

# **BGFA – Sustainable Standalone Solar Metrics for RBF**

## **Discussion Note**

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### **Disclaimer**

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## Introduction

### Objectives of this note

The objective of this note is to share experience on how results-based financing (RBF) programmes can define the commercial sustainability of energy access connections, and what metrics can be used for reporting, and as RBF milestone payment conditions. It describes the approach used to date by the [Beyond the Grid Fund for Africa \(BGFA\)](#) and discusses alternative metrics for a sustainable energy access connection. It does not make recommendations as to which metrics are to be preferred, as this will depend on the context and on the maturity of data systems.

The note brings together reflections initiated across the Nefco, NIRAS, and A2EI (Prospect) teams. It is intended to be shared with other RBF practitioners to generate learnings on the merits, and challenges, of different metrics of sustainability.

### Defining a sustainable energy access connection

A core principle underpinning BGFA's results-based finance has been to incentivise companies to focus on sustainable access, rather than on connections only. This is important, as the pay-as-you-go (PAYGo) business model has run into challenges where companies and their sales agents have focussed more on customer acquisition than on customer quality, and the provision of a sustainable service. The result is a risk of achieving high connection numbers, but with (relatively) low payment rates from customers who do not maintain payments, or technical faults which mean systems no longer function reliably.

The focus of this note is on *commercial* sustainability. As RBF often encourages companies to serve relatively low ability-to-pay customers, there is also a need for consideration of subsidy levels and payment structures to ensure connections are sustainable from the customer's perspective. While BGFA is not solely targeted at the lowest-income or hardest-to-reach customer segments, this broader consideration remains relevant to the design of RBF mechanisms. This gets to a core conflict in the energy access sector and in RBFs – the objective to reach un- or under-served customers who are typically relatively poor, and/or relatively expensive to serve, while also developing commercially viable enterprises.

A commercially financed company operating with a (relatively) high share of customers paying late, or not paying, is going to run into financial difficulties. If customers cannot maintain repayment rates, then the type of RBF provided by BGFA is not well-suited to achieving sustainable commercial outcomes. Other types of RBF, such as EnDev's pro-poor programmes with higher subsidy rates, may be effective in providing a longer-term form of affordability gap subsidy to ensure sustainability of payment for customers.<sup>1</sup>

### Glossary of key terms

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<sup>1</sup> For more information on how BGFA balances impact objectives and commercial sustainability objectives, see the mid-term evaluation at: OPM and Greencroft Economics (2026) "Beyond the Grid Fund for Africa – Mid-Term Evaluation", [Link](#)

| Term                   | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Paid-at</b>         | The date at which customers have made a payment (of any size).                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Paid-until</b>      | The date until which a customer has paid, based on previous payment dates and amounts paid.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>PAR90</b>           | The share of a loan portfolio that is more than 90 days late, which could be calculated as either: (1) the total loan portfolio that is more than 90 days late, divided by the overall loan portfolio size, or (2) the number of customers who are more than 90 days late in payments, divided by the total number of customers.                                                                                                                                                                                  |
| <b>Unlock-rate</b>     | The % of days which a system was “unlocked” (i.e. paid for), over a defined time period.                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Fixed-term loan</b> | A customer has a defined payment plan and must keep up to date to keep their system unlocked. If they fall behind on payments, they must catch up on arrears for their system to be kept active. This means a customer may have been designated as an unsustainable connection, but subsequently makes a payment to catch up on their arrears, in which case the previous designation as unsustainable may need to be revised. With an arrears loan, the “expected amount” and duration of payments is unchanged. |
| <b>PAYGo loan</b>      | A customer pays to unlock their system but has no obligation to do so. However, interest is continually accrued against the outstanding principle, so the longer it takes to pay off the initial cost of acquiring the system, the more interest accrues. The “expected amount” of the PAYGo loan is therefore dynamic, depending on how much the customer uses their system.                                                                                                                                     |

