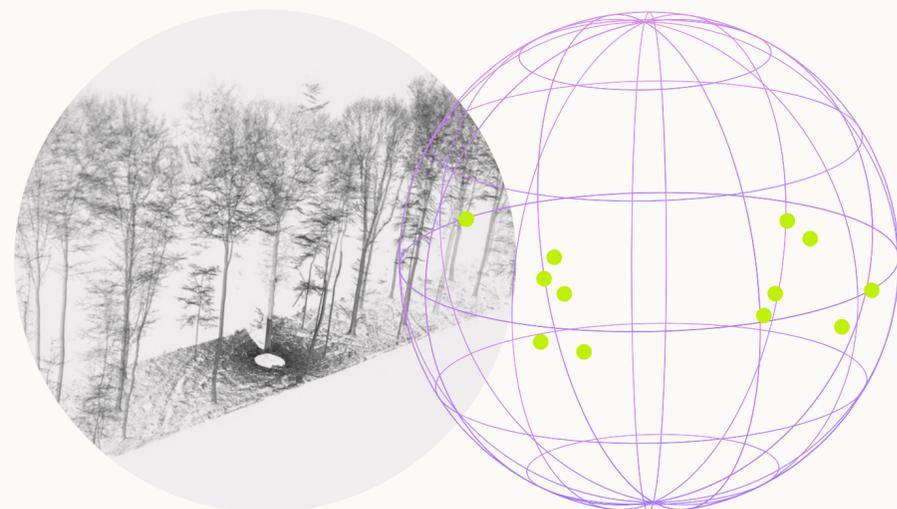
Sylvera's biomass map and Google satellite data comparison

AGB t/ha

- 0
- 50
- 100
- 150
- 200

250   500m

Sylvera's biomass map

Google Earth imagery

Sylvera's field team in Belize

Our data collection begins with our field teams who travel to an array of forest types to laser scan (also known as using LiDAR) the ground and the top of the forest canopy using state-of-the-art drones.

The resulting 3D scans of the forest are processed into ultra-accurate forest biomass maps using various structural modeling and machine learning tools. These maps enable us to glean finer and more precise insights into these valuable ecosystems, which should hopefully support efforts to preserve and maintain them.

Sylvera's Multi-Scale LiDAR team have been generating first-of-their-kind above-ground biomass maps derived from ground and UAV laser scanning measurements collected in forests around the world, and the results are providing fascinating insights into the carbon stored across these ecosystems. Sylvera's biomass map (left) shows areas of low (white) and high (dark blue) biomass in tonnes per hectare, and looking closely, we are able to see the contributions from individual trees. Interestingly, when compared with Google Earth imagery (Maxar Technologies 2018) (right), it can be observed how significant deforestation is changing these landscapes over time. Sylvera are using both proprietary multi-scale LiDAR data and various modalities of satellite data (optical, radar and LiDAR), to underpin accurate predictions of forest biomass stocks at scale.

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The Carbon Storage Capacity of Trees Continued

Sylvera's field team in Peru and Mozambique

3M

To-date, we have measured 3 million trees worldwide. There are a number of factors that determine how much carbon a tree stores. It varies across geography, species and age. In the UK, annual carbon uptake can range from around 0.9 tons in a Sycamore to 3.1 ton in an English Oak. To put this into perspective an average passenger car emits 4.6 ton of carbon per year.

10yrs

It can take up to 10 years before forests start absorbing more CO_2 than they emit, which is why it is crucial that we protect our existing trees, as well as restore and plant new ones.
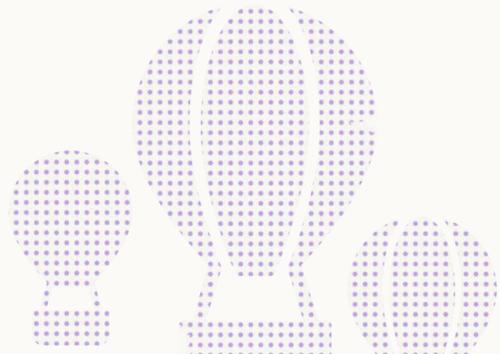
816Gt

The current carbon storage of global forests is around 816 gigatons, the equivalent to filling close to a trillion hot-air balloons with carbon.
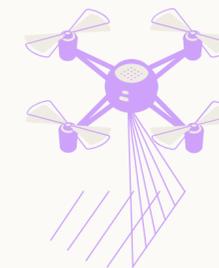
Today, Sylvera uses our ground and drone based laser scans to train and calibrate our Earth Observation-based machine learning models to improve their accuracy.

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Nature-based solutions

Reducing Emissions from Deforestation and Forest Degradation (REDD+)

REDD+ is a type of avoidance credit that finances activities that focus on the sustainable management and conservation of at-risk mature forests. Sovereign carbon credits, or Jurisdictional Nested REDD+, are not included in the scope of this assessment.

For the 78 registered and issuing projects, there are a total of **397,324,507** issued credits in the VCMs. If every REDD+ credit did legitimately equal one metric ton of carbon dioxide (tCO2) or other greenhouse gases (GHGs) being avoided, then the avoided emissions would be equivalent to: 50% of all the emissions from commercial flights in a single year.

397M = ✈ 50% of all emissions from commercial flights in a single year
issued credits

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Reducing Emissions from Deforestation and Forest Degradation (REDD+) Continued

There are two project types that fall under REDD+ umbrella:

Avoided Planned Deforestation (APD):

These projects prevent large-scale conversion of primary forest by commercial agents. Commercial conversion activities can range from developing crop plantations to cattle ranches. These projects also protect the forest from secondary agents of deforestation, driven by subsistence-based practices. A well-known APD project is Katingan Peatlands (VCS1477) in Indonesia.

Avoided Unplanned Deforestation (AUD):

These projects aim to protect forests from localized agents of deforestation, such as deforestation caused by local communities growing crops for local consumption or deforestation due to illegal logging. A well-known AUD project is Kariba (VCS902) in Zimbabwe.

4 Rejected / withdrawn

78 Registered & issuing

10 Registered & not issuing yet

142 recorded projects

50 Upcoming projects
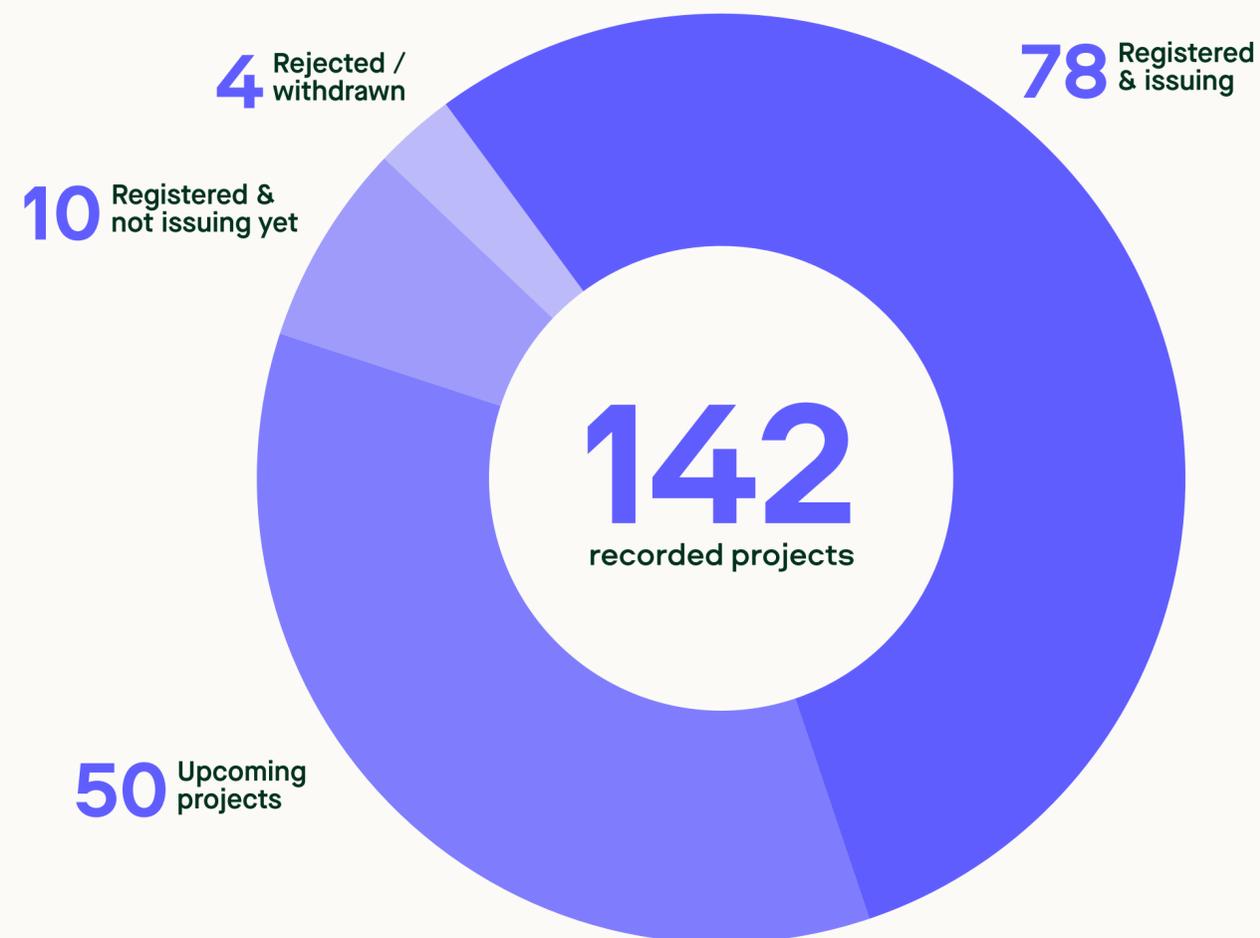
337M

Sylvera has rated 85% of issued REDD+ credits from currently registered projects, which is 337,826,202 credits.

All REDD+ projects on the Berkeley database are registered with Verra Carbon Standard (VCS).

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Nature-based solutions **REDD+**

Regional credit issuance breakdown of REDD+ projects

South America
44 projects
155,981,367 Total credits
3,466,253 Average issuance/project

39%

Asia-Pacific (APAC)
9 projects
117,800,424 Total credits
13,088,936 Average issuance/project

29%

Sub Saharan Africa
19 projects
115,306,225 Total credits
6,068,749 Average issuance/project

29%

Central America
6 projects | 9,360,788 Total credits
1,337,255 Average issuance/project

2%

South America has the highest number of issued credits (155,981,367), taking up 39% of the market share.

Although Sub-Saharan Africa has less than half the number of projects in comparison to South America, it has just over 40 million less credits. This is due to deforestation rates being generally higher in Africa, because the dominant drylands forests contain less biomass than tropical biomes, meaning deforestation agents are able to clear areas faster. This, combined with the difficulty in predicting forest loss in dryland biomes, has resulted in generally inflated baselines.

Asia-Pacific (APAC) also has less than half the number of projects as Africa, but it has the same market share with just over 500,000 more credits. This is due to the type and location of the projects. Several projects are situated in peatlands, which are very carbon-dense, and are also APD projects, which have more inflated baselines.

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Global Ratings Insights

So what do Sylvera's ratings reveal?

There is a misconception that all REDD+ projects are low quality. This is not true. Almost a third of the credits that Sylvera has rated are considered high quality, with strong scores across the core pillars of carbon performance, additionality and permanence. As a result, these projects are considered low risk.

The top-rated projects are characterized by conservative baselines, accurate deforestation reporting, strong evidence that the project implements activities above the business-as-usual scenario, and minimal permanence risks.

These Tier 1 projects have issued 143,452,424 carbon credits. If all of these high quality REDD+ credits were purchased and retired, it would be equivalent to 143 million tons of CO2e being offset— which is almost equivalent to the annual emissions from the entire EU shipping industry.

Provisional **14%**

Tier 1 **31%**

Sylvera REDD+ Ratings Summary (%Projects)

Tier 3 **25%**

Tier 2 **29%**

However, scrutiny is advised

- The remaining ⅔ of the projects we've rated are mixed quality.
- Approximately 30% of the projects we've rated have low over-crediting risks.
- 25% of the projects we've rated are considered very low quality, and consequently, high risk. The lowest rated REDD+ projects have red flags in one or more areas.

The majority of D rated projects have grossly under-reported the deforestation in the project area and have exceeded the baseline emissions. In one other extreme scenario, a project terminated carbon project activities in favor of legally deforesting the project area for agricultural production. In these cases, one carbon credit cannot be used to offset one ton of carbon.

Red flags in additionality are also drivers for projects receiving low ratings. Additionality risks can manifest in an over-estimation of the project's baseline emissions, as well as the additionality activities.
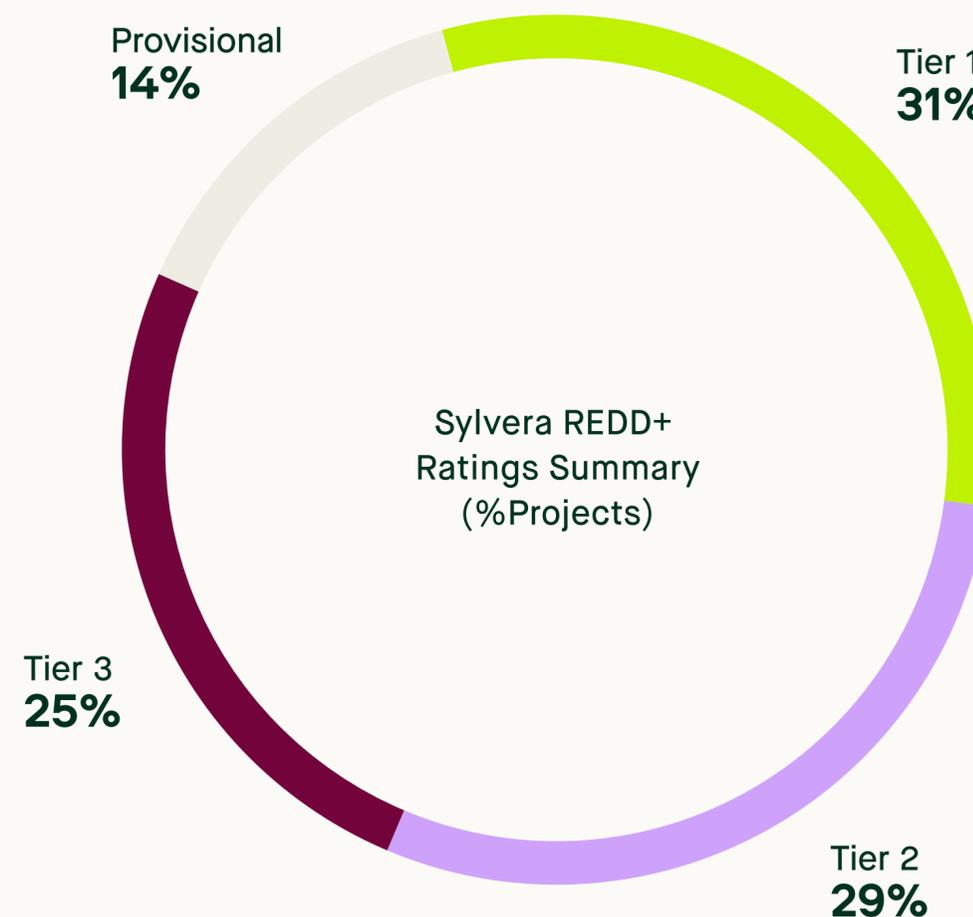
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Project-specific Insights

Within the Sylvera platform, users can save specific projects to their "Shortlist".
This year, the most popular REDD+ projects added to Shortlists were:

Katingan Peatlands

Verra 1477 (Indonesia)

Guatecarbon

Verra 1384 (Guatemala)

Tambopata

Verra 1067 (Peru)

Kariba

Verra 902 (Zimbabwe)

Cordillera Azul

Verra 985 (Peru)

These projects have in common strong co-benefits scores. It is important to note that not all carbon projects deliver comparable co-benefits. The Sylvera co-benefits score assesses both community benefits and biodiversity, enabling buyers to compare co-benefits impact between projects. Sylvera measures community co-benefits using the UN's Sustainable Development Goals. When assessing biodiversity impacts, Sylvera evaluates species richness, regional threats to biodiversity, and project actions to reduce pressure on biodiversity. We leverage a variety of data sources, including data through our partnership with the Integrated Biodiversity Assessment Tool (IBAT).

For all the REDD+ projects Sylvera has rated, the top 3 Sustainable Development Goals are:

8 DECENT WORK AND ECONOMIC GROWTH

5 GENDER EQUALITY

4 QUALITY EDUCATION

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Nature-based solutions **REDD+**

South America

South America has the highest number of REDD+ projects & issued credits:

156M

155,964,595 issued credits, which equals 38% of all REDD+ credits in VCMs, and equals an average of 3,544, 650 credits issued per project.

44

total issuing projects, which is 56% of issuing REDD+ projects on VCMs.

The age distribution of the 44 issuing projects is:

5 - 9 years	23
10 -14 years	19
>14 years	2

31.8M Colombia
11 projects

64.2M Peru
10 projects

59.2M Brazil
19 projects

55K Bolivia
1 projects

21K Paraguay
2 projects

533K Chile
1 project

South America has been, and will continue to be, a key driver of credit volume in the VCMs. The Amazon Rainforest is one of the world's most important carbon sinks. Brazil is often synonymous with the Amazon Rainforest and, in particular, holds a significant amount of credits.

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South America Sylvera ratings analysis

119M

Sylvera has rated 119,256,986 credits, which is 76% of the total number of REDD+ credits in South America. Sylvera has rated 51% of still issuing projects in this region, 2 projects due to issue, 1 project that has been canceled and 7 pre-issuance projects.

Provisional **22%**

Tier 1 **35%**

Sylvera's overall ratings (% Projects)

Tier 3 **16%**

Tier 2 **25%**

Additionality

1.7 — 4

For the additionality of activities of the projects rated, our score for this region ranges from a minimum of 1.7 to a maximum of 4. This reveals a broad spectrum in which some projects have questionable additionality and others do not. The majority of the projects assessed have a score of 3 or above, which is considered a reasonable indicator of quality with respect to additionality of activities.

Strength of Baseline

2 — 5

For the projects rated, the strength of baseline scores in this region range from 2 to 5. This is one of the highest performing regions for strength of baseline on average, with only a small number of projects being on the lower end of the scale. However, the vast majority of projects receive an intermediate score, which suggests there is still some over-crediting risk present for most projects.

Co-benefits

2.8

South America is the worst performing region for co-benefits, with an average score of 2.8. South America has exceptional biodiversity and species richness, but projects rarely define robust monitoring and protection plans. Moreover, many projects implement limited activities that contribute to the progression of Sustainable Development Goals.

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Nature-based solutions REDD+
Sub Saharan Africa

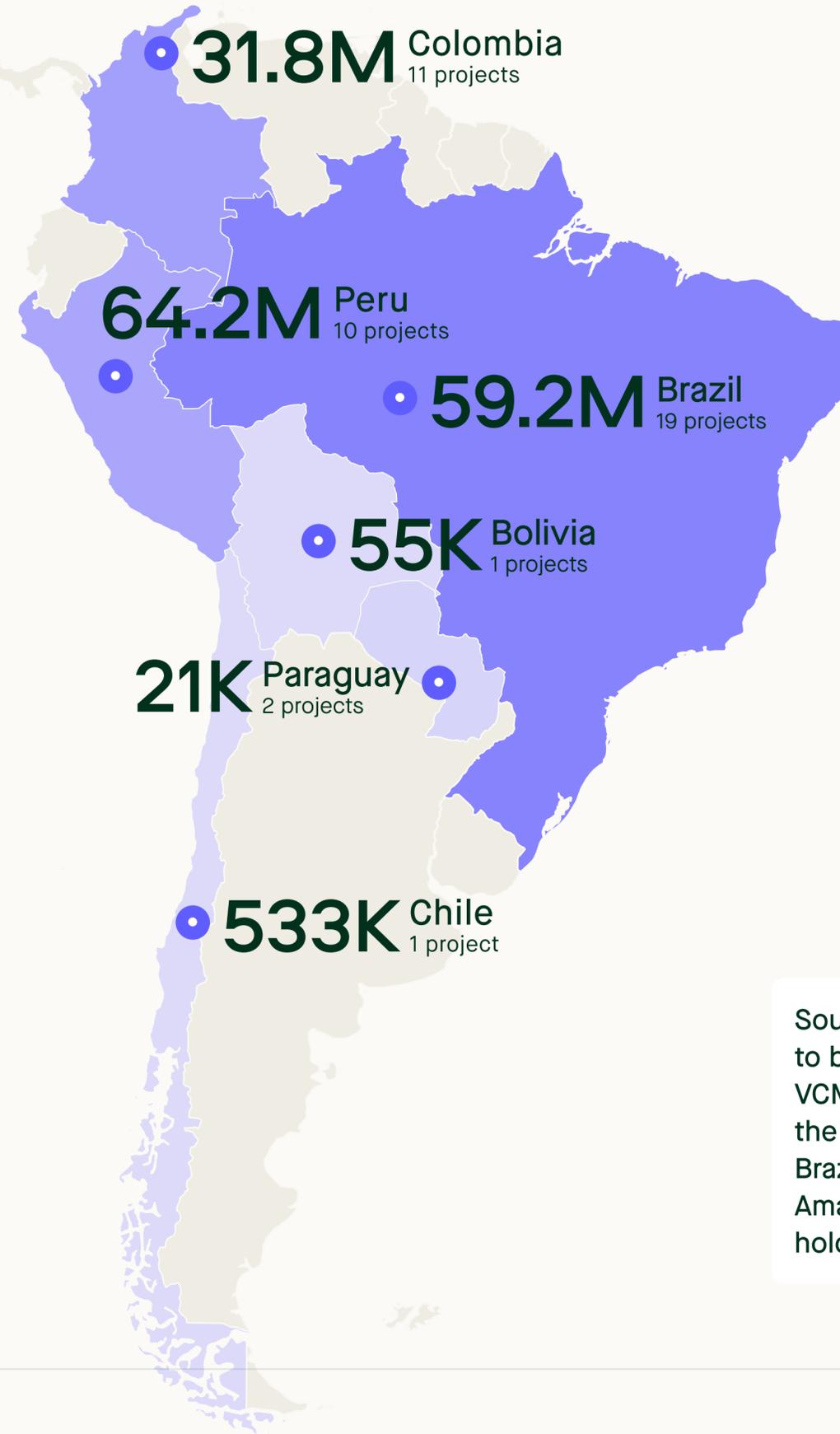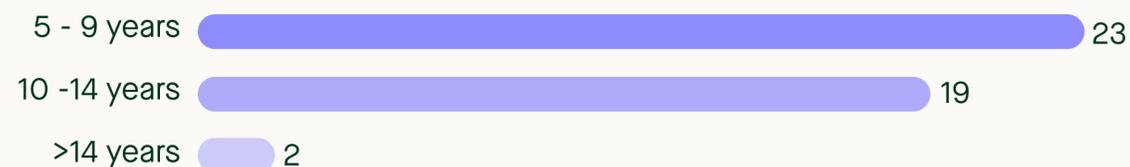The next highest concentration of REDD+ projects is in Africa:

115M

115,306,225 issued credits, which equals 29% of all REDD+ credits in VCMs, and equals an average of 6,068,749 credits issued per project.