### BGFA’s approach to defining sustainable energy service subscriptions (ESS) to date

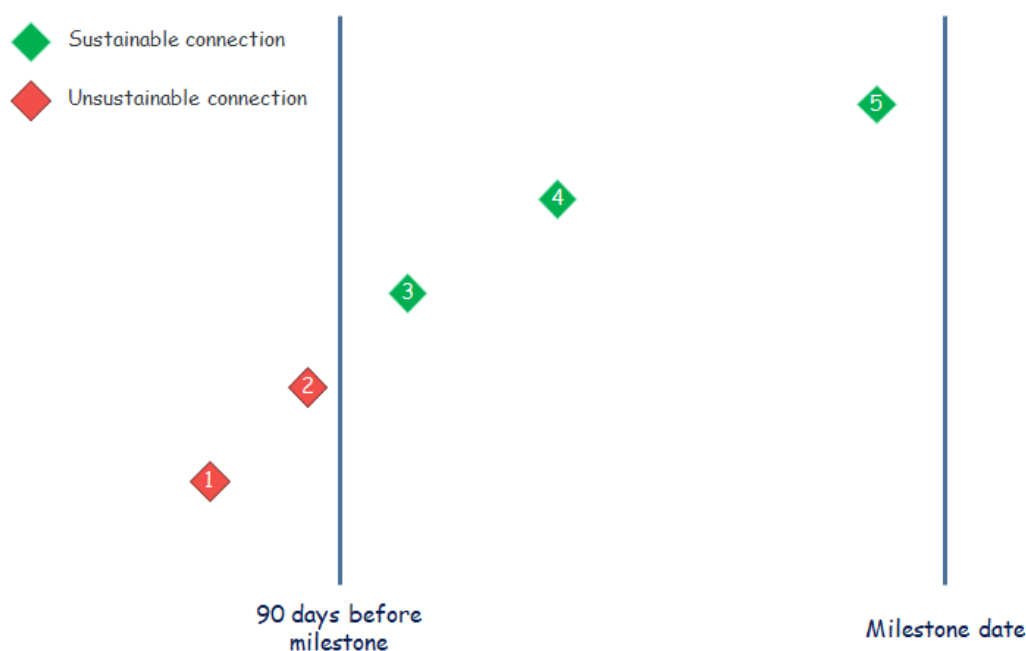
The approach used by BGFA up to now has been to assess the sustainability of each customer of its contracted energy service providers based primarily on whether they have made a payment in the 90 days preceding an RBF milestone.

Each BGFA contract includes a clause requiring that payments are consistent with the terms of the contract between the ESP and its customer. However, while in principle this gives contractual grounds to make sure payments are in line with expected payments, in practice this is challenging to monitor, and no specific measures have been implemented as a result of these clauses. For example, it could mean checking that the customer payments made in the 90 days prior to the milestone are proportionate to the retail price of the product. But, in order to monitor and implement such a contractual condition, the data analysis required for more sophisticated metrics such as the paid-until, unlock-rate, or paid-versus-planned (described below) would need to be carried out.

The 90-day period was chosen to allow flexibility for customers that may go through (short) periods where they may not make payments, but that if this period extends too long the likelihood of non-payment increases. The 90-day window also aligns with lessons learned from sector-wide initiatives such as PAYGo PERFORM, and customer portfolio quality metrics such as PAR90.

With improving data systems and digital monitoring reporting and verification (dMRV), BGFA has been exploring alternative, more complex, metrics, drawing on the principles of the portfolio-at-risk PAR90 metric. The remainder of this note discusses in turn: (1) paid-at metrics, (2) paid-until metrics, and (3) unlock-rate metrics.

## Paid-at metrics



A paid-at approach assesses the sustainability of a customer's connection based on whether a customer has made a payment in a fixed period preceding a payment milestone. The figure above provides a worked example based on a 90-day window (used by BGFA as described above). For example, if the company has a milestone set at the 1<sup>st</sup> of June 2026, then any of that company's customers who have made a payment since the 3<sup>rd</sup> of March 2026 would be qualified as sustainable and eligible to unlock the RBF payment.

In the graphic above, customers 1 and 2 would be qualified as unsustainable as they have not made a payment in the last 90 days (however, this status may change if they continue to make payments over time), whereas customers 3, 4 and 5 would be qualified as sustainable.

The major advantage of this approach is that it is simple to compute, and to validate/verify. It only requires checking the date of the last payment made by a customer, which can be verified against mobile money records and payment system data.