19

total issuing projects, which is 24% of issuing REDD+ projects on VCMs.
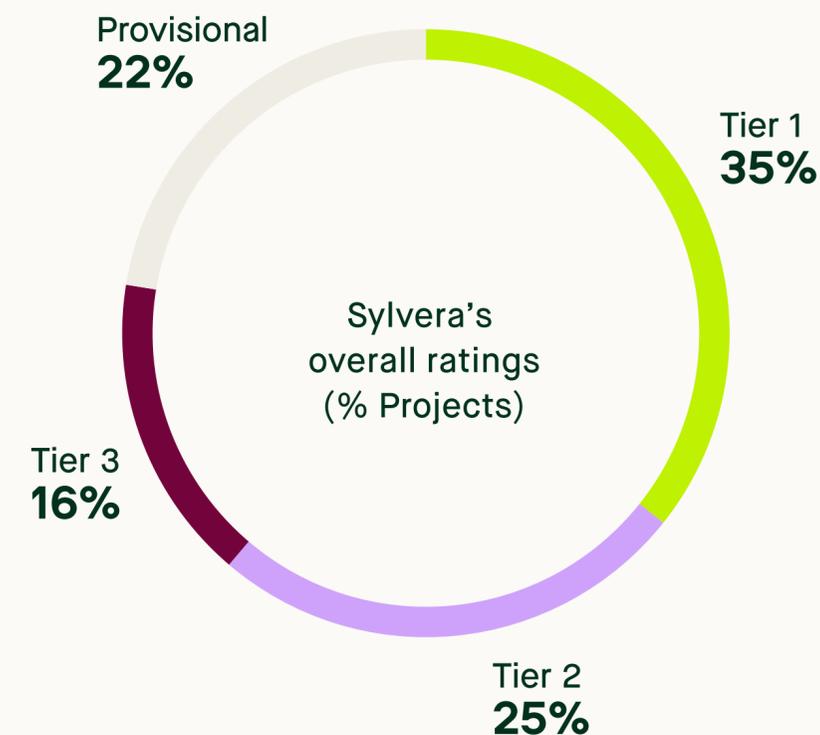
The age of the 19 issuing projects are:

<5 years	1
5 - 9 years	7
10 -14 years	10
>14 years	1

302K Guinea-Bissau
1 project

975K Sierra Leone
1 project

56K R.Congo
1 project

9.1M Ethiopia
1 project

37M DRC
2 projects

19.8M Kenya
3 projects

1.4M Tanzania
3 projects

3.3M Malawi
1 project

8.6M Zambia
3 project

29.0M Zimbabwe
1 project

5.2M Madagascar
2 projects

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Nature-based solutions REDD+
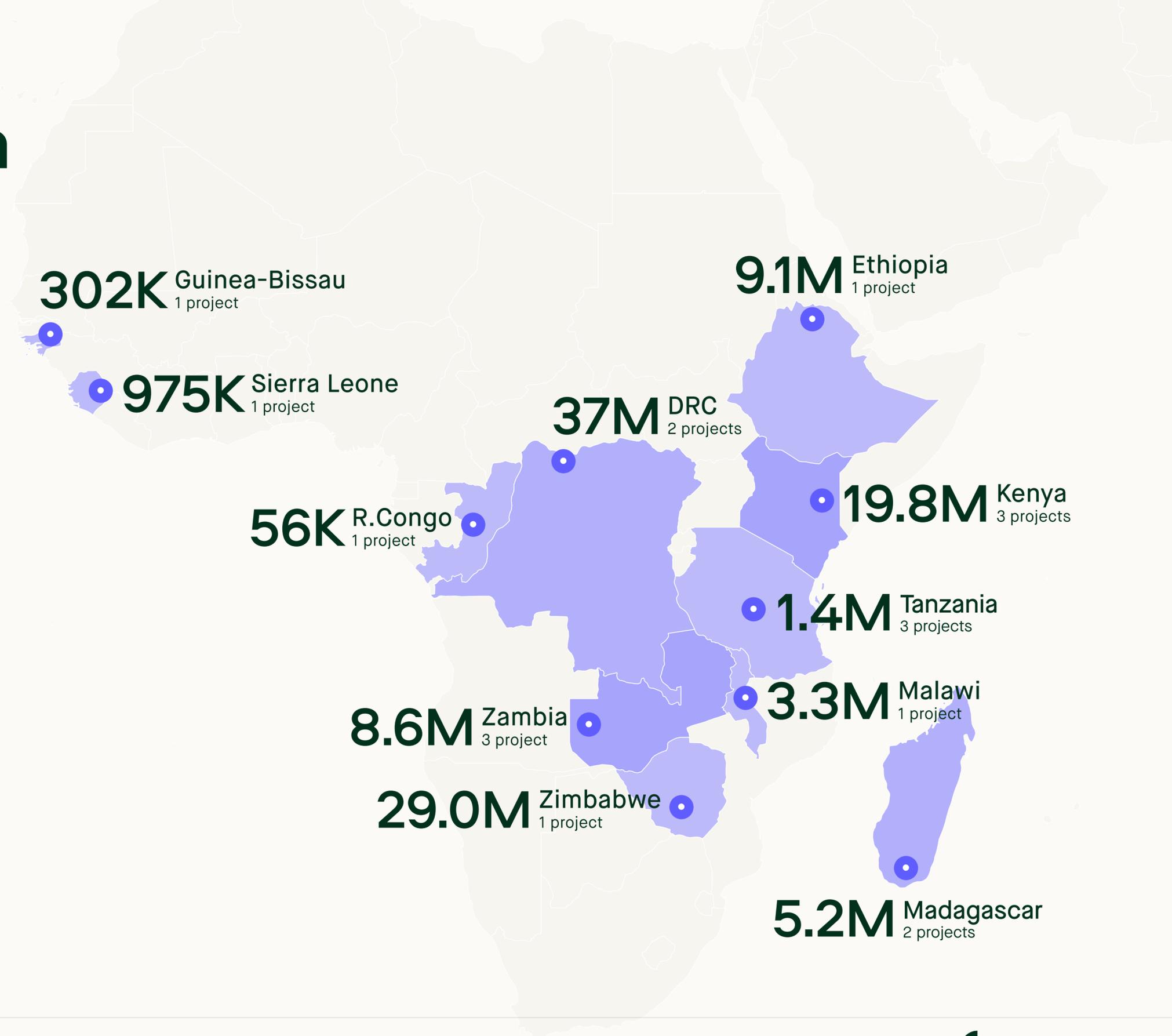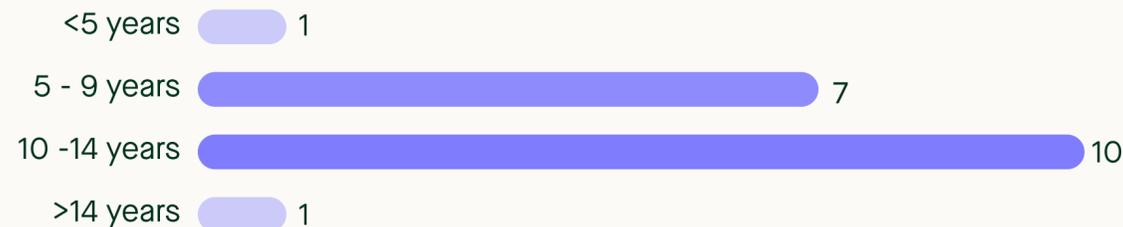
Sub Saharan Africa Sylvera ratings analysis

98M

Sylvera has rated 98,333,162 credits, which is 85% of the total number of credits in Africa (53% of all the projects in this region).

Sylvera's overall ratings (% Projects)

Provisional 0%
Tier 1 10%
Tier 2 20%
Tier 3 70%

Additionality

2.3 — 4.5

For additionality of activities, our score for this region ranges from a minimum of 2.3 to a maximum of 4.5. This shows that projects generally have higher confidence surrounding the project's additionality, compared with South America. Many of these projects take place in evidently underfunded National Parks and have a lot of positive engagement with local communities.

Strength of Baseline

1 — 3

The strength of baseline scores in this region range from 1 - 3. On average, this is the worst performing region for strength of baseline. The deforestation rates are generally higher in Africa because the dominant drylands forests contain less biomass than tropical biomes, meaning deforestation agents are able to clear areas faster. This, combined with the difficulty in predicting forest loss in dryland biomes, has resulted in generally inflated baselines. With our machine learning models, we have found that the magnitudes of baseline inflation are likely overstated, which severely affects the projects' ratings due to the over-crediting risk.

Co-benefits

4.3

The co-benefits scores for Africa averages at 4.3, making it the joint highest scoring region. As several of these projects take place in National Parks, or other highly biodiverse areas, they have the potential to make a large impact. In addition to this, many projects engage successfully with local communities.

Sylvera
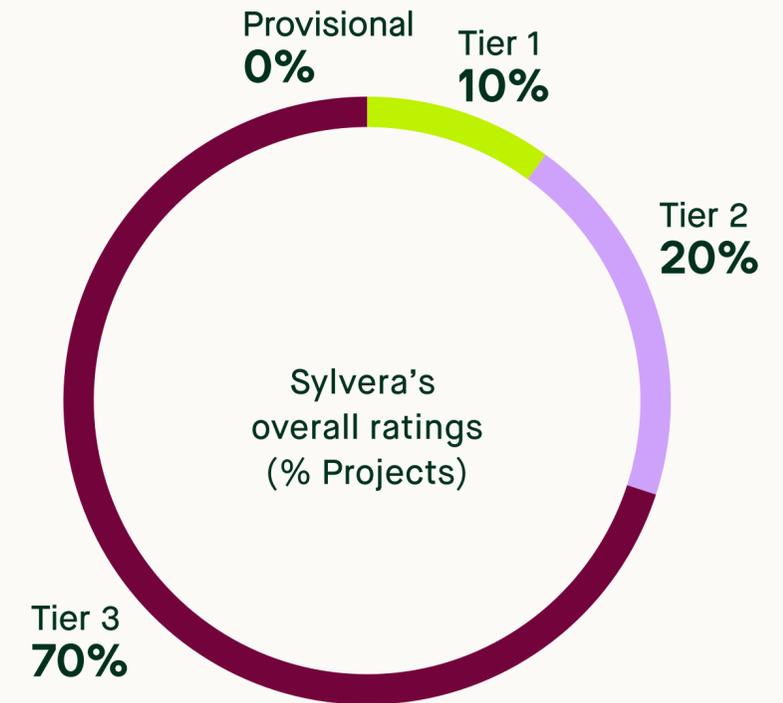
Nature-based solutions REDD+
Asia Pacific

The third highest concentration of REDD+ projects are in Asia Pacific (APAC):

117M

117,800,424 issued credits, which equals 29% of all REDD+ credits, and equals an average of 13,088,936 issued credits per project.

9

total issuing projects, which is 12% of issuing REDD+ projects on VCMs.

39.5M Cambodia
4 projects

76.2M Indonesia
3 projects

1.9M Papa New Guinea
2 projects
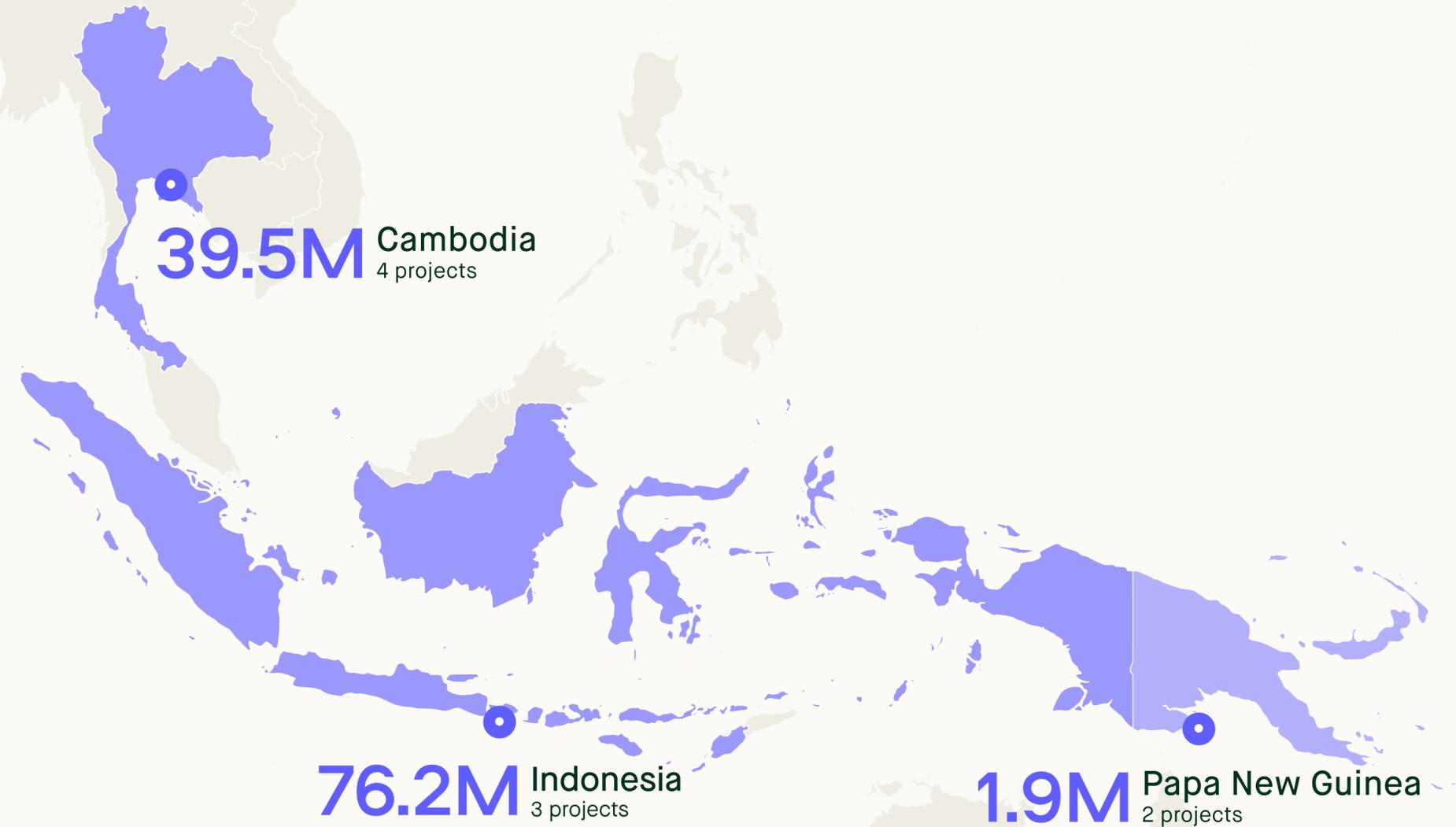
The age of the 9 issuing projects are:

<5 years	1
5 - 9 years	5
10 -14 years	3

Sylvera

Nature-based solutions REDD+
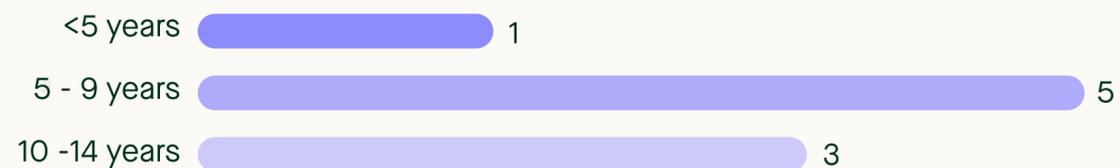
Asia Pacific Sylvera ratings analysis

114M

Sylvera has rated 114,565,141 credits, which is 97% of the total number of credits in Asia Pacific (60% of all the projects in this region).

Provisional
0%

Tier 3
17%

Tier 1
33%

Sylvera's
overall ratings
(% Projects)

Tier 2
50%
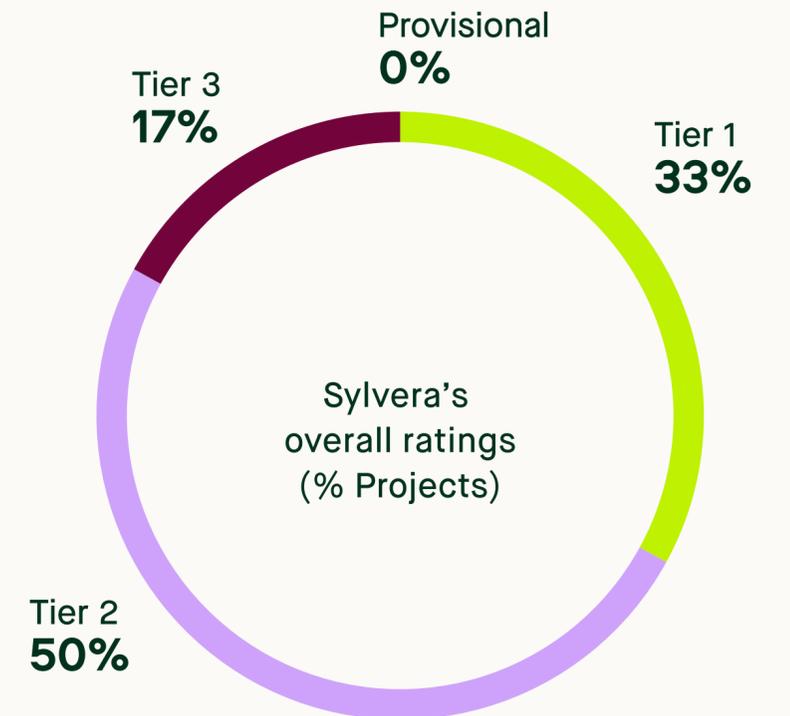
Additionality

2.2 — 4.3

For additionality of activities, our score for this region ranges from a minimum of 2.2 to a maximum of 4.3. This is a similar range to those observed in other regions, however this region shows the greatest variance in the projects assessed, with most projects sitting at either extreme ends of the spectrum of additionality likelihood.

Strength of Baseline

2 — 5

The strength of baseline scores in this region range from 2 to 5. Similarly to additionality of activities, Sylvera has observed a large range of quality of the projects in this region, with the projects either demonstrating relatively high over-crediting risk or very low over-crediting risk.

Co-benefits

3.7

The co-benefits scores for APAC averages at 3.7, making it the second highest scoring region. As several of these projects take place in highly biodiverse areas and successfully engage with local communities, they have the potential to make a large impact.

Sylvera

Central America

Central America has the fourth highest number of REDD+ projects:

8M

8,253,263 issued credits, which equals 2% of all REDD+ credits, and equals an average of 1,375,544 credits issued per project.

6

total issuing projects, which is 8% of issuing REDD+ projects on VCMs.

An average of issued credits per project is relatively low considering the age of the projects in this region are 10 years or above.

The age of the 6 issuing projects are:

10 -14 years ──────────────── 5

>14 years ──── 1

2.58M Belize
4 projects

5.66M Guatemala
2 projects
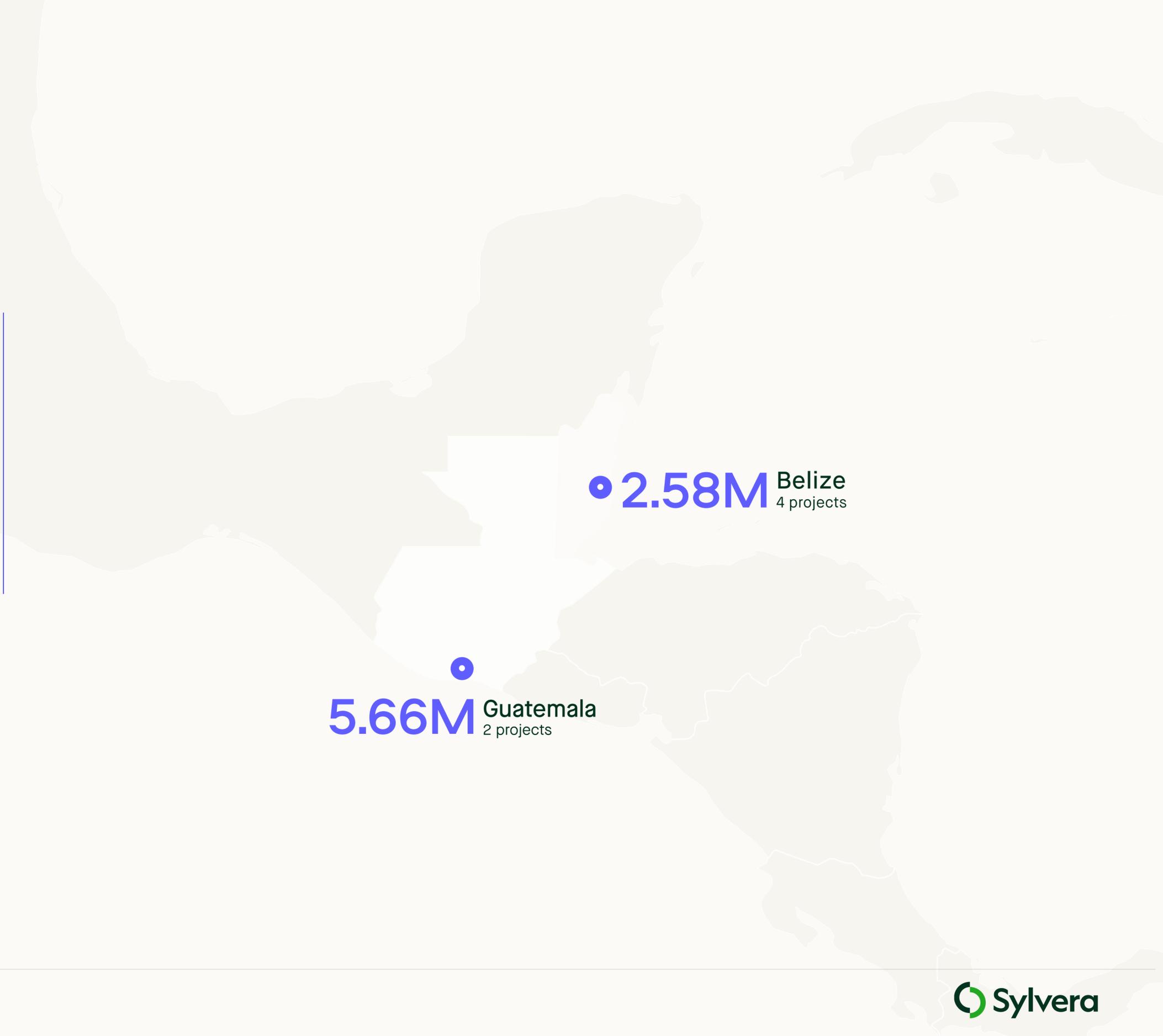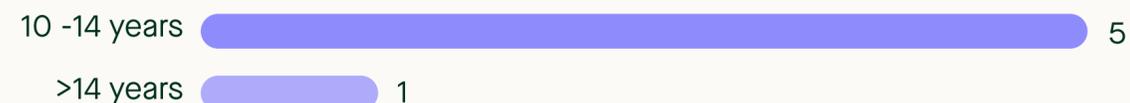
Sylvera

Central America Sylvera ratings analysis

5M

Sylvera has rated 5,666,841 credits, which is 69% of the total number of credits in Central America (43% of all the projects in this region).