However, the paid-at approach has several weaknesses:

1. *It does not account for customers who pre-pay more than 90 days in advance.* Initial data analysis from the BGFA portfolio, and from other programmes, suggests that some (although typically a small share of) customers make infrequent large payments in advance. If a customer makes a payment to unlock their system for 120 days, four months before the RBF milestone date, this customer would be qualified as unsustainable, despite having paid in full for the use of their system. This may be more of an issue for mini-grids where customers may be more likely to make infrequent large payments, although is also relevant for solar home system users.
2. *It rewards payments of any size.* As long as a payment is made within the last 90 days the customer is qualified as sustainable, even if they only made one payment of \$1. A single nominal payment can mask low overall payment rates.

There could be ways to improve this metric – although each have their own pitfalls. For example, you could define the paid-at on the basis of payment in the 90 days prior to the RBF milestone equalling at least X% of the expected monthly payment, etc. However this is complex and raises other issues (see point 1 above and point 3 below).

3. *It only takes into account recent payment history.* The paid-at approach does not account for over- or under-payment throughout the customer contract period. For example, a customer could be 150 days behind payment overall, but as long as they have made a payment within the last 90 days would be qualified as sustainable.

These flaws potentially create incentives for companies to artificially boost customer payment rates hit RBF milestones. Of course, in general companies have a strong incentive to make sure their customers are paying as much as possible, in line with their repayment plans. This is especially true in BGFA, where business sustainability depends primarily on customer repayments rather than the relatively low subsidies. Nonetheless, the fact that an RBF milestone (revenue for the company) is contingent on the number of customers deemed to have made a qualifying payment in the 90 days prior to an RBF milestone incentivises companies to “boost” customer payment rates in this 90-day window.<sup>2</sup> While it is unlikely (but not impossible) that companies call all their customers and suggest they make a \$1 payment just to make sure that the company qualifies for the RBF milestone, it is plausible that a company might offer a short-term payment discount (e.g. 50% reduction in price for three months) or other incentives to increase payment rates in order to meet the RBF milestone and receive their RBF payout. As noted above, in all contracts BGFA stipulates that customer payments must be consistent with the terms of the agreement with the company (and Nefco reserves the right to audit).

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<sup>2</sup> This is potentially compounded, if the definition of an eligible “sustainable” customer is re-assessed and adjusted over several RBF milestones. In this case, the ultimate amount of RBF received only depends on the number of customers qualified as “sustainable” in the final RBF milestone.

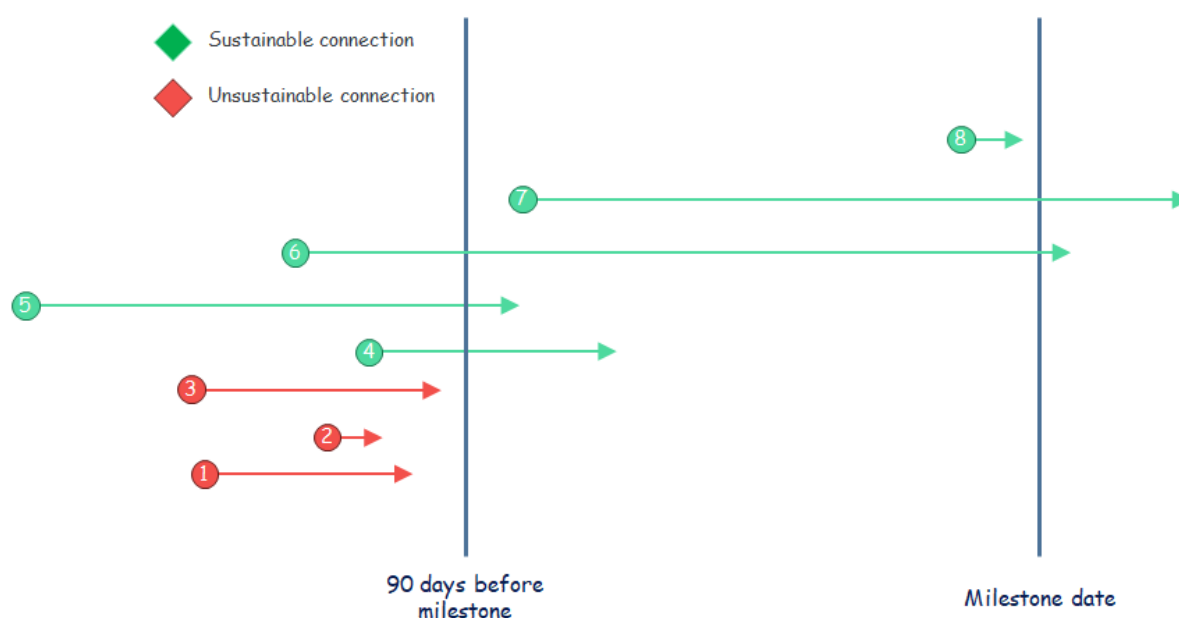
## Paid-until metrics

An alternative is to assess until when a customer has paid. This could be done based on either (1) the latest payment, or (2) using each customer's full payment history.

In both cases, this requires an *ex-ante* definition of how much a customer should pay and over what period of time. This is complex, as it could vary by company, by product, and by customer. A company might offer three products on PAYGo, and for each they may offer several different payment term options (e.g. 6-months, 12-months, 18-months, daily, weekly, monthly payments). Furthermore, companies may change the terms they offer customers as their operating context evolves – so customers acquired 18 months ago may be on different terms to those acquired six months ago.

Nonetheless, this data should exist and can be computed. It is a pre-requisite for the industry-wide benchmarks such as PAR90.

### Paid-until based on last customer payment



In this approach, customers would be eligible if their most recent payment was a valid payment for usage at any point within the 90 days prior to the milestone. In the graphic above, customers 1, 2 and 3 would be qualified as unsustainable, as the last payment was before the 90 day window, and was of too small amount to have paid-until within the 90 day window. Customers 7 and 8 would be qualified as sustainable, as they have made a payment within the 90 day window, so have an eligible paid-until. The difference compared to the paid-at approach is for customers 4, 5 and 6 who would now be qualified as sustainable, as while their last payment was more than 90 days ago, it was large enough to have paid until within the 90-day window.

This addresses the first weakness identified in the paid-at approach, as it means customers who have not made a payment within the last 90 days, but have made sufficiently large payments previously such that their system is in use within the last 90 days now qualify. It does not address the second or the third weaknesses. It would result in more customers being qualified as sustainable compared to the paid-at approach.

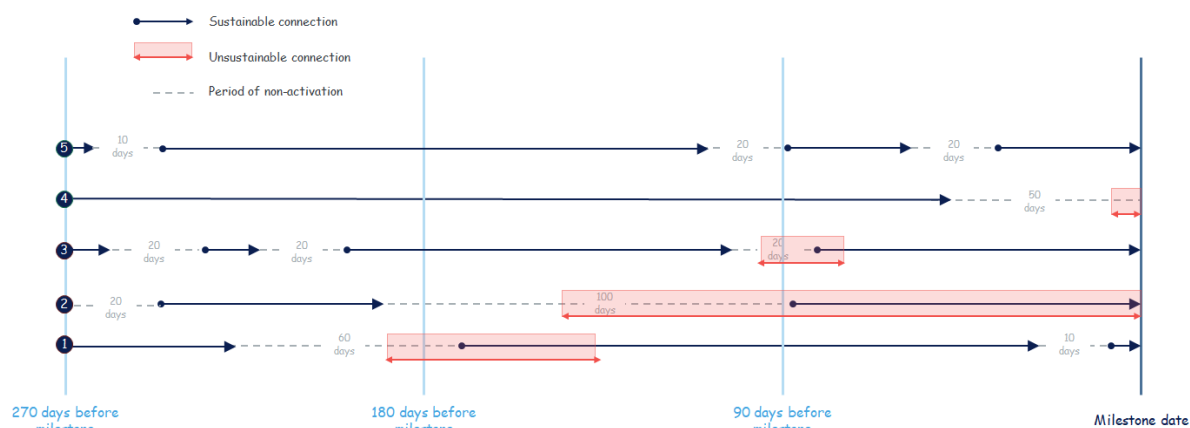
## Paid-until based on full customer payment history



In this approach, customers would be eligible if over the history of their contract with the company, they have accumulated less than 90 days of payment arrears. In the graphic above, customers 1, 2 and 3 would be qualified as unsustainable, as even though they have made recent payments, their payment history has accrued more than 90 days of arrears. Customers 4 and 5 would be qualified as sustainable, as while there are gaps in their payment history, they have cumulated less than 90 days of arrears.