Tier 3
0%

Provisional
0%

Tier 1
33%

Sylvera's
overall ratings

Tier 2
67%

Additionality

3.3 — 3.6

For additionality of activities, our score for this region ranges from a minimum of 3.3 to a maximum of 3.6. Compared to other regions, there isn't as much of a variance with the projects we've rated in Central America, but this is potentially a function of the small number of projects present. So far, there are no major concerns with respect to the likelihood of additionality for these projects.

Strength of Baseline

2 — 4

The strength of baseline scores in this region range from 2 to 4, indicating mixed quality of baselines and therefore over-crediting risk for the region. However, this is a small sample of projects sitting across the spectrum, so these statistics are highly individualized.

Co-benefits

4.3

Across the small sample of projects in this region, the performance in co-benefits has been consistently high, with the joint highest average score of 4.3. No major concerns have been found regarding community engagement in the projects rated so far, and they are taking place in biodiverse areas.

Sylvera
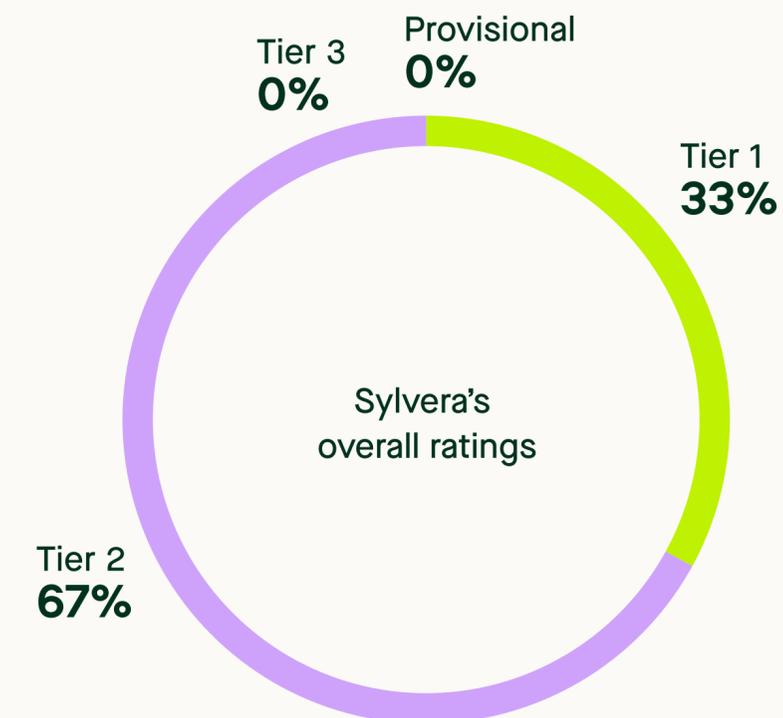
Maísa (Brazil)

The Maísa project was a 5 - 9 year old project in Brazil that was recently terminated in September 2022. The landowner plans to legally deforest for agricultural production. This is an extremely rare instance. We have downgraded the project's rating on our platform to highlight the non-permanence risks present as a result of the termination.

Brazil

Brazil has the highest number of REDD+ projects in the world – 23% of all REDD+ with 19 projects that have issued credits.

Brazil has the third highest number of issued credits in the world - 59,272,203 credits - which is 15% of credits on VCMs, and averages to 3,119,590 credits per project in Brazil.

The governing structure of Brazil is decentralized across a number of states with varying degrees of legislation impacting forest protection. The majority of Brazilian projects take place on private land, typically belonging to large landowners engaged in other commercial activities, unlike Asian Pacific projects, which typically exist within a centralized governing system and on state-owned land. The decentralized governance and widespread privatization of land in Brazil creates favorable conditions for continued market growth and crediting volumes.

Sylvera has rated 70% of REDD+ credits in Brazil, which equals 37,923,379.

The age of the 19 issuing projects are:

5 - 9 years	10
10 -14 years	8
>14 years	1

Indonesia

Indonesia is home to the highest number of issued credits in the world. This can be attributed to the 2 dominant project types which are APD and peatland projects.

Nevertheless, Indonesia is home to only 4% of all REDD+ projects (3 projects) that have issued credits.

These projects have issued 76,261,979 credits, which is 19% of credits on the market. They average 25,420,660 issued credits per project.

Sylvera has rated 97% of REDD+ credits in Indonesia, which is 73,623,906.

The age of the 3 issuing projects are:

5 - 9 years	2
10 - 14 years	1

"Indonesia halts carbon project verification process over legal concerns"

In April 2022, it was announced that no new credit issuances beyond vintage December 2020 will take place for projects in Indonesia. In October 2022 the Indonesian government set out new carbon trading regulations which placed some permanent restrictions on the export of credits. Further announcements are expected at COP27 (6-18 November 2022).

Sylvera

Nature-based solutions REDD+
Country insights

Democratic Republic of the Congo

DRC is home to 2% of all REDD+ projects (only 2 projects), but it has the fourth highest number of issued credits in the world.

DRC projets have issued 37,300,507 credits which is 9.35% of credits on the market, and averages to 18,650,254 credits per project. The unusually high number of credits is due to one of the projects, which has been running for many years, being a large peatland project, which means it has a very high carbon density.

Sylvera has rated 100% of REDD+ credits in DRC.

The age of the 2 issuing projects are between 10 - 14 years.

"Congo to Auction Land to Oil Companies"

The DRC has recently been making headlines as the government is auctioning off incredibly important natural carbon sinks for oil drillings. Further reading on this story in the appendix.

Kenya

Kenya is home to 3% of all REDD+ projects (3 projects) and has issued 19,860,758 credits which is 4.98% of credits on the market.

The average issuance per project in Kenya is 6,620,253 credits.

Sylvera has rated 100% of REDD+ credits in Kenya.

The age of the 3 issuing projects are:

5 - 9 years	1
10 -14 years	1
>14 years	1
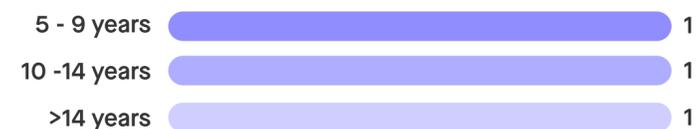
"World's Biggest Ever Carbon Credits Issue Planned in Gabon"

Gabon recently unveiled plans to issue roughly 90 million REDD+ Results Units (RRUs) in late 2022 and early 2023 through a mechanism known as redd.plus. This announcement sparked confusion in the market, with some noting that the units to be issued fail to demonstrate some of the core characteristics of carbon credits, notably a demonstrable claim to being additional. This would make RRUs unsuitable for uses like offsetting. Further large issuances are expected from Papua New Guinea, Honduras and Belize in the near future. See appendix for references to this story.
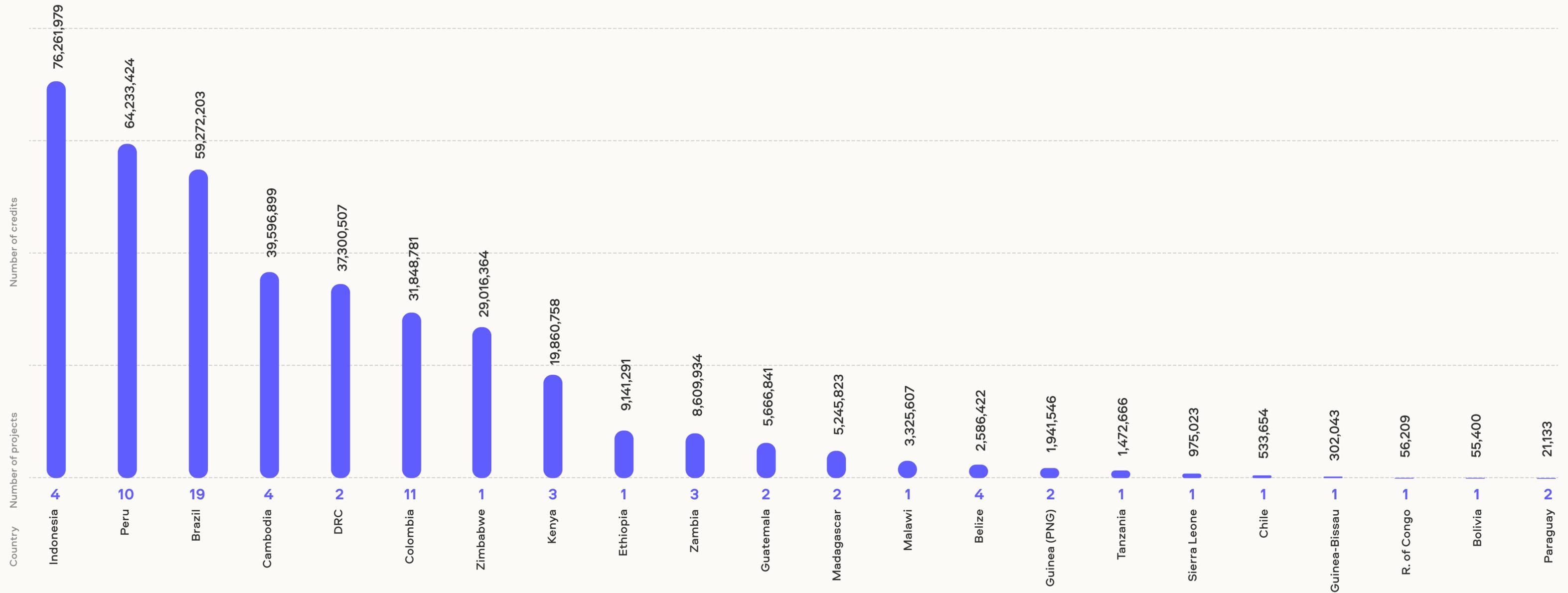
Sylvera

Comparison of projects and credits issuance for issuing countries

Country	Number of projects	Number of credits
Indonesia	4	76,261,979
Peru	10	64,233,424
Brazil	19	59,272,203
Cambodia	4	39,596,899
DRC	2	37,300,507
Colombia	11	31,848,781
Zimbabwe	1	29,016,364
Kenya	3	19,860,758
Ethiopia	1	9,141,291
Zambia	3	8,609,934
Guatemala	2	5,666,841
Madagascar	2	5,245,823
Malawi	1	3,325,607
Belize	4	2,586,422
Guinea (PNG)	2	1,941,546
Tanzania	1	1,472,666
Sierra Leone	1	975,023
Chile	1	533,654
Guinea-Bissau	1	302,043
R. of Congo	1	56,209
Bolivia	1	55,400
Paraguay	2	21,133

Sylvera

Katingan Peatlands

Verra, 1477

AA
Sylvera Rating

99%
Carbon Score

5/5
Additionality

3/5
Permanence

4/5
Co-benefits

Katingan has been rated AA by Sylvera. The project has generally delivered on its emission reduction claims and emissions reductions are very likely to be additional.

The project has nearly met its emissions reductions claims. Sylvera detected slightly more deforestation from 2010 to 2020, which includes forest loss from fire events. Outside of major forest loss event years (which would threaten future issuance capacity), the deforestation rates remain relatively stable.

Katingan is very likely additional as the project's baseline rate of conversion is not likely overstated and project activities for deforestation mitigation are highly additional compared to "business as usual" (BAU).

Within the Reference Area (RA) concessions, annual average and cumulative rates of forest conversion observed in peak conversion years are higher than proposed for the baseline which suggests over-crediting risks are low. The RA is made up of adequate proxies for the Project Area (PA) on the basis of similar agents of deforestation and physical setting.

The project activities are likely additional as the PA was under threat of conversion before project implementation. The PA was previously zoned by the government as a production forest and would likely have been converted to industrial acacia plantations, demonstrating material risk to the forest. Further, high rates of non-compliance with a national peat conversion moratorium decrease the likelihood of forest protection in the absence of the project. The project introduces a new forest patrol and observation team that monitor the project and implement ecosystem restoration activities.

Carbon stock permanence is exposed to high human risks and moderate natural risks. Human risks are driven by the national political context. Inconsistencies in forest governance between central and local governments in Indonesia lead to ineffective forest protection. Increasing land under commercial uses proximal to the PA also increases human risks. Natural risks are driven by the fire vulnerability of the peatland ecosystem. However, the project implements activities to mitigate fire risks, including rewetting and planting fire-break plantations.

Sylvera

Case study
Katingan Peatlands

Carbon Score

Sylvera finds that Katingan has met its emissions reductions claims. Deforestation rates have slightly increased since the last issuance in December 2020, however, this is not expected to impact future issuance capacity.

37.9M

37,949,290 credits have been permitted to issue from 1 November 2010 to 31 December 2020.

37.4M

37,411,713 tCO2e in net emissions reductions

Carbon Score

Sylvera
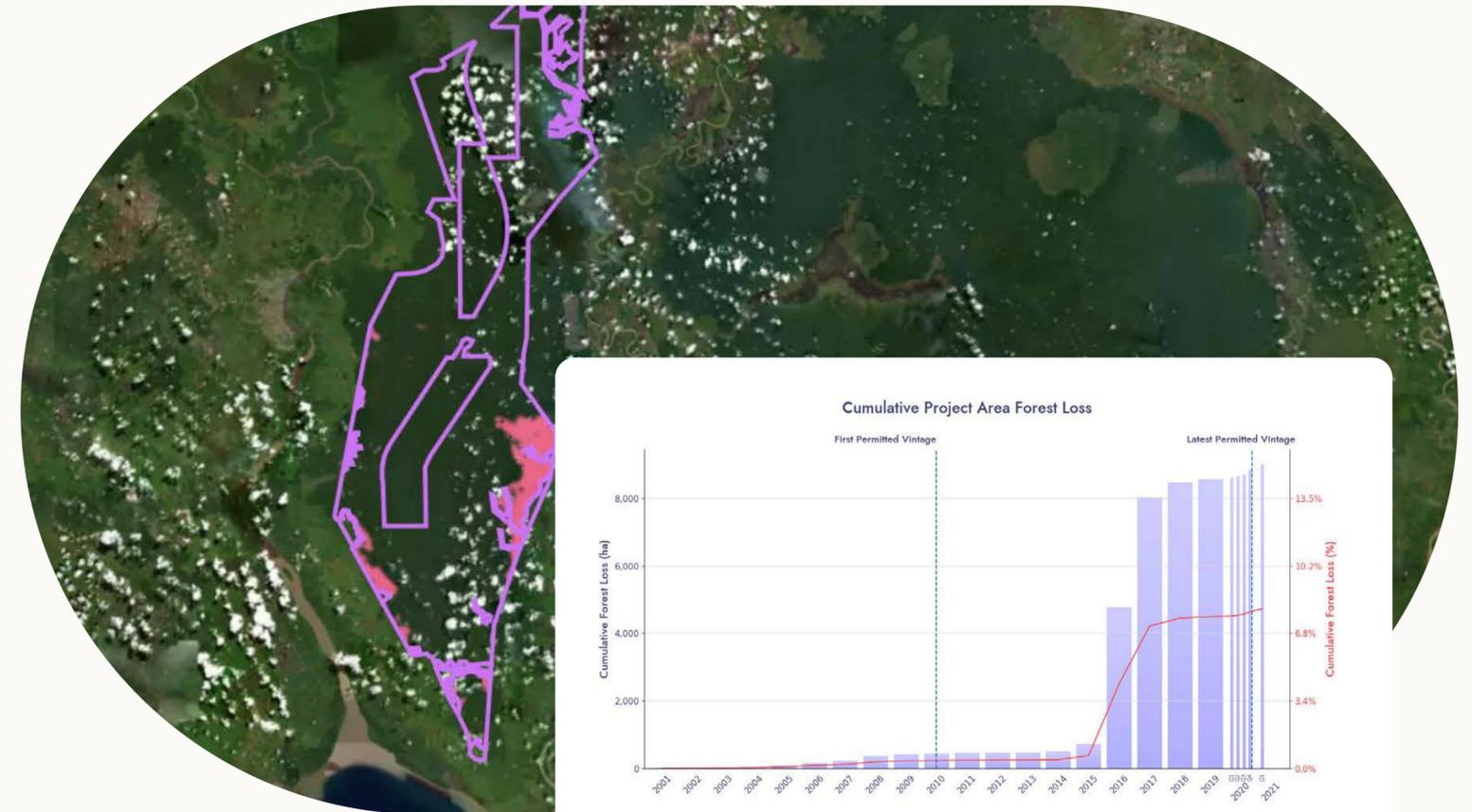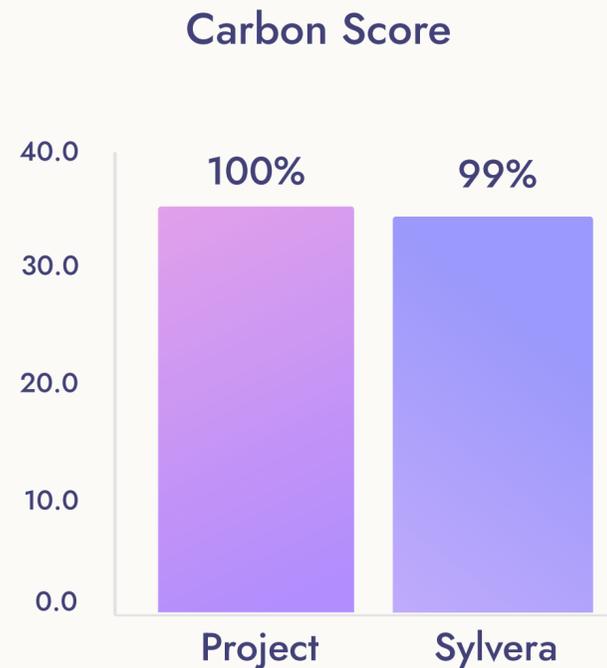
Case study
Katingan Peatlands

Additionality

Katingan is likely additional. The project implements deforestation mitigation activities that are highly additional and the baseline rate of conversion is unlikely to be overestimated.

The Reference Area (RA) is made up of proxy areas that are considered an adequate representation of the Project Area (PA) on the basis of similar agents of deforestation and physical setting. Annual average and cumulative rates of conversion observed in peak conversion years of the RA concessions are higher than proposed for the baseline which suggests that it is not overstated.
These project activities are very likely to be additional as project activities exceed forest protection beyond what was common practice under a "business as usual" (BAU) scenario.

Under BAU the project would be under a material risk of conversion. Before project implementation, the PA was previously zoned as a production forest. Furthermore, acacia plantation and other commercial land use is common practice in the area, suggesting it was likely the forest would have been converted to plantation.

The project activities increase forest protection, through the introduction of ranger patrols, as well as peatland ecosystem restoration activities (e.g. peatland rewetting).