This addresses all three weaknesses identified in the paid-at approach. It means customers who have not made a payment within the last 90 days, but have made sufficiently large payments previously such that their system is in use within the last 90 can be qualified as sustainable. It also makes the size of any particular payment irrelevant, as all that matters is the total amount paid compared to total amount due, so cannot be “gamed” by incentivising to make small payments close to the RBF milestone date. It also takes into account the full payment history.

## Unlock-rate metrics



Similar to the paid-until metrics, an alternative could be a metric based on the proportion of days that a system was unlocked over a given time period (e.g. six months). While most devices do not have sophisticated internet of things (IoT) which would allow for monitoring of usage, CRM systems track whether a system is activated, based on payment data. An unlocked system means the customer has paid to activate the system.

The unlock-rate could be based on a rolling analysis of amount paid compared to amount expected “paid versus planned” (PvP) on a rolling basis, with a threshold for the RBF milestone as a ‘X%’ of days to which the amount paid in the previous ‘Y’ days corresponds to in terms of system unlock. The milestone could be assessed on the basis of the share of customers below the ‘X%’ target at the fixed date of the RBF milestone (similar to the paid-at approach), or based on an assessment of the proportion of days for which a customers’ connection was not unlocked over the 90 days or 180 days prior to the RBF milestone (similar to the paid-until approach).

As an illustrative example, the figure above shows what a rolling assessment of PvP might look like with a target unlock-rate (to qualify for the RBF) of 80%, i.e. a system must be unlocked for 144 days in any 180-day period to qualify as sustainable. For customer 1, the connection is qualified as “unsustainable” when the customer goes (at least) 44 days consecutively without unlocking their system, and remains “unsustainable” so long as there are 44 days within the last 180 days for which the system was not unlocked. However, they are re-qualified as “sustainable” as soon as the rolling stock of days for which the system was not activated over the last 180 days falls back below 44.

Customer 2 is similar but is not requalified as “sustainable” as there is always 44 days within the last 180 days for which the system was not unlocked. If customer 2 kept up payments to unlock their system for a further 50 days the system would then re-qualify as “sustainable”. Customer 4 has only a very short period where there are a cumulative 44 days for which the system was not unlocked in the last 180 days, while customer 5 has 16 days just before the milestone where the system would be qualified as “unsustainable”. Customer 6’s connection is always sustainable, as while there are (short) periods where their system is not unlocked, they never add up to 44 days over the previous 180 days.

This addresses all the weaknesses of the “paid-at” approach, but requires a rolling analysis of payments / system unlock data. It also means that a customer can re-become designated as “sustainable”, if they go back to making payments in line with their plan.

## Validation and verification

To implement a paid-until or an unlock-rate approach would need systems (e.g. Prospect) to have access to:

- Individual customer contract terms loaded for each ESP for each product, i.e. how much they are expected to pay, and over what time period (including if there are adjustments for infrequent larger payments, or seasonal payments etc.)
- Payment dates, and amounts, linked to each customer account.

For validation and verification, this could be done using:

- Verifying payments recorded in the CRM against mobile money records.
- An independent verification agent (IVA) checking a sample of customer contracts and payments.
- Bespoke analysis could check that if using the first paid-until approach (i.e. using last payment data only), there are no unusual patterns in customer repayments close to RBF milestone dates.

The approach taken to validation and verification by BGFA has evolved over the course of the programme. Now all companies (with some exceptions) in the BGFA portfolio are progressing on integrating into Prospect, which allows for pooled data points and automated validation of payment request calculations. BGFA has also begun piloting verification of customer payment data from the company CRM systems (integrated in Prospect), against mobile money reports generated by the companies from their mobile money provider. The early evidence from these pilots is that the (partial) verification of payment data from mobile money reports is feasible, but can be time intensive and so may not be suitable to verify all payment data.

## Discussion

One of the challenges that may be encountered is if, and how, to account for when companies adjust customer payment plans. This is further complicated by there being two types of repayment contract.