Project Area Baseline vs Cumulative Reference Area Conversion Rates

Sylvera
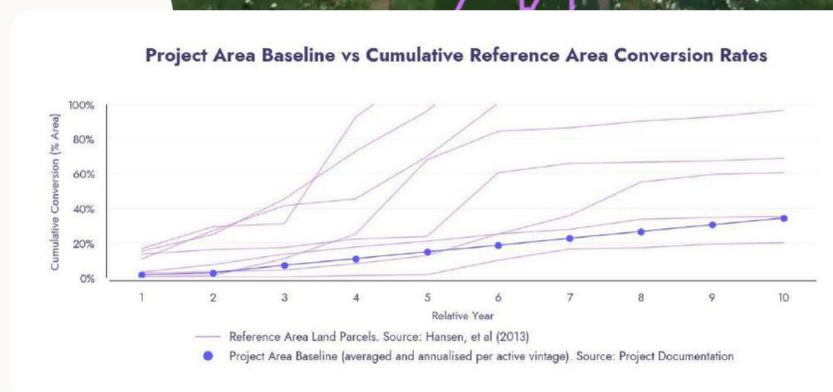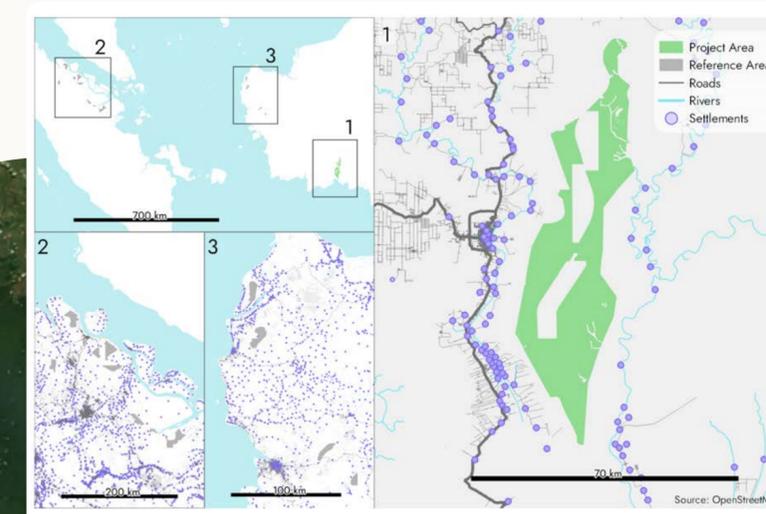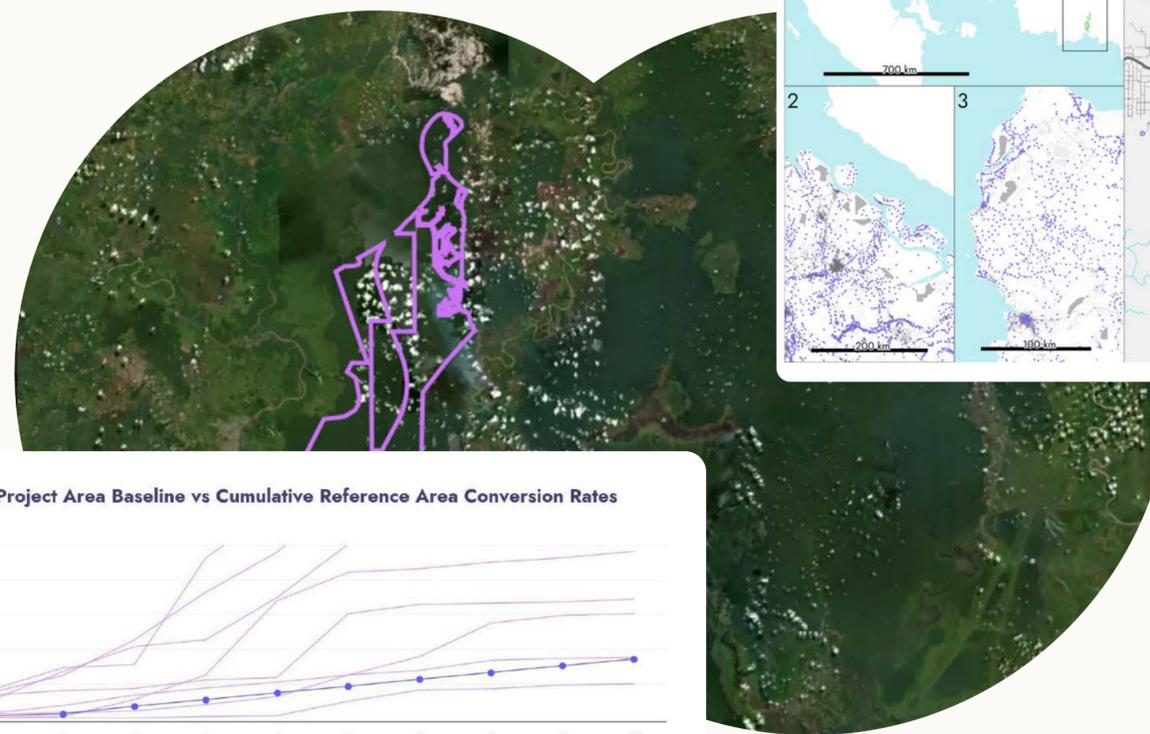
Case study
Katingan Peatlands

Permanence

Carbon stock permanence is exposed to a moderate level of risk. Natural risks are moderate and driven by the peatland's vulnerability to carbon stock loss in the event of a fire ecosystem, particularly during drought or if degraded.
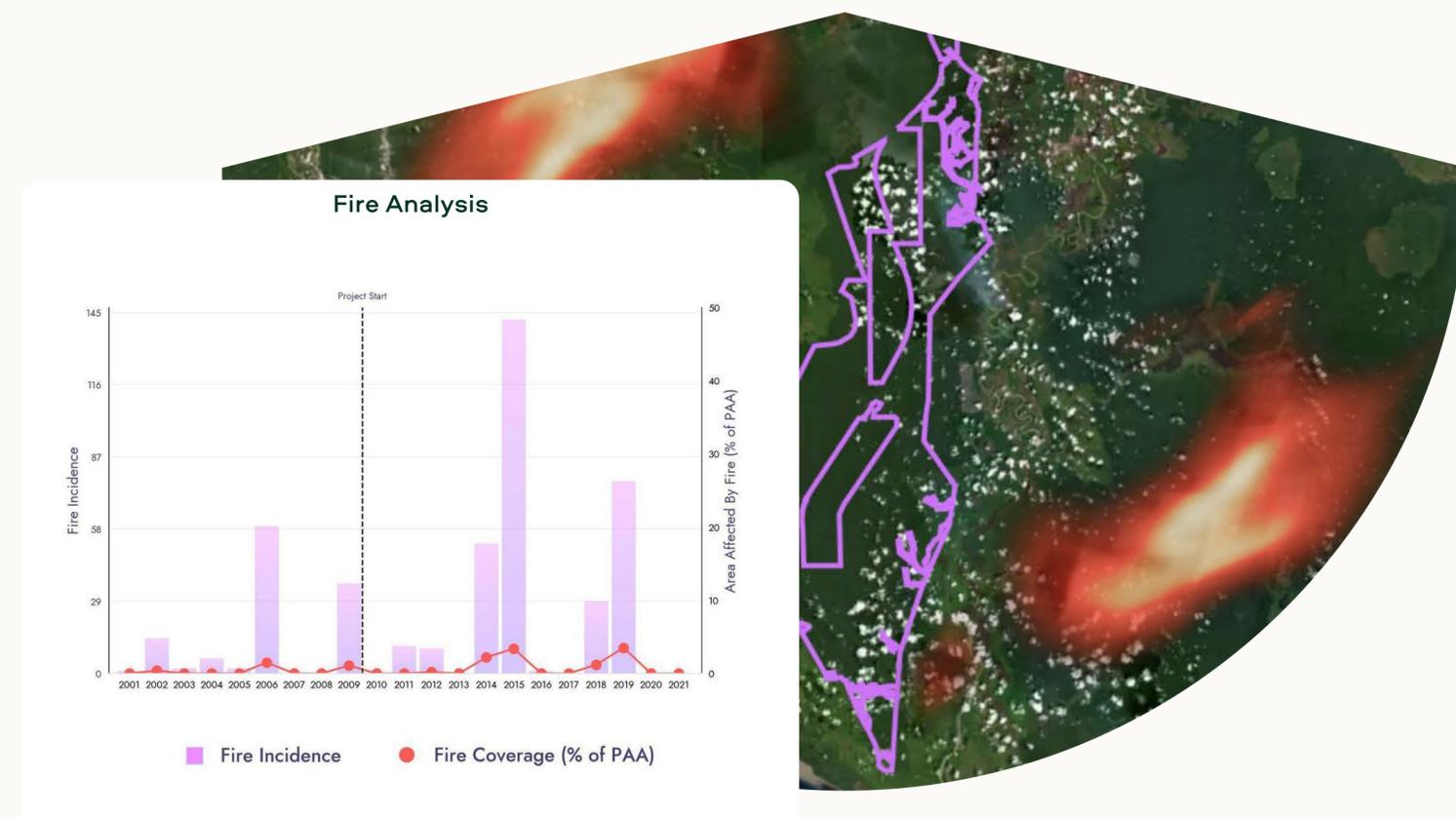
Co-Benefits

Katingan has an above-average overall co-benefits rating. The impact on biodiversity conservation is exceptional, while the impact on the local community is moderate.

Sylvera
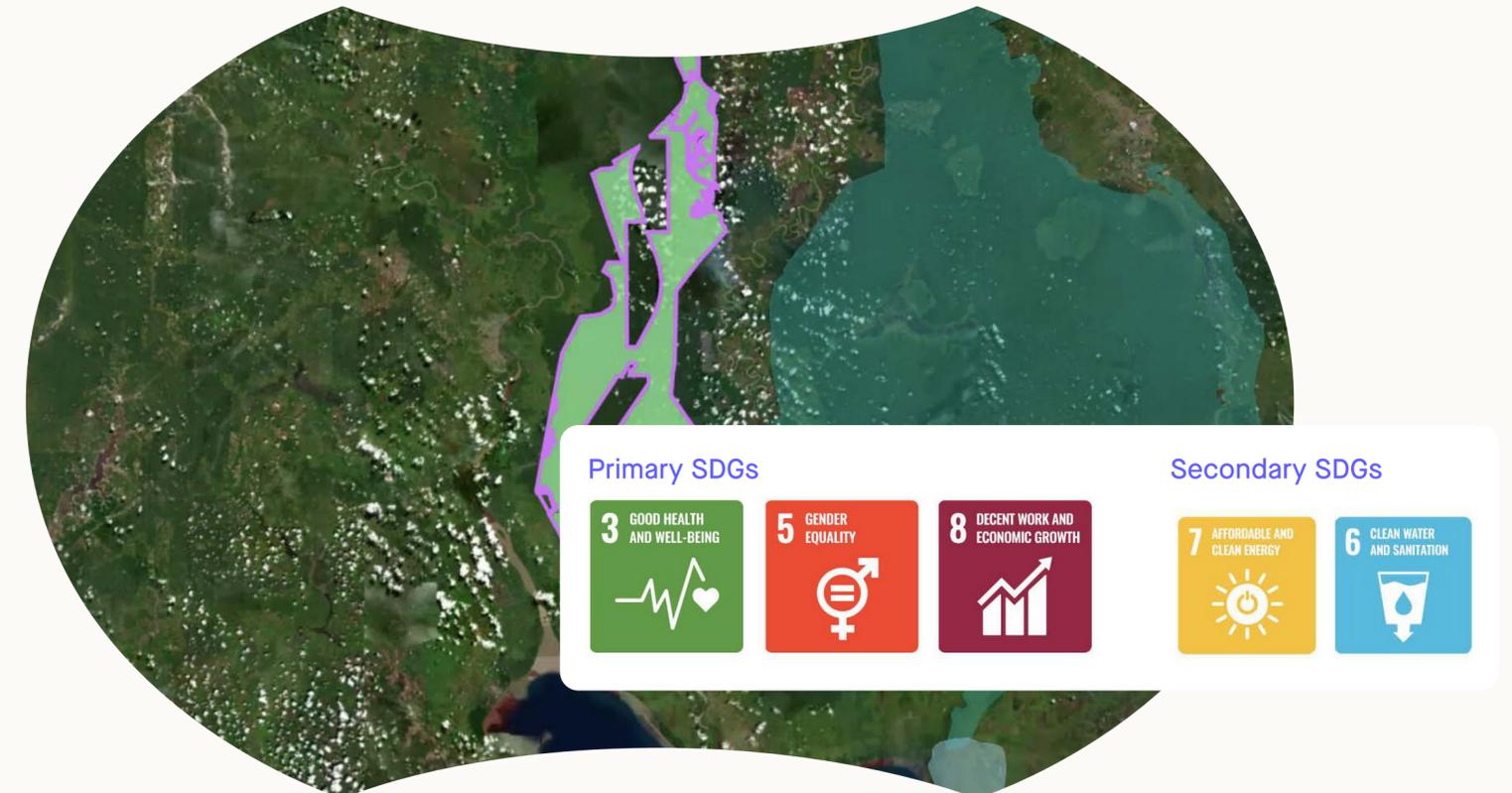
Afforestation, Reforestation & Revegetation (ARR)

ARR is a type of removals credit that utilizes carbon financing to restore forests and woodland through replantation.

For the 94 registered and issuing projects, there are a total 47,273,388 issued credits on the VCMs. If every ARR credit did legitimately equal one metric ton of carbon dioxide (tCO2) or other greenhouse gases (GHGs) being removed, then the removed emissions would be equivalent to:

47M = emissions of 108 million barrels of oil consumed

issued credits on the VCMs
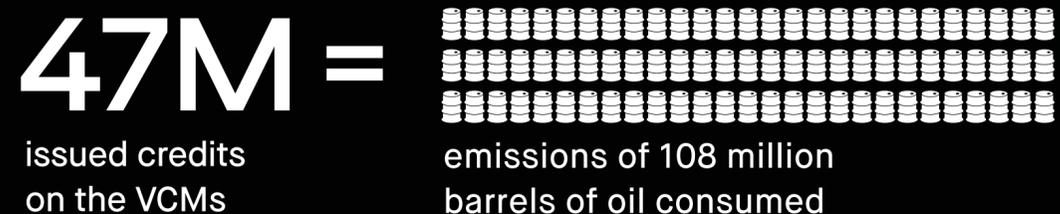
79% of issuing ARR projects are registered with Verra Carbon Standard (VCS), 19% with Gold Standard (GS) and 2% with American Carbon Registry (ACR).

12
Inactive

3
Unknown

44
Registered & not issuing yet

94
Registered & issuing

231
recorded projects

78
Upcoming projects

Sylvera
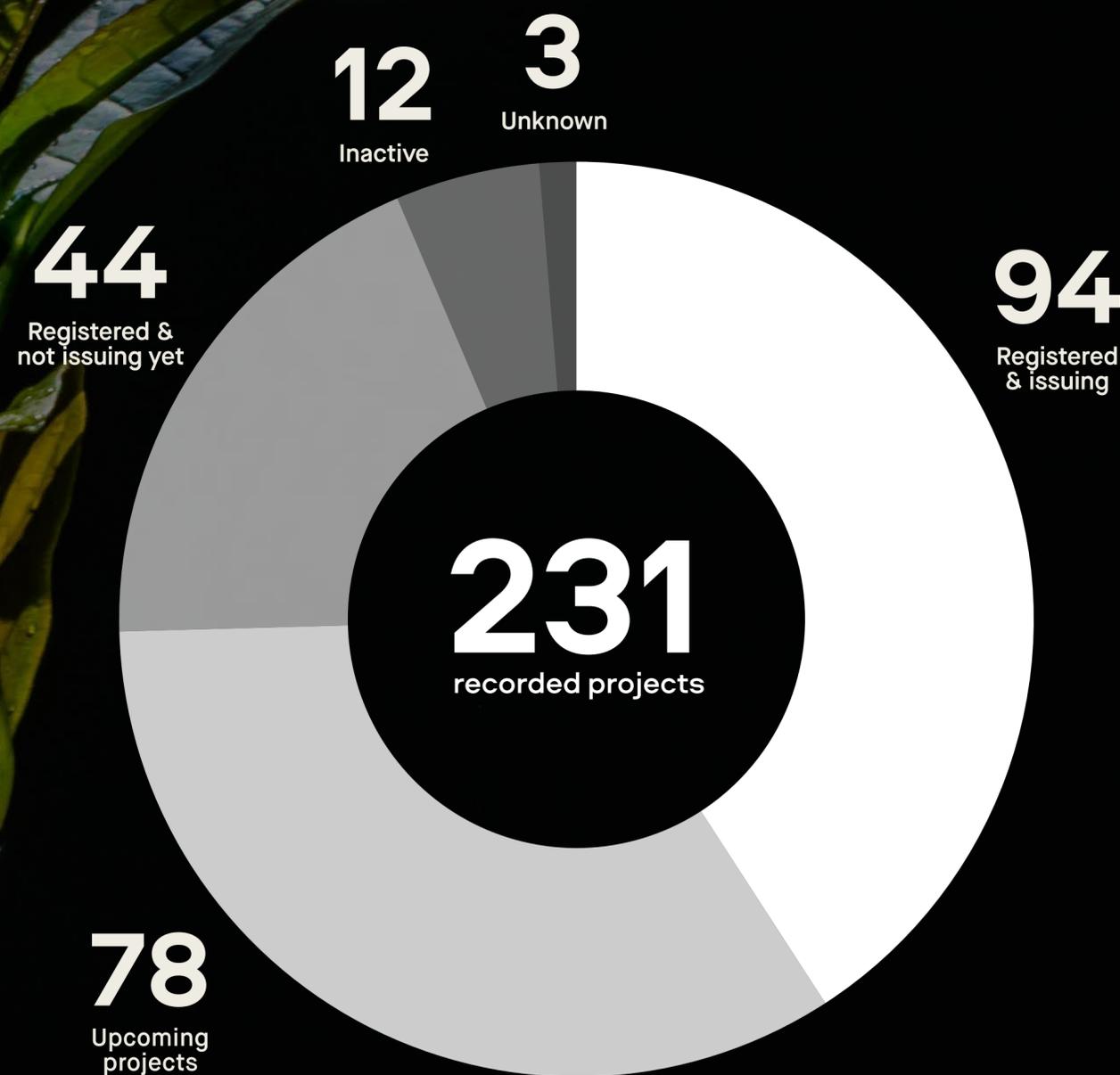
Nature-based solutions **ARR**

Sub-Saharan Africa

Africa has the highest number of ARR projects: 30% of the projects on the market, which is 28 projects that have issued credits. 82% of projects are registered with VCS and 18% are registered with GS.
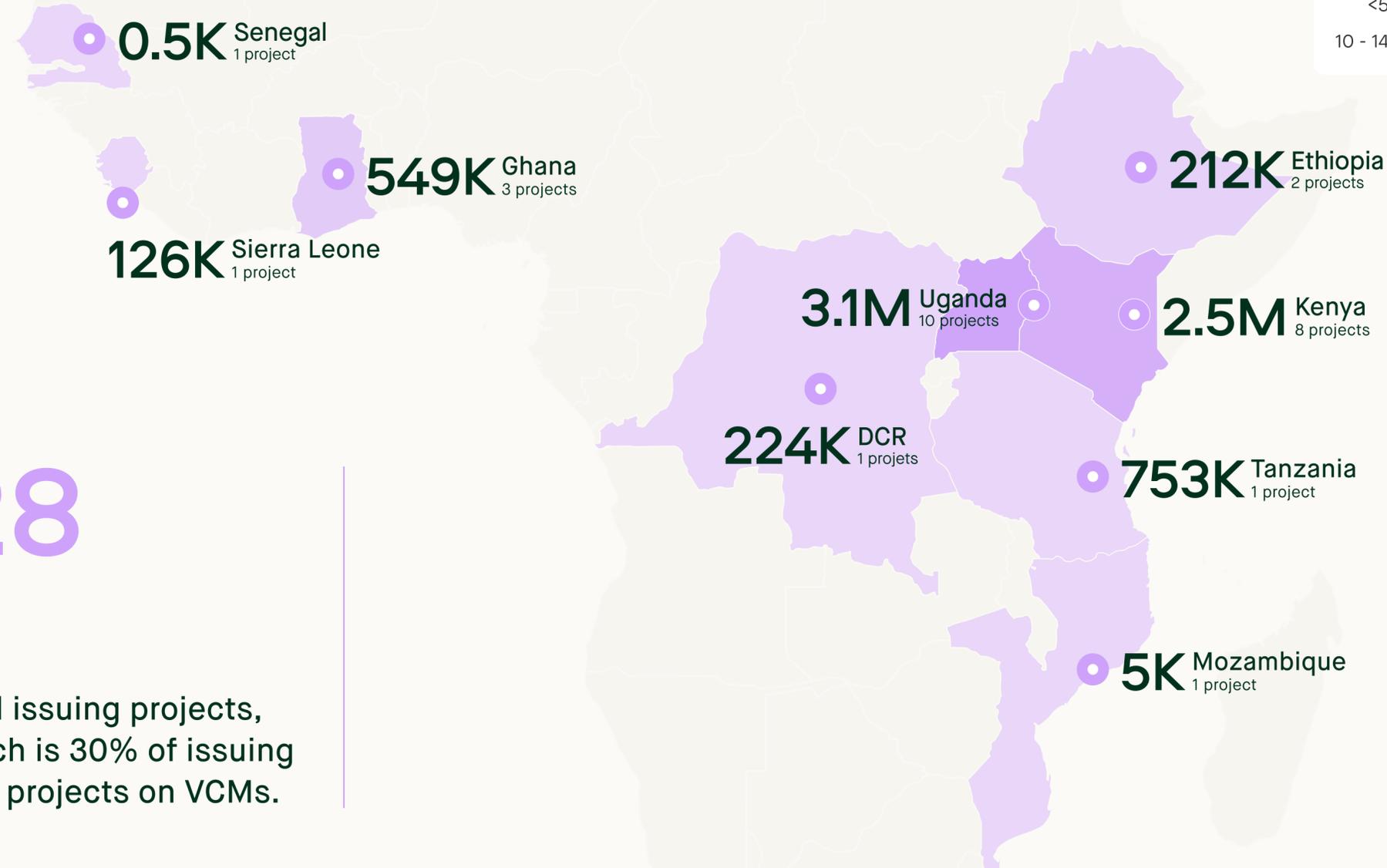
Uganda

Uganda has the highest number of ARR projects with 10 issuing projects.

These projects have issued 3,137,046 credits, which is 7% of credits on the ARR market, and equals an average of 313,705 credits per project.

The age of the 10 projects are:

<5 years	1
10 - 14 years	9

0.5K Senegal
1 project

549K Ghana
3 projects

212K Ethiopia
2 projects

126K Sierra Leone
1 project

3.1M Uganda
10 projects

2.5M Kenya
8 projects

224K DCR
1 projets

753K Tanzania
1 project

5K Mozambique
1 project

7.5M

7,528,359 total issued credits, which is 16% of all ARR credits.

28

total issuing projects, which is 30% of issuing ARR projects on VCMs.

Sylvera

Nature-based solutions ARR

South America

South America has the second number of ARR projects in the world: 22% of the market, which is 21 projects that have issued credits.

This region has the highest number of issued credits.

86% of projects are registered with VCS and 14% are registered with GS.

1.6M Colombia
5 projects

463K Peru
4 projects

687K Brazil
4 projects

133K Bolivia
1 project

435K Paraguay
1 project

12.7M Uruguay
5 projects

1.3M Chile
1 project

17.5M

17,472,006 total issued credits, which is 37% of all ARR credits.

21

total issuing projects, which is 22% of issuing ARR projects on VCMs.
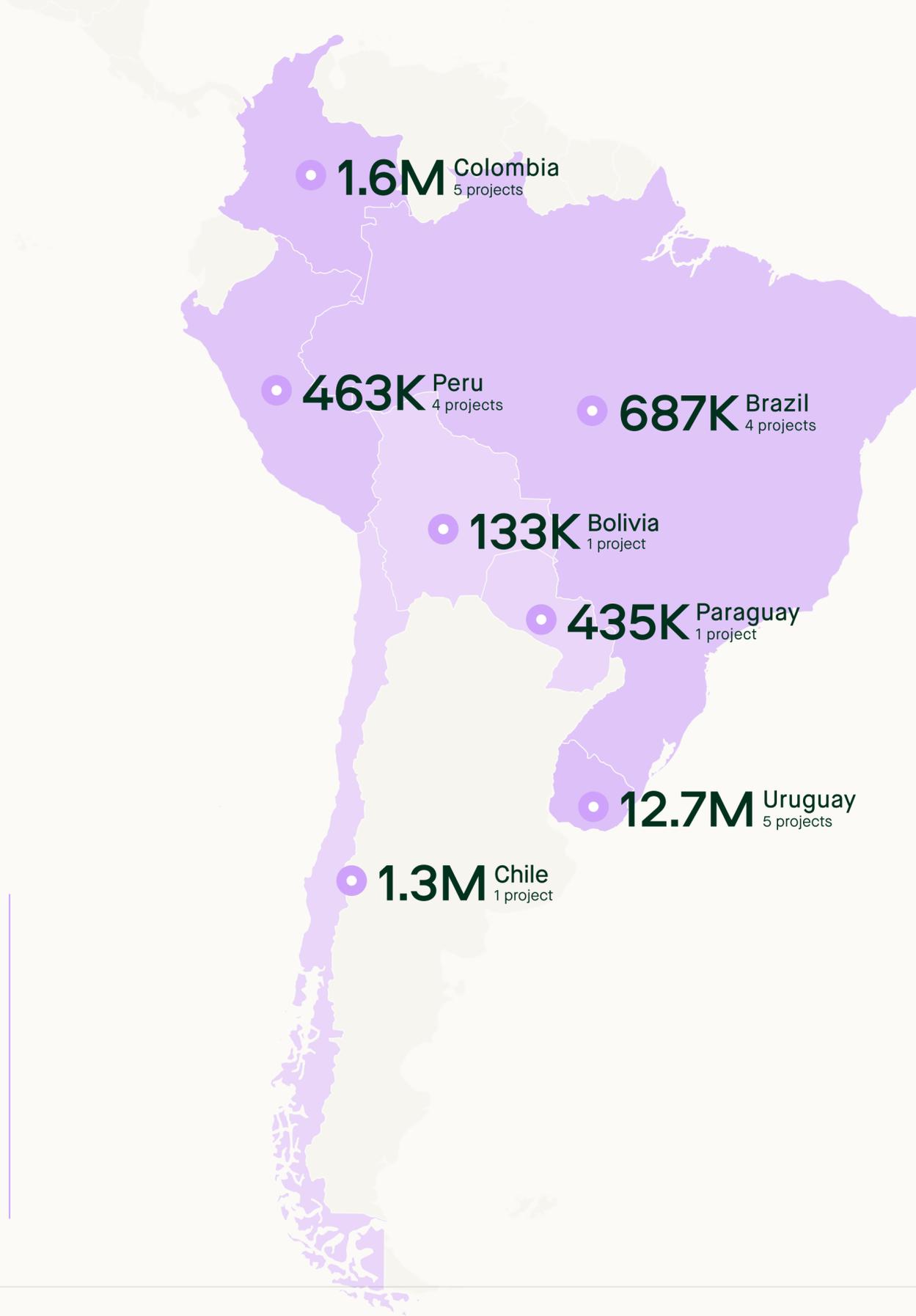
Uruguay

Uruguay has the highest percentage of ARR credits in the world, which is 27% of credits on the ARR market. Each project issues on average 2,540,098 credits.

The country has 5 issuing projects.

The age of the 5 projects are:

| 5 - 9 years | 3 |
| >14 years | 2 |

Sylvera
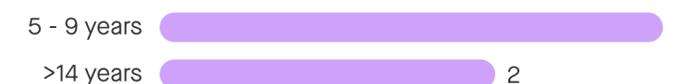
Nature-based solutions **ARR**

East Asia

East Asia has the third highest number of ARR projects, and all are based in China. 23 projects have issued credits, which equals 24% of the market.

96% of projects are registered with VCS and 4% are registered with GS.

● 9.9M China
23 projects

9.9M

9,904,728 total issued credits, which is 21% of all ARR credits. This is an average of 430,640 credits per project.

23

total issuing projects, which is 24% of issuing ARR projects on VCMs.

China

China has the highest number of ARR projects in the world.

The age of the 23 projects are:

<5 years   9

5 - 9 years   14

Sylvera

Nature-based solutions ARR

Regional credit issuance breakdown of ARR projects

South America
21 projects
17,472,006 Total credits
832,000 Average issuance/project

37%

East Asia
23 projects
9,904,728 Total credits
430,640 Average issuance/project

21%

Sub-Saharan Africa
28 projects
7,528,359 Total credits
268,870 Average issuance/ project

16%

North America
5 projects
7,787,436 Total credits
1,557,487 Average issuance/ project

16%

Central America
9 projects
3,687,501 Total credits
409,722 Average issuance/ project

8%

Oceania 0.35%

S. E. Asia 0.33%

South Asia

1.20%

South America has issued the largest volume of ARR credits on the market, despite having a similar age range and number of projects as Africa, which has issued significantly less.

North America has only 5 projects, which is 23 less than Africa, but more than 200,000 issued credits than Africa.

Oceania and South East Asia individually have the lowest numbers of issued credits of ARR projects.

Oceania: 0.35% of the market, which is 1 project that has issued 166,940 credits.

South East Asia: 0.33% of the market, which is 2 projects that have issued credits. Total issued credits equal 157,865.

Sylvera

Nature-based solutions ARR

Comparison of projects and credits issuance for issuing countries

Number of credits

12,700,490	9,904,728	6,293,594	3,137,046	2,741,053	2,519,564	1,657,698	1,493,842	1,393,414	753,975	687,699	568,553	558,533	549,442	463,939	435,075	320,459	224,018	212,170	166,940	133,691	126,297	83,099	74,766	48,801	18,655	5,367	480

Number of projects

Country

5	23	3	10	2	8	5	2	1	1	4	5	3	3	4	1	2	1	2	1	1	1	1	1	1	1	1	1
Uruguay	China	USA	Uganda	Panama	Kenya	Colombia	Mexico	Chile	Tanzania	Brazil	India	Guatemala	Ghana	Peru	Paraguay	Nicaragua	DRC	Ethiopia	Australia	Bolivia	Sierra Leone	Laos	Timor-Leste	Costa Rica	Honduras	Mozambique	Senegal

Sylvera

Nature-based solutions

Improved Forest Management (IFM)

IFM can be considered both removals and avoidance projects depending on the activity being funded. The activities could include refraining from logging or implementing improved practices to promote enhanced forest growth (i.e. extension of harvesting rotation length, or the use of thinning.)

For the 175 registered and issuing IFM projects on the VCMs, there are a total of 87,455,062 issued credits. If every IFM credit did legitimately equal one metric ton of carbon dioxide (tCO2) or other greenhouse gases (GHGs) being avoided, then the avoided emissions would be equivalent to:

87M = 🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗🚗 = 🗺️

issued credits on the VCMs

19,011,970 cars being taken off the road

cars in Australia
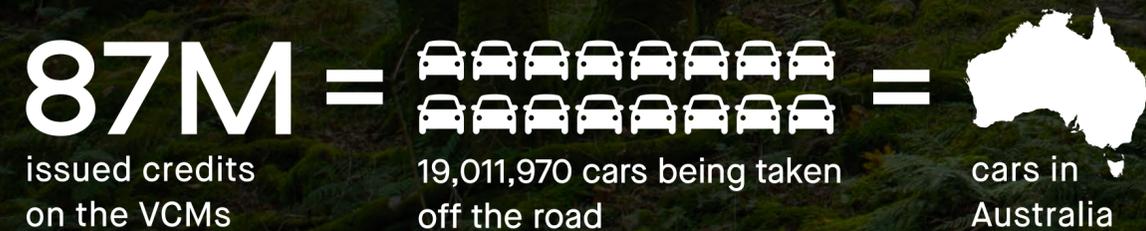
71% of issuing IFM projects are registered with Climate Action Reserve (CAR), 17% with American Carbon Registry (ACR) and 12% with Verra Carbon Standard (VCS).

70 Inactive

3 Registered & not issuing yet

98 Unknown

467 recorded projects

175 Registered & issuing

121 Upcoming projects

Sylvera
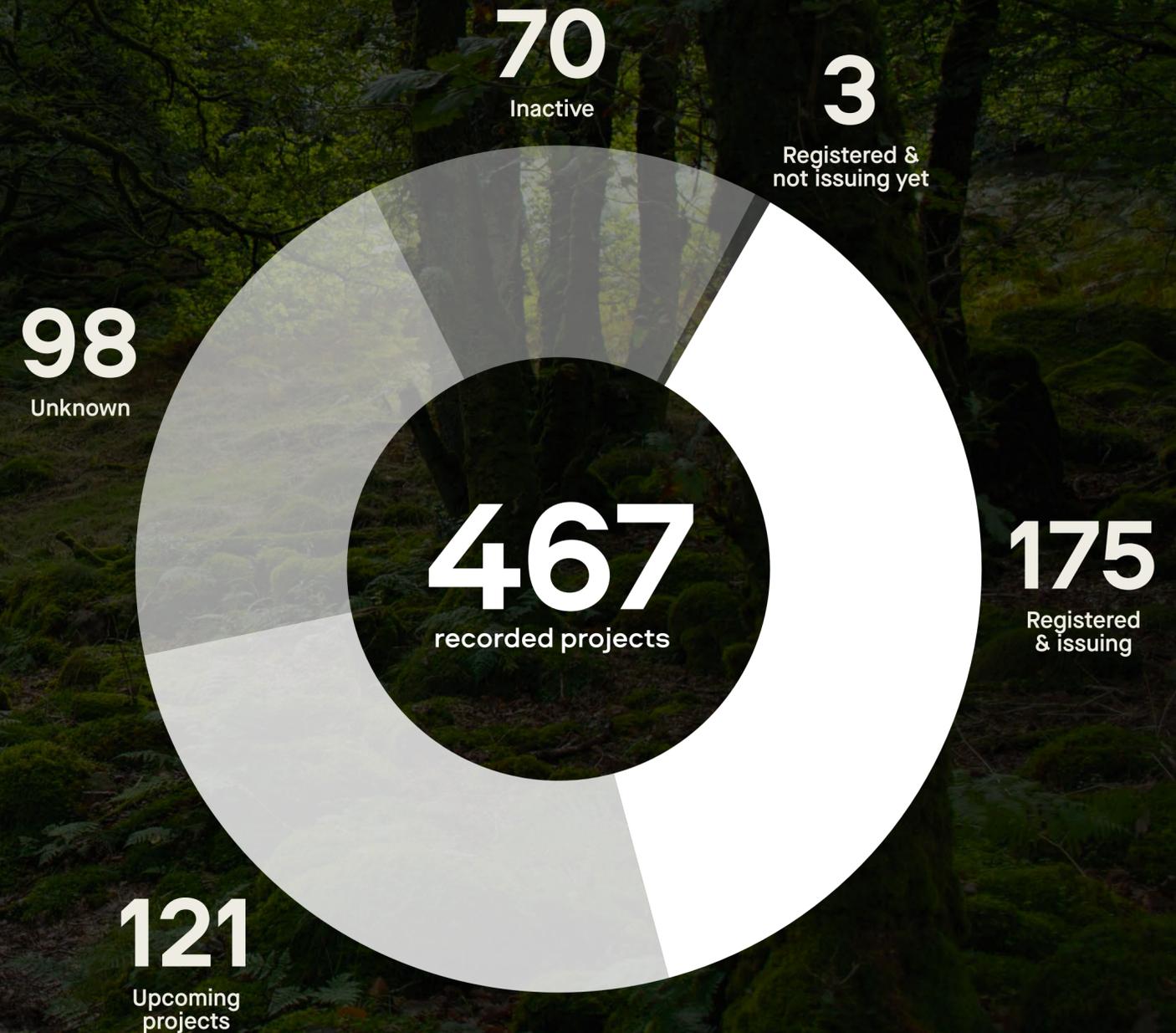
North America

The majority of IFM credits are based in North America: 92% of the issuing IFM market, which is 161 projects.

78% of projects are registered with CAR, 18% of ACR and 4% with VCS.

81.7M
81,750,005 total issued credits, which is 93% of all IFM credits.

161
total issuing projects, which is 92% of issuing IFM projects on VCMs.

3.4M Canada
2 projects

77.9M United States
108 projects

397K Mexico
51 projects
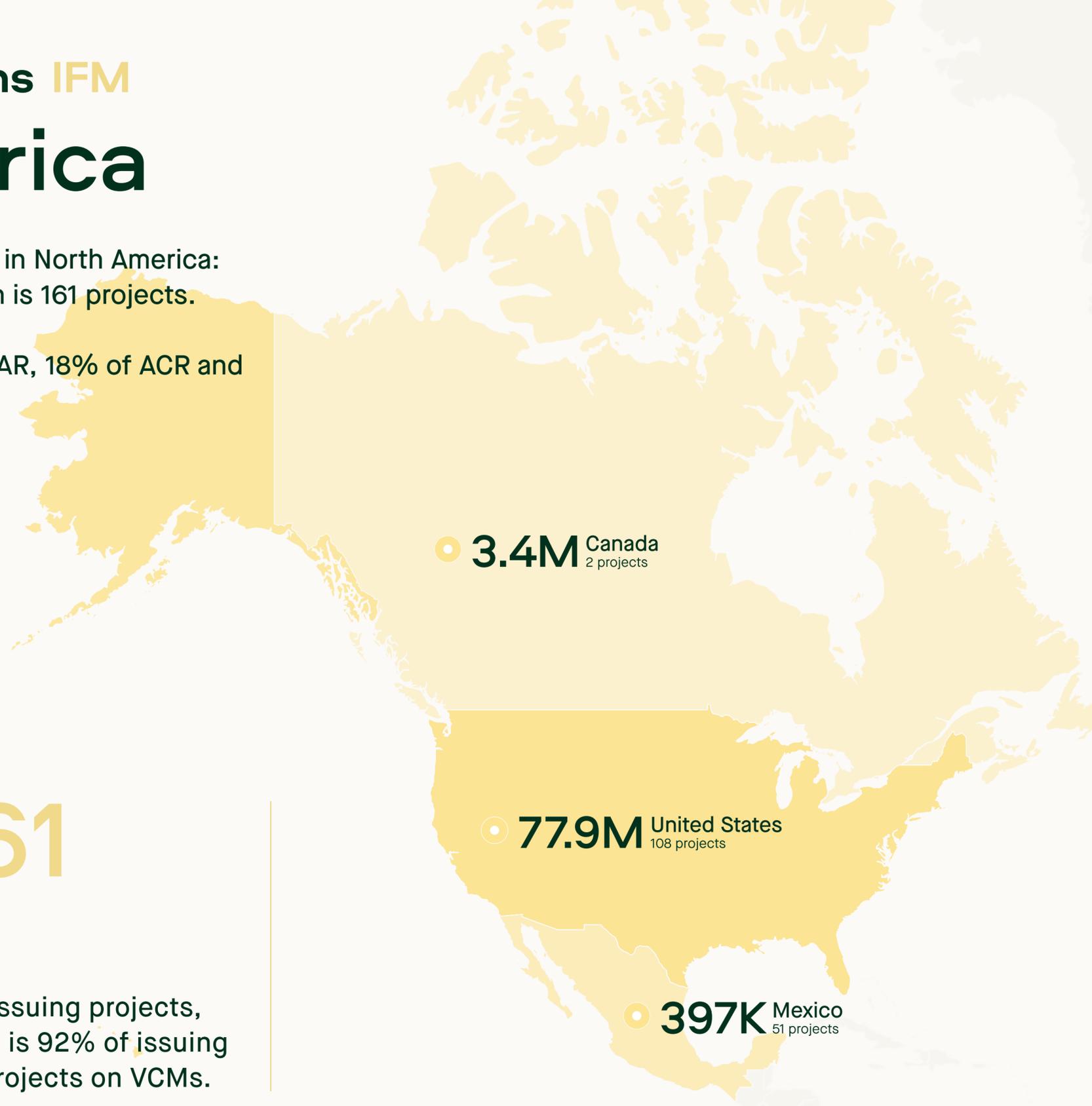
United States

The US has the largest number of IFM projects and the largest share of issued credits.

US accounts for 61% of all IFM projects with 108 projects issuing 77,967,924 credits, which is 89% of IFM credits. This equals an average of 721,925 issued credits per project in the US.

The age of the 108 projects are:

<5 years	42
5 - 9 years	54
10 - 14 years	5
>14 years	7

Some projects may be older as they existed under different IDs on the registry before switching over to be compliance (ARB) eligible

Mexico

Although Mexico has a high number of projects, the number of credits are the second lowest on the market for IFM.

Mexico has 29% of IFM with 51 projects issuing 397,910 credits, which is 0.45% of IFM credits. This equals an average of 7,802 issued credits per project in Mexico.

The age of the 51 projects are:

<5 years	47
5 - 9 years	4

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East Asia

East Asia has the second highest number of IFM Projects, all are based in China: 5% of the issuing IFM, market which is 8 projects.

The projects are registered with VCS.

⊙ **4.47M** China
8 projects

4.5M

4,477,864 total issued credits, which is 5% of all IFM credits.

8

total issuing projects, which is 5% of issuing IFM projects on VCMs.

China

China has the second highest number of IFM credits.

All the projects in the region of East Asia are based in China, this is an average of 559,733 per project in the China.

The age of the 8 projects are:

| 5 - 9 years | 3 |
| 10 - 14 years | 5 |

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Regional credit issuance breakdown of IFM projects

North America

161 projects

81,750,005 Total credits

507,764 Average issuance/project

93%

East Asia

7 projects | 4,477,864 Total credits | 559,733 Average issuance/project

5%

Oceania

0.81%

S. E. Asia

0.58%

North America has a disproportionately high number of IFM projects and credits, with the majority based in one country.

East Asia has a higher average issuance per project, since there are only 8 projects in this region in comparison to the 161 in North America.

Oceania, South East Asia and Europe individually have the lowest numbers of issued credits of IFM projects.

Oceania: 0.81% of the market with 4 projects that have issued credits. Total issued credits equal. 711,029.

South East Asia: 0.58% of the market with 1 project that has issued a total of 509,540 credits.

Europe: 0.01% of the market with 1 project that has issued a total of 6,624 credits.

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Nature-based solutions IFM

Comparison of projects and credits issuance for issuing countries

Sylvera
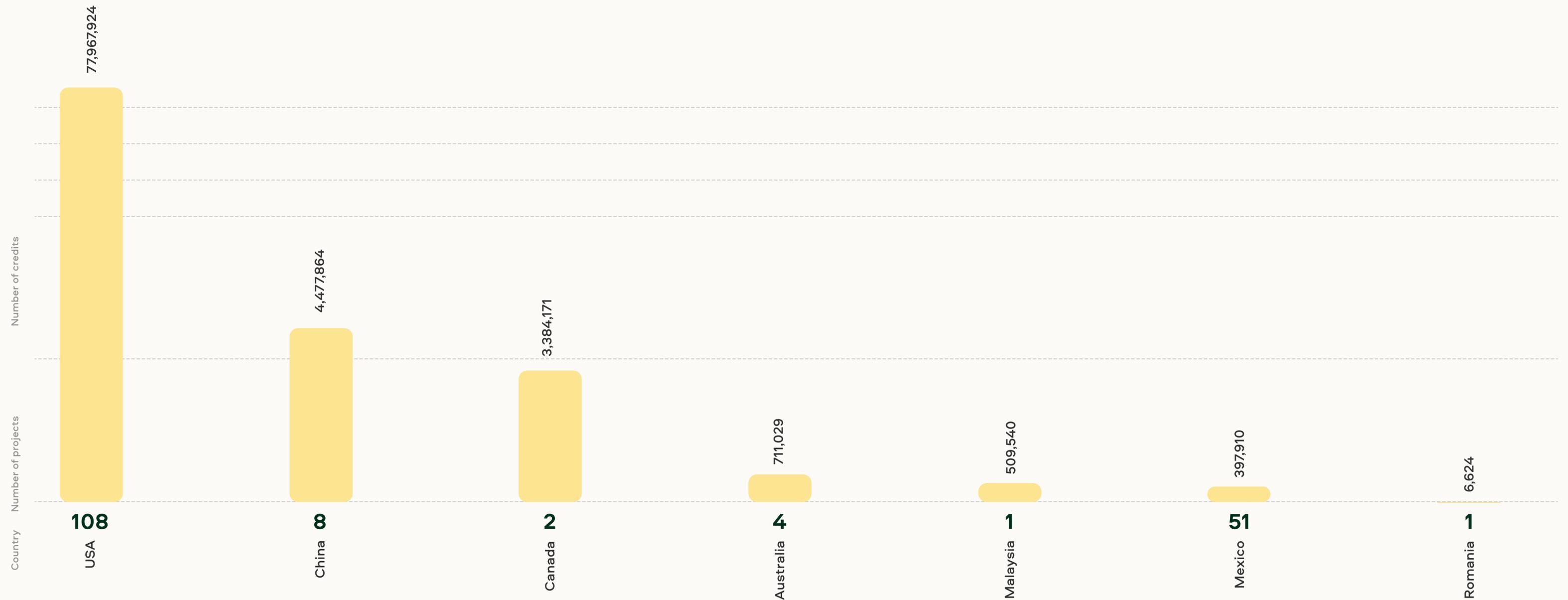
Renewable Energy Sources

Carbon Credit Breakdown (%)

WIND 51%

Number of credits: 209,972,203
Total issuing projects: 642

SOLAR 34%

Number of credits: 59,664,734
Total issuing projects: 128

HYDRO 14%

Number of credits: 144,688,072
Total issuing projects: 282

Introduction

RES projects avoid emissions associated with traditional energy sources. These projects displace emissions from fossil fuel power plants and supply electricity to a grid through renewable energy.