### Fixed-term loans versus PAYGo loans

If a customer has “fixed term” loan (or, alternatively, an “arrears loan”), they need to make payments as stipulated in their contracted, or the system will be locked. For example, a customer would have an 18-month loan, with an obligation to pay \$20 per month. If they fall behind on payments, they need to catch up on the arrears for their system to be kept active. So in the example above, after 12 months the customer needs to have made 12\*\$20 payments, or \$240 in total. This means a customer may have been designated as an unsustainable connection, but subsequently makes a payment to catch up on their arrears, in which case the previous designation as unsustainable may need to be revised. It also means the total expected payment amount and period is fixed – \$360 over 18 months.

If a customer has a PAYGo loan, they are not obliged to pay for (or to unlock) their system – they can choose to pay to unlock their system as and when they want to, but can also choose not to pay (and not to unlock their system). However, the longer it takes to pay off the initial cost of acquiring the system, the more interest accrues. So the expected payment

is dynamic, with the PAYGo loan and duration depending on the cadence of repayments (i.e. how much the customer uses the system).

While a different business model, mini-grid customers are effectively on a similar arrangement to a PAYGo loan for the purposes of this note, in the sense that after an initial connection fee, they are under no obligation to use power, and only pay for what they consume (on pre-pay meters or post-consumption bills).

In both cases the company has an expectation on how quickly the customer will pay off the system. This expectation can be used to define an appropriate sustainability metric for RBF, building in some forgiveness and flexibility for a tolerable margin of late payments (e.g. 90 days, or an X% unlock-rate, as set out in the metrics above).

### Dynamic contracts and repayment terms

Companies might offer incentives to encourage customers in arrears to improve their repayment rates, such as extending the loan duration, offering discounts, or payment amnesties. This is good practice from companies, to take action to improve their overall collection rates.

Basing sustainability calculations on revised contractual terms would run into two issues.

- First, while offering some flexibility for customer payments may be good practice, it nonetheless means those connections are less sustainable than intended at the outset; when customers pay less, or later, than expected, this comes at a cost to the company.
- Second, it introduces a “moral hazard” risk. While it would ensure companies are incentivised to make sure systems are maintained and operational (so customers continue to have access), it would weaken incentives for customers to focus on acquisition of customers who are able to pay, and weaken incentives for companies to take responsibility for timely payment collection, as they could still access their RBF payments on the basis of revised customer repayment schedules.

For these reasons, for the purposes of RBF milestones, paid-until should be assessed on the original customer contract, not accounting for adjustments and incentives offered to improve repayment rates.

### The costs and benefits of more sophisticated sustainability metrics

This note has set out various conceptual approaches to defining and reporting on sustainability metrics for RBF. However, the more complex metrics (paid-until and unlock-rate) require substantially more data processing, data validation, and verification.

Very few RBFs have implemented sophisticated sustainability metrics, instead relying on recorded sales, or on a one-off verification of systems still active a year later. BGFA was a pioneer in moving towards a more sophisticated sustainability approach, intending to capture ongoing usage of the energy access connections. To do this it has (to now) relied on a “paid-at” approach, with more sophisticated potential alternatives emerging in the last few years.

The “paid-at” remains the simplest metric to calculate and to verify. There are ways that increasing confidence could be built into this type of metric:

1. Use CRM systems and data uploaded into platforms like Prospect to carry out (could be automated) validation checks which flag concerns:
  - a. Check if there is a spike in frequency of payments in the 90 days prior to the RBF milestone.
  - b. Analyse PvP rates on an ongoing basis and check if there are major fluctuations per customer
  - c. These would be validation exercise, not verified against mobile money payment records or by an independent verification agent. They would be used to raise automatic flags
2. Project managers to verify where flags are raised – this would likely be a small sub-sample, but means the RBF provider has to have capacity to do this analysis.

However, even if this analysis could be used to identify potentially problematic trends, it is not clear what the RBF provider could do if red flags were raised. It may be possible to use the contract terms for the milestones that *“payments are consistent with the terms of the contract between the ESP and its customer”*, but this may not be a practical solution (as the ESP contracts may allow them flexibility – as is desirable – to alter payment terms and offer periodic incentives).

Moving to RBF milestones based on paid-until or unlock-rate metrics is in principle a more robust way of capturing a more complete assessment of the commercial sustainability of customer repayments. However, it should be explored cautiously, and the data analysis, validation, and verification steps tested in pilots before determining the feasibility of these approaches. This includes weighing up the extra effort (time and cost) compared to improved accuracy compared to a paid-at (plus enhanced validation as described above).