Financial additionality for renewables projects can be problematic. Finance from the sale of carbon credits is not the primary incentive for renewable projects. Income from power generation leads to the risk that the project would have gone ahead without carbon finance.

Some renewables projects on the market have revenue streams from both the sale of carbon credits and renewable energy certificates (RECs), and both can help companies achieve their net zero goals. RECs are an accounting instrument that certify the production of a megawatt hour (MWh) of electricity from renewable energy sources and can be purchased through exchanges or bilateral trades. RES carbon credits and RECs have material differences buyers need to be aware of when making claims about renewables usage in their value chain and their offset strategy. Notably, RECs cannot be used to offset emissions, but can be used to reduce a company's carbon emissions, specifically scope 2 emissions.

Wind

Solar

Hydro

Sylvera
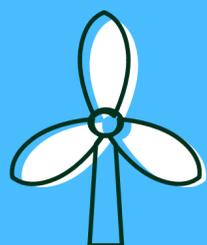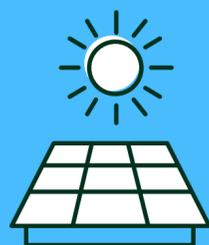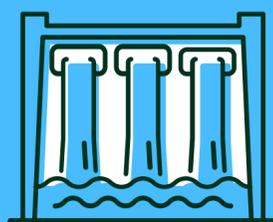
Renewable energy sources
Wind Renewables

Wind energy projects are a type of avoidance credit. These projects harness and convert wind, a naturally-occurring and renewable energy source, into electricity.

For the 978 registered projects and issuing, there are a total of 209,972,203 credits issued on the VCMs.

If every credit did legitimately equal one metric ton of carbon dioxide (tCO2) or other greenhouse gases (GHGs) being avoided, then the avoided emissions would be equivalent to 45,646,131 cars taken off the road, which is more than the number of cars in Canada.

209M = 🌱🌱🌱🌱🌱 = 🗺️

issued credits on the VCMs

a third of agriculture activities in the USA

72% is registered with Verra Carbon Standard (VCS) and 28% is registered with Gold Standrd (GS).

86
Registered & not issuing yet

28
Inactive

12
Unknown

210
Upcoming projects

978
recorded projects

642
Registered & issuing

Sylvera
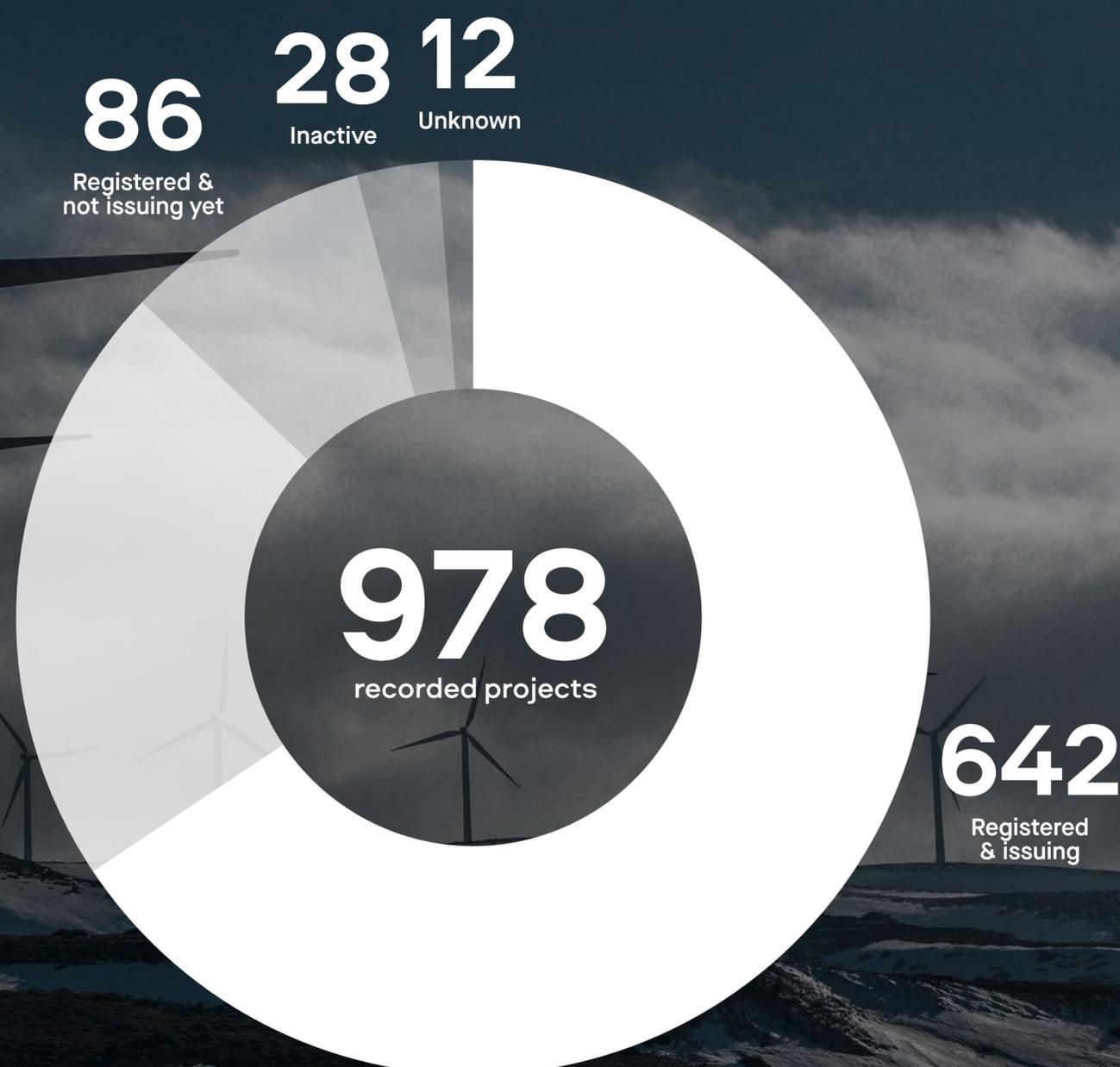
Renewable energy sources **Wind renewables**

South Asia

Over half of wind projects are based in South Asia, making this the largest proportion for one region globally.

86% of projects are registered with Verra Carbon Standard and 14% are registered with Gold Standard.

620K Pakistan
4 projects

⊙ **92.7M** India
315 projects

⊙ **70K** Sri Lanka
2 projects

93M

93,418,828 issued credits (44% of all wind credits). This equals an average of 291,024 credits per project in this region.

321

total issuing projects, which is 50% of issuing wind projects on the VCMs.
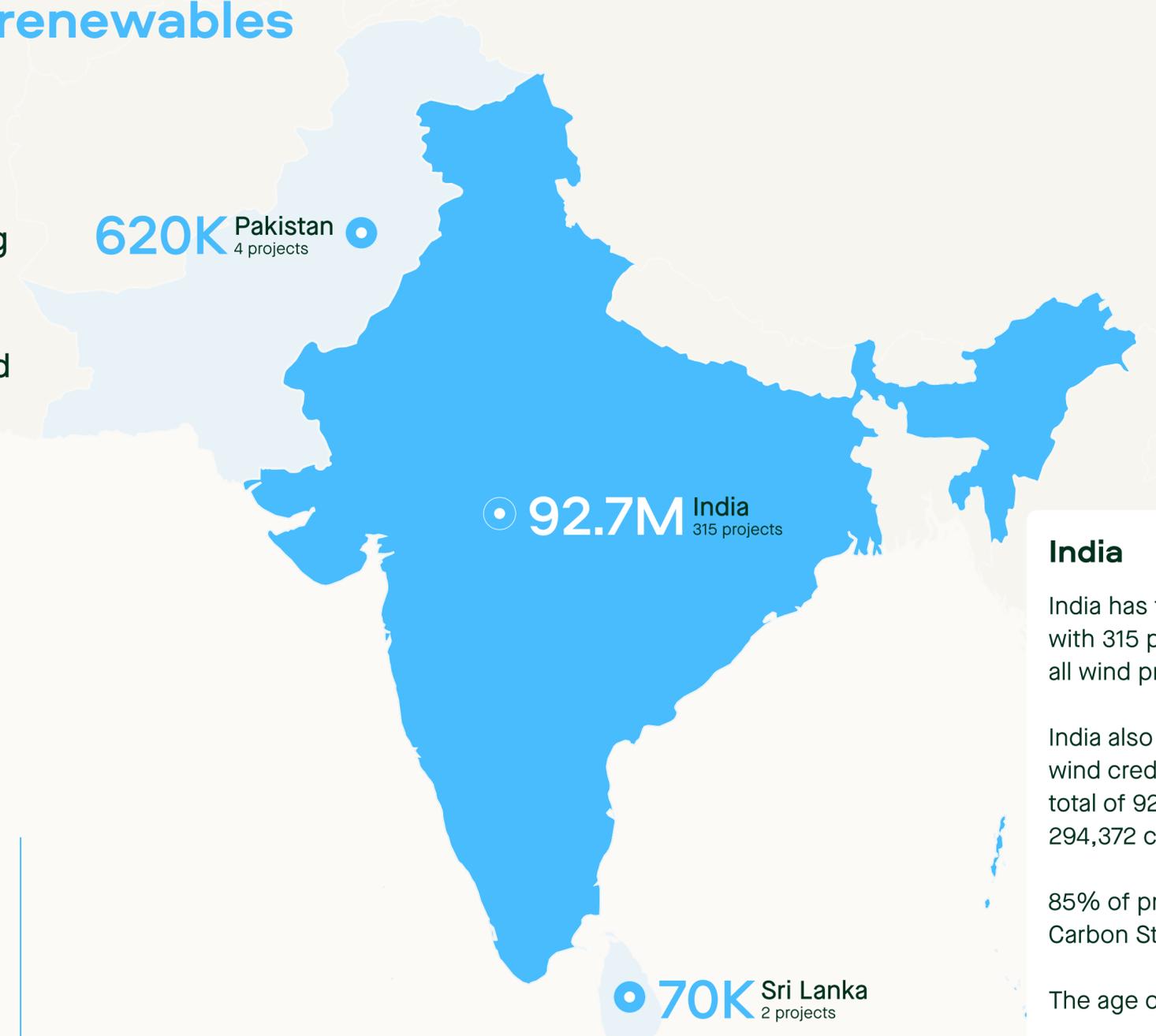
India

India has the highest number of wind projects with 315 projects, with just under half (49%) of all wind projects based in the country.

India also has the largest proportion of issued wind credits (44%) on the VCMs, which is a total of 92,727,115 credits. This is an average of 294,372 credits per project.

85% of projects are registered with Verra Carbon Standard and 15% with Gold Standard.

The age of the 315 projects are:

<5 years	14
5 - 9 years	84
10 -14 years	114
>14 years	103

Sylvera

East Asia

The second highest proportion of wind projects are in East Asia.

86% of projects are registered with Verra Carbon Standard and 14% are registered with Gold Standard.

454K **Mongolia**
1 projects

47.5M **China**
161 projects

5.6M **Taiwan**
5 projects

53M

53,701,963 issued credits (26% of all wind credits). This equals an average of 319,655 credits per project in this region.

168

total issuing projects, which is 26% of issuing wind projects on the VCMs.

China

China is home to the second highest number of wind projects, which is 161 projects. The number of projects in this region accounts for 23% of the market and the second largest number of issued credits (22.7%), which is a total of 47,557,121 credits.

On average, projects issue 295,386 credits.

86% of projects are registered with Verra Carbon Standard and 14% with Gold Standard.

The age of the 161 projects are:

5 - 9 years	13
10 -14 years	116
>14 years	32

Sylvera
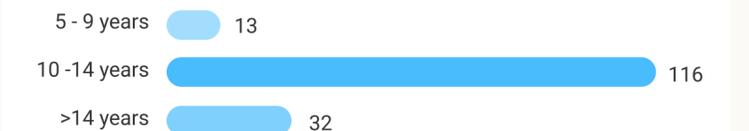
Middle East

The third highest concentration of wind projects and credits are located in the Middle East. All projects are located in Turkey.

89% of projects are registered with Gold Standard and 11% are registered with Verra Carbon Standard.

⊙ **34.6M** Turkey
98 projects

34M

34,587,227 issued credits (16% of all wind credits). This is an average of 352,931 credits per project in this region.

98

total issuing projects, which is 15% of issuing wind projects on the VCMs.

Turkey

The age of the 98 projects are:

<5 years	11
5 - 9 years	41
10 -14 years	42
>14 years	4

Sylvera
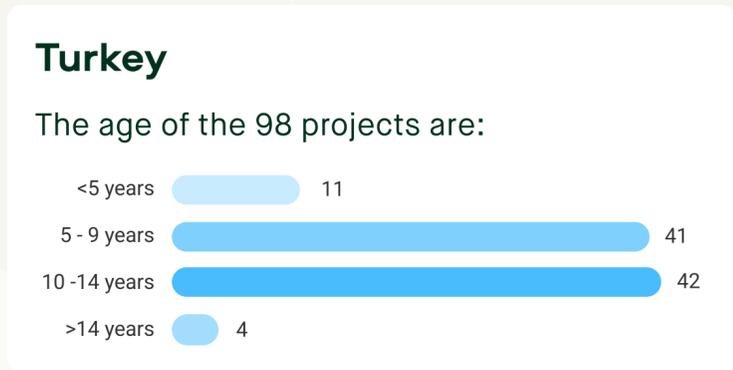
Renewable energy sources **Wind renewables**

North America

North America has a total of 13 wind projects and the fourth highest proportion of credits.

All of projects are registered with VCS.

United States

Although the US has a considerably lower number of wind projects compared to India, China and Turkey, it has the fourth highest number of wind credits globally, this is likely due to the large size of the projects.

USA wind projects account for 10,166,455 issued credits (4.8% of all wind credits). This is an average of 1,016,646 credits per project.

The age of the 10 projects are:

<5 years		1
5 - 9 years		2
10 - 14 years		7

10M

10,531,850 issued credits (5% of all wind credits). This equals an average of 810,142 credits per project in this region.

13

total issuing projects, which is 1.79% of issuing wind projects on the VCMs.

⊙ **10.1M** United States
10 projects

⊙ **365K** Mexico
3 projects

Sylvera
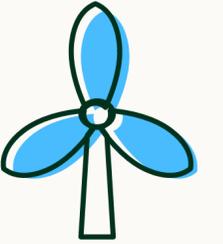
Regional credit issuance breakdown of Wind Renewables projects

South Asia

321 projects
93,418,828 Total credits
291,024 Average issuance/project

44%

East Asia

168 projects
53,701,963 Total credits
319,655 Average issuance/project

26%

Middle East

98 projects
34,587,227 Total credits
352,931 Average issuance/project

16%

North America

5%

Others

9%

The majority of Wind credits are based in Asia; all the countries in this continent account for a total of 89% of the market.

North America: 5% of the market, which is 13 projects that have issued credits. Total issued credits 10,531,850 which is 810,142 credits an average issuance per project in this region.

'Others' are:
South East Asia, South America, Central America, Sub-Saharan Africa, Oceania, Europe, Central Asia and North Africa which individually have the lowest numbers of issued credits.

Collectively, the total number of wind projects that fall under 'others' is 42 projects which have issued credits. Total issued wind credits for these regions is 17,732,335 credits, which is 9% of the wind market.

Sylvera

Renewable energy sources **Wind renewables**

Comparison of projects and credits issuance for issuing countries

Sylvera
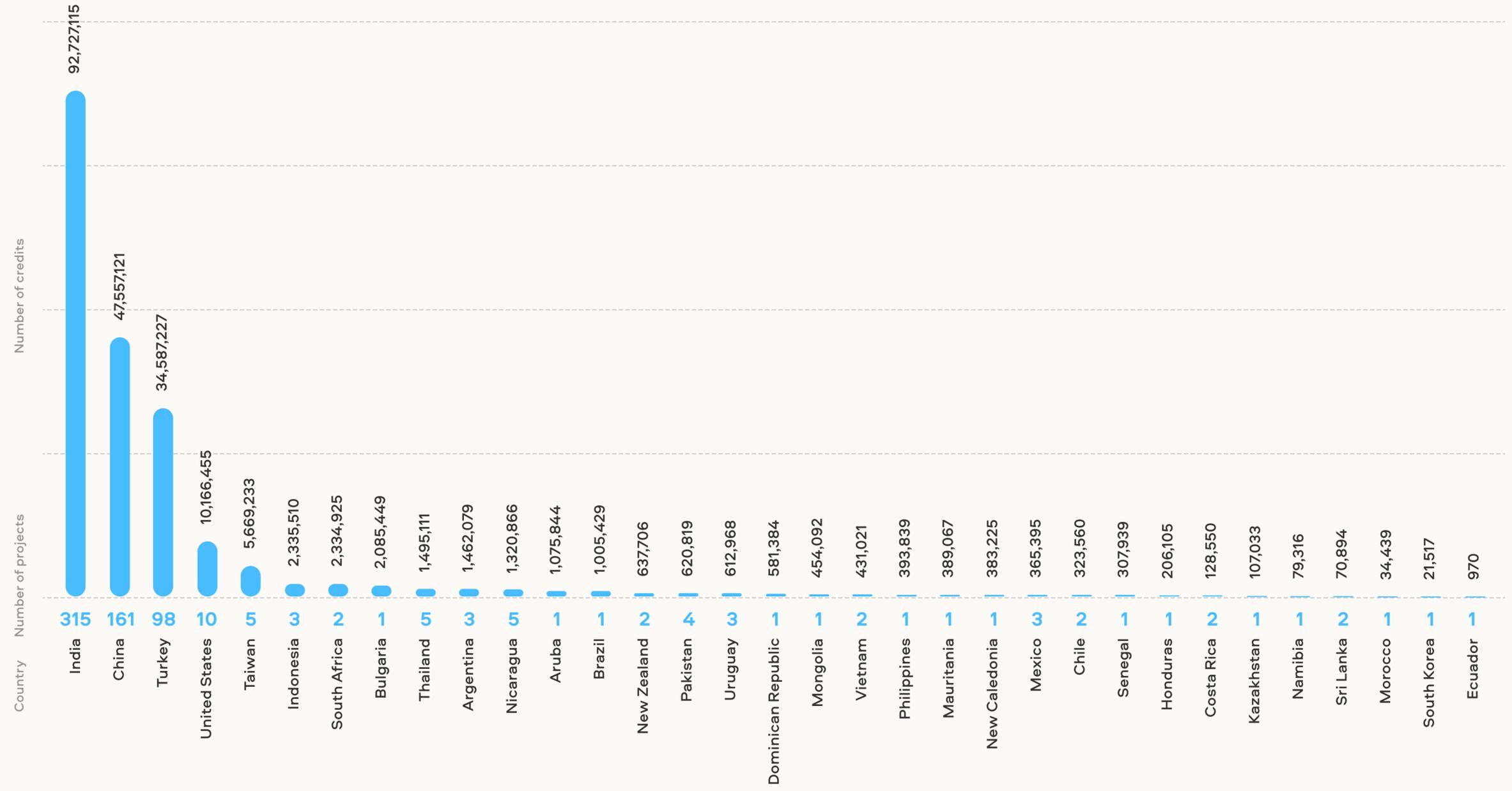
Centralized Solar Renewables

Solar renewables projects are a type of avoidance credit. These projects convert energy from sunlight into electricity.

For the 128 registered and issuing projects, there are 59,664,734 issued credits on the VCMs.

If every credit did legitimately equal one metric ton of carbon dioxide (tCO2) or other greenhouse gases (GHGs) being avoided, then the avoided emissions would be equivalent to just over all the emissions produced by the 25 million homes in England.

59M = 🏠🏠🏠🏠🏠🏠🏠🏠 =

issued credits on the VCMs

emissions produced by the 25 million homes in England

63% of solar projects are registered with Verra Carbon Standard (VCS), and the remaining 38% are registered with Gold Standard (GS).

26
Registered & not issuing yet

12
Inactive

5
Unknown

252
recorded projects

128
Registered & issuing

81
Upcoming projects

Sylvera

Renewable energy sources **Centralized Solar Renewables**
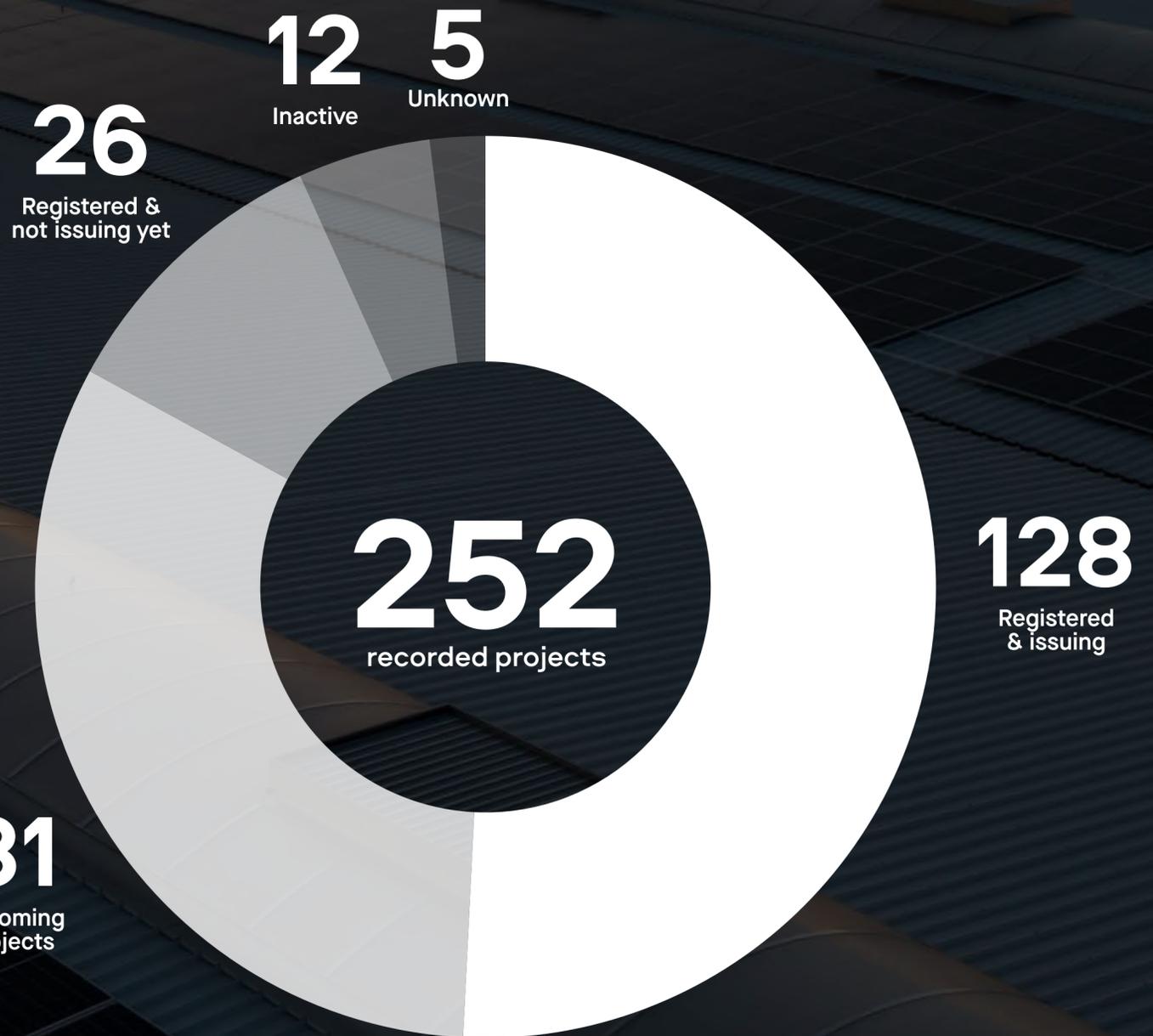
South Asia

The majority of solar projects (57%) are based in South Asia. All the projects are located in India, and the country has the highest number of issued credits on the market.

62% of projects are registered with VCS and 38% with GS.

⊙ **52.9M** India
73 projects

52M

52,999,063 issued credits (89% of all solar credits). This equals an average of 726,015 credits per project in this region.

73

total issuing projects, which is 57% of issuing solar projects on the VCMs.

India

The age of the 73 projects are:

<5 years	23
5 - 9 years	39
10 - 14 years	11

Sylvera
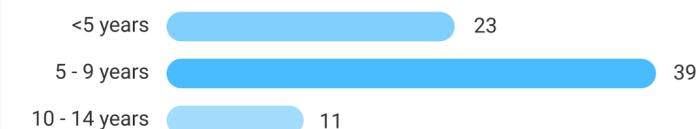
East Asia

After South Asia, East Asia is home to the next highest number of solar projects and credits. All of these projects are located in China.

61% of projects are registered with VCS and 39% with GS.

○ **China**
18 projects

3M

3,708,892 issued credits (6% of all solar credits). This equals an average of 206,050 credits per project in this region.

18

total issuing projects, which is 14% of issuing solar projects on the VCMs.

China

The age of the 18 projects are:

<5 years	▬	1
5 - 9 years	▬▬▬▬▬▬▬	8
10 - 14 years	▬▬▬▬▬▬▬▬	9

Renewable energy sources Centralized Solar Renewables
Middle East

The third highest proportion of solar projects are located in the Middle East. All projects are located in Turkey.

63% of projects are registered with GS and 38% with VCS.

⊙ **125K** Turkey
8 projects

125K

125,668 issued credits (0.21% of all solar credits). This equals an average of 15,709 credits per project.

8

total issuing projects, which is 6% of issuing solar projects on the VCMs.

Turkey

The age of the 8 projects are:

| <5 years | 2 |
| 5 - 9 years | 6 |

Sylvera

Regional credit issuance breakdown of Solar projects
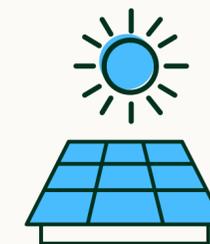
South Asia

73 projects
52,999,063 Total credits
726,015 Average issuance/project

89%

East Asia

18 projects
3,708,892
Total credits
206,050
Average
issuance/
project

6%

Others

37 projects
2,956,779
Total credits

5%

Similar to wind renewables, the vast majority of Solar credits are based in Asia. Based on countries in the Asian continent, the number of credits total to 97% of the market.

'Others' are:
South East Asia, Sub-Saharan Africa, Middle East, North Africa, South America, Central America and North America which individually have the lowest numbers of issued credits.

Collectively, the total number of solar projects that fall under 'others' are 37 projects which have issued credits. Total issued solar credits for these regions is 2,956,779 credits, which is 5% of the solar market.

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Renewable energy sources **Centralized Solar Renewables**

Comparison of projects and credits issuance for issuing countries

Sylvera

Country	Number of projects	Number of credits
India	73	52,999,063
China	18	3,708,892
Vietnam	5	508,929
Thailand	2	452,519
Senegal	4	352,411
Egypt	3	294,995
Philippines	1	259,688
Argentina	2	210,226
Mauritius	3	173,760
Mauritania	1	162,411
Namibia	3	129,929
Turkey	8	125,668
Dominican Republic	1	108,264
Indonesia	1	85,939
Madagascar	1	37,847
Mexico	1	28,298
Rwanda	1	25,895

Renewable energy sources

Hydropower Renewables

Hydropower energy projects are a type of avoidance credit. These projects generate electricity through the flow of water.

For the 282 registered and issuing hydropower projects, there are a total of 144,688,072 issued credits on the VCMs.

If every credit did legitimately equal one metric ton of carbon dioxide (tCO_2) or other greenhouse gases (GHGs) being avoided, then the avoided emissions would be equivalent to to removing all maritime shipping emissions from the EU which is 144 million tonnes of CO_2.

144M = 🚢🚢🚢 = ⭐

issued credits on the VCMs

all annual maritime shipping emissions from the European Union
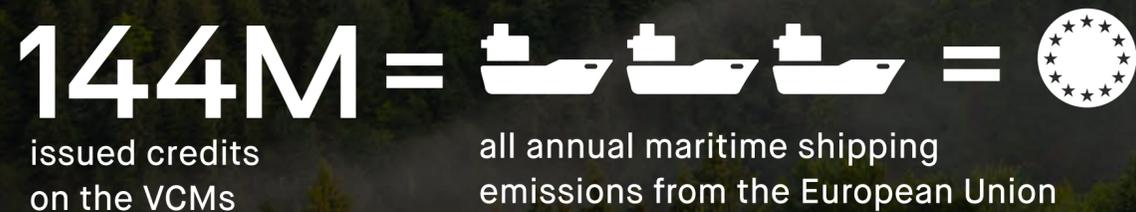
82% of hydropower projects are registered with Verra Carbon Standard (VCS) and 18% with Gold Standard (GS).

13 Inactive **11** Unknown

72 Registered & not issuing yet

518 recorded projects

282 Registered & issuing

140 Upcoming projects

Sylvera
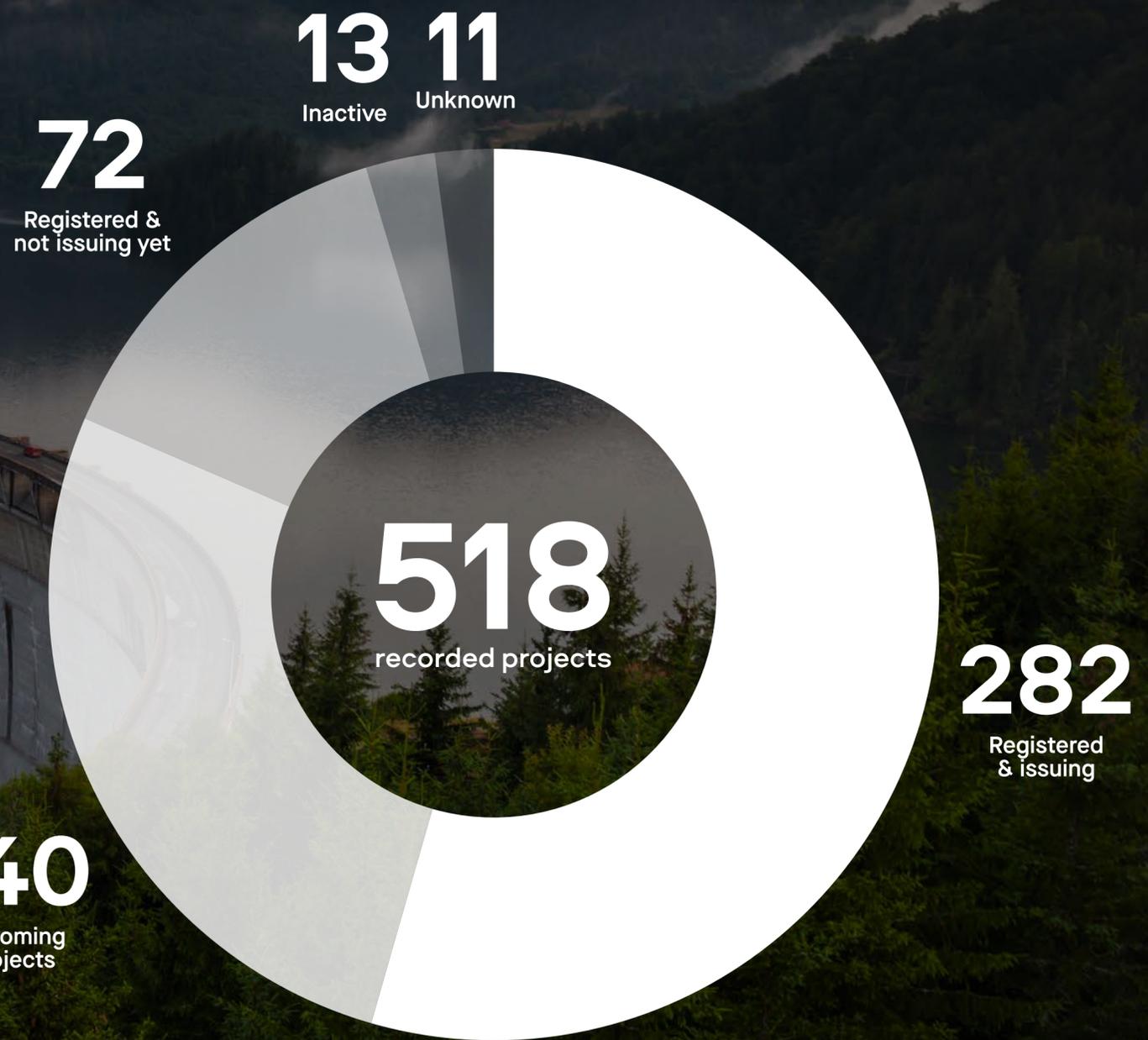
East Asia

East Asia has the highest number of issuing hydropower projects, and third highest proportion of credits on the market. All projects are based in China apart from 1, which is based in Taiwan.

88% of these projects are registered with VCS and the remaining 12% are with GS.

China

China has the highest number of hydropower projects on the VCMs, which is 92 projects and is a total of 33% of the market.

It also has the third highest number (20%) of issued credits on the hydropower market, which is a total of 29,112,341 credits. This is an average of 316,438 credits per project.

The age of the 92 projects are:

10 -14 years	50
>14 years	42

China
92 projects

29M

29,220,000 issued credits (20% of all hydropower credits). This is an average of 314,194 credits per project.

93

total issuing projects, which is 33% of issuing hydropower projects on the VCMs.

107K Taiwan
1 project

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Renewable energy sources **Hydropower Renewables**

Middle East

The Middle East has the highest number of hydropower projects. All of these projects are based in Turkey.

81% of projects are registered with VCS and 19% are registered with GS.

⊙ **31.4M** Turkey
75 projects

31M

31,441,518 issued credits (22% of all hydropower credits). This is an average of 419,220 credits per project.

75

total issuing projects, which is 27% of issuing hydropower projects on VCMs.

Turkey

The age of the 75 projects are:

<5 years	1
5 - 9 years	23
10 -14 years	48
>14 years	3

Sylvera

Renewable energy sources **Hydropower Renewables**
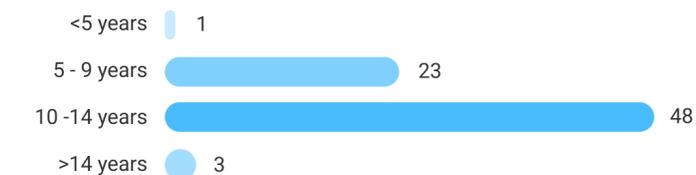
South Asia

Although South Asia has fewer projects compared to other regions, it is home to the highest proportion of hydropower credits.

90% of these projects are registered with VCS and the remaining 10% are with GS.

56M

56,939,922 issued credits (39.35% of all hydropower credits). This equals an average 1,459,998 credits per project.

39

total issuing projects, which is 14% of issuing hydropower projects on the VCMs.

⊙ 56.9M India
37 projects

● 20K Sri Lanka
2 projects
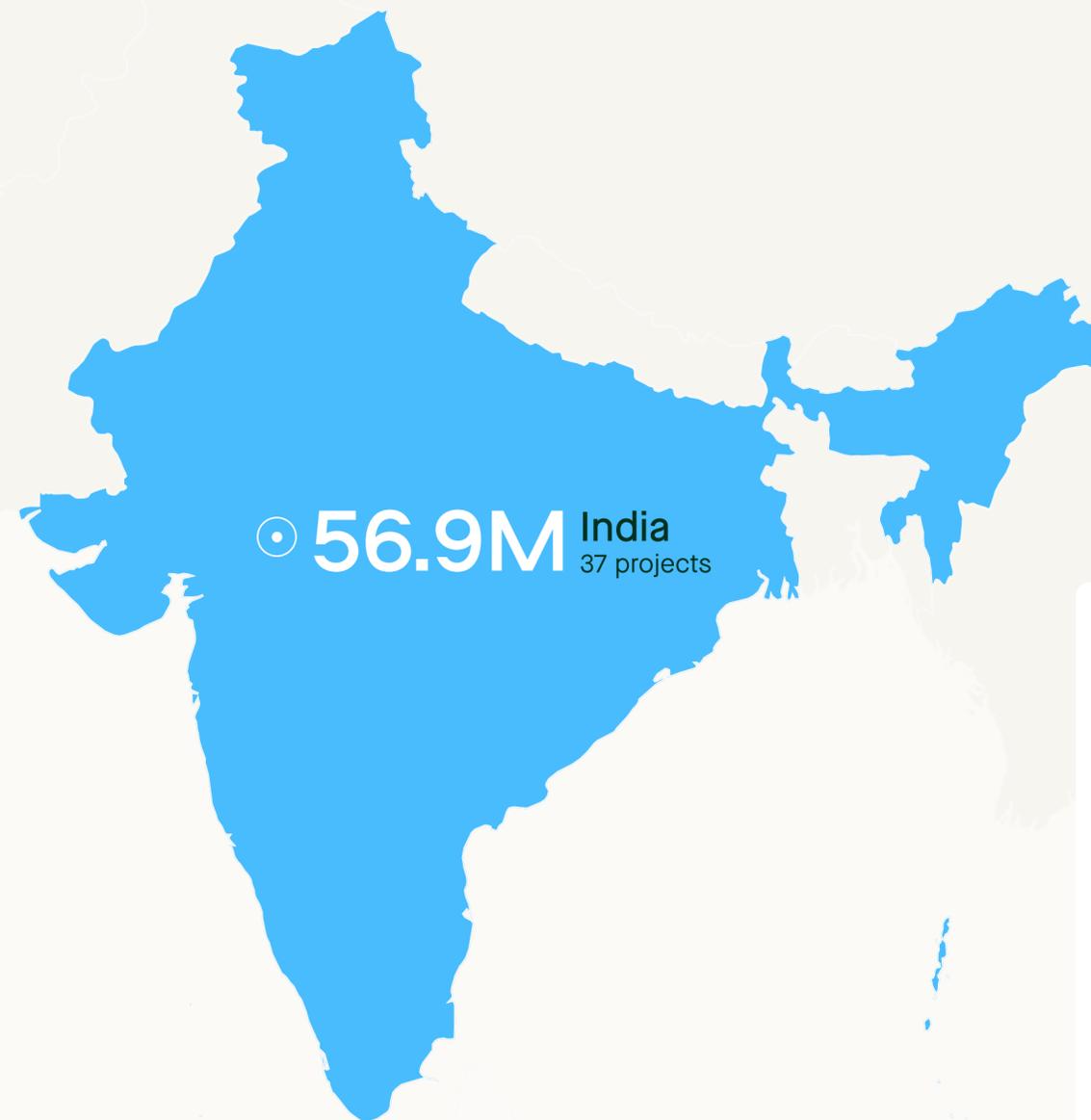
India

India has the highest number of hydropower projects in South Asia with 37 projects, which is 13% of the hydropower market.

Hydropower projects in India accout for 39% of the market, with a total of 56,919,582 issued credits. This is an average of 1,538,367 credits per project.

95% of projects are registered with VCS and 5% with GS.

The age of the 37 projects are:

<5 years	4
5 - 9 years	11
10 -14 years	16
>14 years	6

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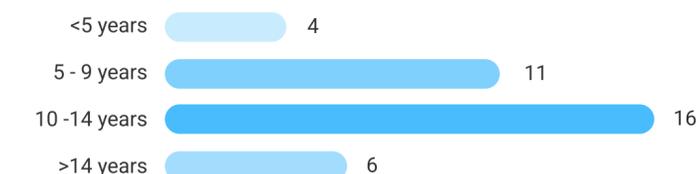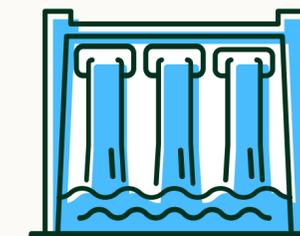
Regional credit issuance breakdown of Hydropower Renewables projects

South Asia
39 projects
56,939,922 Total credits
1,459,998 Average
issuance/project

39%

Middle East
75 projects
31,441,518 Total credits
419,220 Average issuance/project

21%

East Asia
93 projects
29,220,000 Total credits
314,194 Average issuance/
project

20%

South America
27 projects
11,379,493 Total credits
421,463 Average issuance/project

8%

South East Asia
36 projects
10,664,045 Total credits
296,223 Average issuance/project

7%

Sub-Saharan Africa

3%

Others

2%

As with the other renewables project types, the majority are based in Asia. The countries in this continent make up 63% of the hydropower market.

Sub-Saharan Africa: 3% of the hydropower market, which is 6 projects that have issued credits. Total issued credits 4,076,153 which is an average of 679,359 credits per project in this region.

'Others' are:
Central America, Central Asia and Europe which individually have the lowest numbers of issued hydropower credits.

Collectively, the total number of hydropower projects in regions that fall under 'others' is 6 projects which have issued credits. Total issued hydropower credits for these regions is 966,941 credits, which is 2% of the hydropower market.

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Comparison of projects and credits issuance for issuing countries

Number of credits

Number of projects

Country   Number of projects

India	Turkey	China	Brazil	Indonesia	Côte d'Ivoire	Vietnam	Colombia	Laos	Chile	Honduras	Uganda	Tajikistan	Argentina	Madagascar	Turkmenistan	Taiwan	DRC	Bulgaria	Sri Lanka	Malaysia	Zambia
56,919,582	31,441,518	29,112,341	9,270,597	7,894,210	3,350,508	2,013,202	1,140,755	745,941	693,651	414,253	412,660	315,553	274,490	245,580	187,408	107,659	63,924	49,727	20,340	10,692	3,481
37	75	92	10	5	1	25	9	5	7	3	2	1	1	1	1	1	1	1	2	1	1

Sylvera

Policy roundup

- The record breaking growth of the VCMs in 2021 has not continued unchecked into 2022, largely as a result of the global macroeconomic situation following the Ukraine war and resulting energy price shock.

- This year we have also seen disruption to the VCMs due to uncertainty around Article 6 and its effects on national emissions reductions pledges. For example, a number of countries including Indonesia and Papua New Guinea have announced moratoria on future REDD+ issuances, in part due to lack of clarity on how the sale of these credits may affect the host countries' GHG accounting. As the practicalities of Article 6 are agreed, and the VCMs reach a consensus on how to integrate these new frameworks, we expect more certainty and stability to return to the market.

- There is widespread support for the move towards jurisdictional REDD+ and nesting REDD+ projects in jurisdictional baselines, as evidenced by, for example, the interest in the LEAF Coalition from both the private sector and governments. However, it is still unclear when the first issuances from ART TREES, Verra JNR or the FCPF will reach the VCMs. While many expect these approaches to come to dominate NBS issuances, this shift from project-based to jurisdictional REDD+ issuances could take two to eight years.

Large jurisdictional activity increasingly has the potential to disrupt the market, both on the sell-side and the buy-side.

- On the sell-side, this reflects the growing recognition from governments across the Global South, and in particular in tropical forest nations, that carbon markets offer the potential for significant climate finance inflows. This is underscored by the oversubscription to the LEAF Coalition, where over 600mt has been offered by participating jurisdictions and will compete to be among the 100mt to sell for a guaranteed $10/t.

- On the buy-side, the key shift is towards governments now looking to secure access to large quantities of credits to achieve the targets set out in their NDCs, through Article 6.2 of the Paris Agreement. A number of countries, including Switzerland, Norway and Singapore are actively exploring bilateral credit purchase agreements with supplier countries. In some cases these sovereign buyers could compete with and potentially crowd out corporate VCM activity.

- As noted in the box about Gabon on page 28, the redd.plus mechanism has raised questions from many in the market regarding the acceptable boundaries of the VCM itself. There is debate as to whether the REDD+ Results Units (RRUs) issued through redd.plus qualify as carbon credits, and therefore whether they can be legitimately used for offsetting purposes. As a positive, this is bringing renewed attention to the importance of quality scrutiny and high integrity approaches to offsetting or beyond value chain mitigation.

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Policy roundup Continued

- This year also saw significant debate about the potential for credits issued by "High Forest Low Deforestation" (HFLD) jurisdictions to contribute high integrity supply to the VCMs. CORSIA surprised some in the market by accepting the admission of HFLD credits, as part of the admission of ART TREES, which also includes jurisdictional reforestation and avoided deforestation approaches. No HFLD credits have yet traded hands in the VCMs, though according to market rumors the first issuance is due in late 2022 / early 2023.

- The start of 2022 saw significant interest in the carbon crypto movement, which seeks to combine blockchain technologies with carbon credits to create a new type of financial instrument. The most famous of the carbon crypto projects, Toucan, was criticized in the spring for encouraging a rise in the issuance of poor quality credits, and the value of their coin subsequently lost over three quarters of its value. This had a chilling effect on the wider carbon crypto scene, which took a lower profile in the following months, though numerous variants on this theme emerged, including one initiative to leverage blockchain-based investments to bid in a government-run auction of a huge tract of peatlands in the DRC, in order to prevent them being bought by large energy companies seeking to extract fossil fuel.

- Market Initiatives such as VCMI and IC-VCM are shining a light on market integrity, encouraging buyers to act with more confidence. The SBTi has also begun to offer more clarity on the role of offsetting, or Beyond Value Chain Mitigation (BVCM), in science-based net zero pathways. This should help to counter previous perceptions that offsetting is solely a tool for greenwashing, and help organizations set more ambitious goals for their short term, global-scale, impacts on GHG emissions.

- There is growing momentum towards regulatory oversight of the VCMs and corporate decarbonization strategies. Building on climate-risk disclosure requirements recommended by TCFD, regulators across the world including the SEC, CFTC, FCA, EFRAG etc. are looking to require more comprehensive disclosures around emissions, climate claims and offset use, ESG ratings and VCM-linked financial instruments.

- Moving even faster than regulators are actors seeking to use legal systems to challenge low integrity corporate climate claims. No sector is safe from this scrutiny, and high profile banks, airlines, energy companies, manufacturers and retailers have all been forced to change their activities or advertising. These legal precedents are likely to have a meaningful impact on corporate concerns around greenwashing accusations.

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Looking toward the future

There is a clear need for buyers to understand the provenance and performance of the carbon credits, so that they only invest in legitimate, quality credits that align with their net zero and sustainability goals.

As the VCMs scale, the question around the quality of credits continues to be one of the biggest challenges facing organizations looking to invest. Policy implications will also shape the market and influence how organizations engage with carbon markets. There is a clear need for buyers to understand the provenance and performance of the carbon credits, so that they only invest in legitimate, quality credits that align with their net zero and sustainability goals.

Market participants also need to be aware of the trends that are influencing investment decisions. For example, there's an ongoing debate about whether avoidance or removals credits are better. Many companies believe removals credits – nature-based or technology-based – are the only viable option when it comes to offsetting their emissions. However, supply is limited and typically much more expensive.

As our data shows, there are quality REDD+ credits available today. They may come at a premium, but companies that truly care about offsetting unabatable emissions must be willing to pay. We believe companies should and will be taking a portfolio approach to offsetting; investing in removals projects (especially emerging technology-based solutions like Direct Air Capture) can help them scale to be a reliable solution in the future, while investing in high quality avoidance projects that are currently available can make a tangible impact today.

Sylvera's project coverage is rapidly expanding. Over the next year, we will continue to build robust frameworks and conduct our bottom-up analysis of other project types – like Direct Air Capture, Biochar, Jurisdictional REDD+ – so that buyers can have a view of the entire offsetting market and make the most impactful investments.

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More reading

Voluntary Carbon Markets 101

A Primer on the VCMs

OLD VS NEW

Should we be planting new trees or protecting our old ones

How we rate REDD+ Projects

How Sylvera rates carbon projects: REDD+

How we rate ARR Projects

How Sylvera rates carbon projects: ARR

How we rate IFM Projects

How Sylvera rates carbon projects: IFM

How we rate renewables

How Sylvera rates carbon projects: Renewables

An introduction to jurisdictional REDD+

An introduction to Jurisdictional REDD+

The New York Times

Democratic Republic of Congo auctioning land to oil companies

7 steps for carbon credit due diligence

How to conduct carbon credit due diligence in order to select high quality offsets

Understanding co-benefits in carbon projects

Tackling the climate and biodiversity crises with nature-based solutions

S&P Global Commodity Insights

Indonesia halts carbon project verification process over legal concerns

Bloomberg

World's Biggest Ever Carbon Credits Issue Planned in Gabon

An analysis of REDD.plus
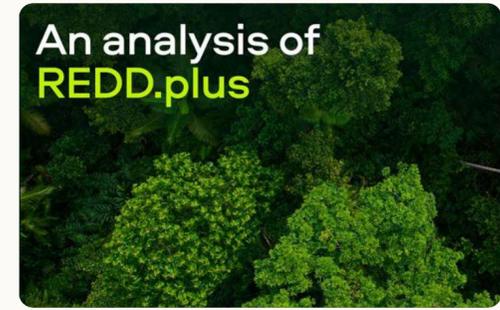
REDD.plus - the good, the bad, and the confusing

Carbon: Asset or liability?

Asset or liability? What carbon means for corporate balance sheets

Carbon removals vs avoidance: A dangerous distraction

SCIENCE BASED TARGETS

Net-Zero: Urgent Beyond Value Chain Mitigation Is Essential

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Appendix

REDD+ data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Percentage of credits Sylvera has rated	Number of credits Sylvera has rated	Age of projects
Indonesia	APAC	4	4%	76,261,979	19%	25,420,660	97%	73,623,906	Not recorded: 1 5 - 9 years: 2 10 - 14 years: 1
Peru	South America	10	13%	64,233,424	16%	6,423,342	87%	56,101,356	<5 years: 1 5 - 9 years: 3 10 - 14 years: 8
Brazil	South America	19	25%	59,272,203	15%	3,119,590	70%	37,923,379	5 - 9 years: 10 10 - 14 years: 8 >14 years: 1
Cambodia	APAC	4	5%	39,596,899	10%	9,899,225	98%	38,999,689	5 - 9 years: 3 10 - 14 years: 1
Democratic Republic of Congo	Sub-Saharan Africa	2	3%	37,300,507	9%	18,650,254	100%	37,300,507	10 - 14 years: 2
Colombia	South America	11	14%	31,848,781	8%	2,895,344	79%	25,215,479	5 - 9 years: 10 10 - 14 years: 1
Zimbabwe	Sub-Saharan Africa	1	1%	29,016,364	7%	29,016,364	100%	29,016,364	10 - 14 years: 1
Kenya	Sub-Saharan Africa	3	4%	19,860,758	5%	6,620,253	100%	19,860,758	5 - 9 years: 1 10 - 14 years: 1 >14 years: 1
Ethiopia	Sub-Saharan Africa	1	1%	9,141,291	2%	9,141,291	0	0	10 - 14 years: 1
Zambia	Sub-Saharan Africa	3	4%	8,609,934	2%	2,869,978	91%	7,854,903	5 - 9 years: 2 10 - 14 years: 1
Guatemala	Central America	2	3%	5,666,841	1.43%	2,833,421	100%	5,666,841	10 - 14 years: 2
Madagascar	Sub-Saharan Africa	2	3%	5,245,823	1.32%	2,622,912	0	0	10 - 14 years: 2

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REDD+ data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Percentage of credits Sylvera has rated	Number of credits Sylvera has rated	Age of projects
Malawi	Sub-Saharan Africa	1	1%	3,325,607	0.83%	3,325,607	100%	3,325,607	>14 years: 1
Belize	Central America	4	5%	2,586,422	0.65%	646,606	0	0	10 - 14 years: 3 >14 years: 1
Papua New Guinea	APAC	2	3%	1,941,546	0.49%	970,773	68%	1,327,442	<5 years: 1 10 - 14 years: 1
Tanzania	Sub-Saharan Africa	1	4%	1,472,666	0.37%	490,889	0	0	<5 years: 1 5 - 9 years: 2
Sierra Leone	Sub-Saharan Africa	1	1%	975,023	0.24%	975,023	100%	975,023	10 - 14 years: 1
Chile	South America	1	1%	533,654	0.13%	533,654	0	0	>14 years: 1
Guinea	Sub-Saharan Africa	1	1%	302,043	0.08%	302,043	0	0	5 - 9 years: 1
Republic of Congo	Sub-Saharan Africa	1	1%	56,209	0.01%	56,209	0	0	10 - 14 years: 1
Bolivia	South America	1	1%	55,400	0.01%	55,400	0	0	10 - 14 years: 1
Paraguay	South America	2	3%	21,133	0.01%	10,567	0	0	5 - 9 years: 1 10 - 14 years: 1

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Appendix
ARR data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
Uruguay	South America	5	5%	12,700,490	27%	2,540,098	5 - 9 years: 3 >14 years: 2
China	East Asia	23	24%	9,904,728	21%	430,640	<5 years: 9 5 - 9 years: 14
United States	North America	3	3%	6,293,594	13%	2,097,865	5 - 9 years: 1 10 - 14 years: 2
Uganda	Sub-Saharan Africa	10	11%	3,137,046	7%	313,705	<5 years: 1 10 - 14 years: 9
Panama	Central America	2	2%	2,741,053	6%	1,370,527	5 - 9 years: 1 >14 years: 1
Kenya	Sub-Saharan Africa	8	9%	2,519,564	5%	314,946	<5 years: 1 10 - 14 years: 7
Colombia	South America	5	5%	1,657,698	4%	331,540	5 - 9 years: 1 10 - 14 years: 1 >14 years: 1
Mexico	North America	2	2%	1,493,842	%	746,921	5 - 9 years: 2
Chile	South America	1	1%	1,393,414	3%	1,393,414	5 - 9 years: 1
Tanzania	Sub-Saharan Africa	1	4%	753,975	1%	753,975	10 - 14 years: 1
Brazil	South America	4	4%	687,699	1%	171,925	<5 years: 1 5 - 9 years: 2 10 - 14 years: 1
India	South Asia	5	5%	568,553	1%	113,711	5 - 9 years: 1 10 - 14 years: 2 >14 years: 2

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Appendix
ARR data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
Guatemala	Central America	3	3%	558,533	1%	186,178	5 - 9 years: 2 10 - 14 years: 1
Ghana	Sub-Saharan Africa	3	3%	549,442	1%	183,147	<5 years: 1 5 - 9 years: 2 10 - 14 years: 1
Peru	South America	4	4%	463,939	1%	115,985	5 - 9 years: 2 10 - 14 years: 2
Paraguay	South America	1	1%	435,075	1%	435,075	5 - 9 years: 1
Nicaragua	Central America	2	2%	320,459	0.68%	160,230	5 - 9 years: 2
Democratic Republic of Congo	Sub-Saharan Africa	1	1%	224,018	0.47%	224,018	10 - 14 years: 1
Ethiopia	Sub-Saharan Africa	2	2%	212,170	0.45%	106,085	10 - 14 years: 2
Australia	Oceania	1	1%	166,940	0.35%	166,940	10 - 14 years: 1
Bolivia	South America	1	1%	133,691	0.28%	133,691	10 - 14 years: 1
Sierra Leone	Sub-Saharan Africa	1	1%	126,297	0.27%	126,297	5 - 9 years: 1
Laos	South East Asia	1	1%	83,099	0.18%	83,099	5 - 9 years: 1
Timor-Leste	South East Asia	1	1%	74,766	0.16%	74,766	10 - 14 years: 1
Costa Rica	Central America	1	1%	48,801	0.10%	48,801	10 - 14 years: 1
Honduras	Central America	1	1%	18,655	0.04%	18,655	5 - 9 years: 1

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Appendix

ARR data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
Mozambique	Sub-Saharan Africa	1	1%	5,367	0.01%	5,367	<5 years: 1
Senegal	Sub-Saharan Africa	1	1%	480	0%	480	5 - 9 years: 1

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IFM data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
United States	North America	108	62%	77,967,924	89%	721,925	<5 years: 42 5 - 9 years: 54 10 - 14 years: 5 >14 years: 7
Mexico	North America	51	29%	397,910	0.45%	7,802	5 - 9 years: 47 10 - 14 years: 4
China	East Asia	8	5%	4,477,864	5%	559,733	5 - 9 years: 3 10 - 14 years: 5
Australia	Oceania	4	2%	711,029	0.81%	177,757	10 - 14 years: 4
Canada	North America	2	1%	3,384,171	4%	1,692,086	<5 years: 1 10 - 14 years: 1
Malaysia	South East Asia	1	1%	509,540	0.58%	509,540	10 - 14 years: 1
Romania	Europe	1	1%	6,624	0.01%	6,624	<5 years: 1

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Wind renewables data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
India	South Asia	315	49%	92,727,115	44%	294,372	<5 years: 14 5 - 9 years: 84 10 - 14 years: 114 >14 years: 103
China	East Asia	161	25%	47,557,121	23%	295,386	5 - 9 years: 13 10 - 14 years: 116 >14 years: 32
Turkey	Middle East	98	15%	34,587,227	16%	352,931	<5 years: 11 5 - 9 years: 42 10 - 14 years: 41 >14 years: 4
United States	North America	10	1.56%	10,166,455	5%	1,016,646	<5 years: 1 5 - 9 years: 2 10 - 14 years: 7
Taiwan	East Asia	5	0.78%	5,669,233	3%	1,133,847	5 - 9 years: 2 10 - 14 years: 3
Thailand	South East Asia	5	0.78%	1,495,111	0.71%	299,022	<5 years: 5
Nicaragua	Central America	5	0.78%	1,320,866	0.63%	264,173	5 - 9 years: 2 10 - 14 years: 3
Pakistan	South Asia	4	0.62%	620,819	0.30%	155,205	5 - 9 years: 4
Indonesia	South East Asia	3	0.47%	2,335,510	1.11%	778,503	<5 years: 2 10 - 14 years: 1
Argentina	South America	3	0.47%	1,462,079	0.70%	487,360	<5 years: 2 10 - 14 years: 1
Uruguay	South America	3	0.47%	612,968	0.29%	204,323	5 - 9 years: 2 10 - 14 years: 1

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Appendix

Wind renewables data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
Mexico	North America	3	0.47%	365,395	0.17%	121,798	10 - 14 years: 3
South Africa	Sub-Saharan Africa	2	0.31%	2,334,925	1.11%	1,167,463	5 - 9 years: 2
New Zealand	Oceania	2	0.31%	637,706	0.30%	318,853	>14 years: 2
Vietnam	South East Asia	2	0.31%	431,021	0.21%	215,511	5 - 9 years: 1 10 - 14 years: 1
Chile	South America	2	0.31%	323,560	0.15%	161,780	5 - 9 years: 1 10 - 14 years: 1
Costa Rica	Central America	2	0.31%	128,550	0.06%	64,275	<5 years: 1 5 - 9 years: 1
Sri Lanka	South Asia	2	0.31%	70,894	0.03%	35,447	5 - 9 years: 1 10 - 14 years: 1
Bulgaria	Europe	1	0.16%	2,085,449	0.99%	2,085,449	10 - 14 years: 1
Aruba	Central America	1	0.16%	1,075,844	0.51%	1,075,844	10 - 14 years: 1
Brazil	South America	1	0.16%	1,005,429	0.48%	1,005,429	5 - 9 years: 1
Dominican Republic	South America	1	0.16%	581,384	0.28%	581,384	5 - 9 years: 1
Mongolia	East Asia	1	0.16%	454,092	0.22%	454,092	5 - 9 years: 1
Philippines	South East Asia	1	0.16%	393,839	0.19%	393,839	5 - 9 years: 1
Mauritania	Sub-Saharan Africa	1	0.16%	389,067	0.19%	389,067	5 - 9 years: 1
New Caledonia	Oceania	1	0.16%	383,225	0.18%	383,225	10 - 14 years: 1

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Wind renewables data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
Senegal	Sub-Saharan Africa	1	0.16%	383,225	0.18%	383,225	10 - 14 years: 1
Honduras	Central America	1	0.16%	206,105	0.10%	206,105	10 - 14 years: 1
Kazakhstan	Central Asia	1	0.16%	107,033	0.05%	107,033	<5 years: 1
Namibia	Sub-Saharan Africa	1	0.16%	79,316	0.04%	79,316	5 - 9 years: 1
Morocco	North Africa	1	0.16%	34,439	0.02%	34,439	<5 years: 1
South Korea	East Asia	1	0.16%	21,517	0.01%	21,517	10 - 14 years: 1
Ecuador	Central America	1	0.16%	970	0%	970	10 - 14 years: 1

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Solar renewables data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
India	South Asia	73	57%	52,999,063	89%	726,015	<5 years: 23 5 - 9 years: 39 10 - 14 years: 11
China	East Asia	18	14%	3,708,892	6%	206,050	<5 years: 1 5 - 9 years: 8 10 - 14 years: 9
Turkey	Middle East	8	6%	125,668	0.21%	125,668	<5 years: 6 5 - 9 years: 2
Vietnam	South East Asia	5	4%	508,929	0.86%	101,786	<5 years: 5
Senegal	Sub-Saharan Africa	4	3%	352,411	0.59%	88,103	<5 years: 1 5 - 9 years: 3
Egypt	North Africa	3	2%	294,995	0.50%	98,332	<5 years: 3
Mauritius	Sub-Saharan Africa	3	2%	173,760	0.29%	57,920	<5 years: 2 5 - 9 years: 1
Namibia	Sub-Saharan Africa	3	2%	129,929	0.22%	43,310	<5 years: 1 5 - 9 years: 2
Thailand	South East Asia	2	2%	452,519	0.76%	226,260	5 - 9 years: 2
Argentina	South America	2	2%	210,226	0.35%	105,113	<5 years: 2
Philippines	South East Asia	1	1%	259,688	0.44%	259,688	5 - 9 years: 1
Mauritania	Sub-Saharan Africa	1	1%	162,411	0.27%	162,411	5 - 9 years: 1
Dominican Republic	Central America	1	1%	108,264	0.18%	108,264	5 - 9 years: 1

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Solar renewables data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
Indonesia	South East Asia	1	1%	85,939	0.14%	85,939	<5 years: 1
Madagascar	Sub-Saharan Africa	1	1%	37,847	0.06%	37,847	<5 years: 1
Mexico	North America	1	1%	28,298	0.05%	28,298	5 - 9 years: 1
Rwanda	Sub-Saharan Africa	1	1%	25,895	0.04%	25,895	5 - 9 years: 1

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Hydro renewables data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
China	East Asia	92	33%	29,112,341	20%	316,438	10 - 14 years: 50 >14 years: 42
Turkey	Middle East	75	27%	31,441,518	22%	419,220	<5 years: 1 5 - 9 years: 23 10 - 14 years: 48 >14 years: 3
India	South Asia	37	13%	56,919,582	39%	1,538,367	<5 years: 4 5 - 9 years: 11 10 - 14 years: 16 >14 years: 6
Vietnam	South East Asia	25	9%	2,013,202	1.39%	80,528	<5 years: 1 5 - 9 years: 10 10 - 14 years: 14
Brazil	South America	10	4%	9,270,597	6%	927,060	10 - 14 years: 6 >14 years: 4
Colombia	South America	9	3%	1,140,755	0.79%	126,751	<5 years: 1 5 - 9 years: 4 10 - 14 years: 3 >14 years: 1
Chile	South America	7	2%	693,651	0.48%	99,093	<5 years: 2 10 - 14 years: 4 >14 years: 1
Indonesia	South East Asia	5	2%	7,894,210	5%	1,578,842	10 - 14 years: 3 >14 years: 2
Laos	South East Asia	5	2%	745,941	0.52%	149,188	5 - 9 years: 5
Honduras	Central America	3	1%	414,253	0.29%	138,084	5 - 9 years: 1 >14 years: 2

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Hydro renewables data

Country	Region	Number of projects with issued credits	Market share from number of issued projects	Number of issued credits	Percentage of credits in the market	Average number of credits per project	Age of projects
Uganda	Sub-Saharan Africa	2	1%	412,660	0.29%	206,330	5 - 9 years: 1 10 - 14 years: 1
Sri Lanka	South Asia	2	1%	20,340	0.01%	10,170	5 - 9 years: 2
Côte d'Ivoire	Sub-Saharan Africa	1	0.35%	3,350,508	2%	3,350,508	5 - 9 years: 1
Tajikistan	Central Asia	1	0.35%	315,553	0.22%	315,553	>14 years: 1
Argentina	South America	1	0.35%	274,490	0.19%	274,490	10 - 14 years: 1
Madagascar	Sub-Saharan Africa	1	0.35%	245,580	0.17%	245,580	10 - 14 years: 1
Turkmenistan	Central Asia	1	0.35%	187,408	0.22%	187,408	>14 years: 1
Taiwan	East Asia	1	0.35%	107,659	0.07%	107,659	10 - 14 years: 1
Dominican Republic of Congo	Sub-Saharan Africa	1	0.35%	63,924	0.04%	63,924	5 - 9 years: 1
Bulgaria	Europe	1	0.35%	49,727	0.03%	49,727	10 - 14 years: 1
Malaysia	South East Asia	1	0.35%	10,692	0.01%	10,692	10 - 14 years: 1
Zambia	Sub-Saharan Africa	1	0.35%	3,481	0%	3,481	10 - 14 years: 1

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Data sources

Sylvera platform (October 2022)

Berkeley Voluntary Registry Offsets Database (March 2022)

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Who relies on the Sylvera platform?

Our customers and partners span corporate buyers, traders and exchanges. They are often large institutions who have made net zero commitments, and who are the biggest buyers of carbon credits in the market.

BAIN & COMPANY   Cargill   salesforce   MITSUBISHI   CO₂

Climate Impact X   CARBON GROWTH PARTNERS   Shell   Ecologi   Chevron

Xpansiv   ANGLO AMERICAN   equinor   BCG   Respira

Sylvera's mission is to be a source of truth for carbon markets.

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Contact us to learn more.