

ARB Compliance Offset Program

Livestock Project Compliance Offset Protocol

Frequently Asked Questions

In California's Greenhouse Gas (GHG) Cap-and-Trade Program, covered entities may use Air Resources Board (ARB) offset credits to fulfill up to 8% of their compliance obligation. Offset credits are tradable compliance instruments that represent verified GHG emission reductions or removal enhancements made in sectors and sources not covered by the Cap-and-Trade Program.

ARB has developed this Frequently Asked Questions (FAQs) document specific to livestock projects using ARB's Compliance Offset Livestock Protocol (Livestock Protocol). These FAQs clarify existing requirements in the Livestock Protocol.

1. Eligibility

a) Can there be a small dairy and a large beef cattle farm both feeding a digester?

Yes, Section 2.2 of ARB's Livestock Protocol does not preclude an Offset Project Operator (OPO) or Authorized Project Designee (APD) from co-digesting other organic matter in the biogas control system (BCS). Organic matter from the large beef farm may be fed into the BCS. However, for the purpose of ARB's Livestock Protocol, only dairy cattle and swine manure is eligible for crediting from the project.

b) What is an "initial start-up period?" When does the ten year crediting period start?

Pursuant to section 3.2 of ARB's Livestock Protocol, the "initial start-up period" refers to the period between post-system installation and pre-project commencement. After the installation of the project's BCS, the OPO/APD may run, tune, and test the system to ensure its operational quality. The commencement date, which follows the initial start-up period, is defined as the date that the BCS becomes operational. The crediting period for the Livestock Protocol is ten years from the date that the first GHG emission reductions or GHG removal enhancements took place according to the first Positive Offset or Qualified Positive Offset Verification Statement that is received by ARB. Projects with commencement dates prior to December 31, 2006 are not eligible under the Livestock Protocol.

c) What is the definition of an anaerobic system?

An anaerobic system is one that operates in the absence of oxygen. ARB's Livestock Protocol requires the OPO/APD to demonstrate that the depth of the anaerobic lagoons or ponds prior to the offset project's implementation were sufficient to prevent algal oxygen production and create an oxygen-free bottom layer; which means at least one meter in depth (section 3.4.1.)

d) Section 3.4.1 of the Livestock Protocol notes that greenfield projects are eligible "only if the Offset Project Operator or Authorized Project Designee can demonstrate that uncontrolled anaerobic storage and/or treatment of manure is common practice in the industry and geographic region where the offset project is located." What constitutes common practice and over what geographic region must common practice be evaluated?

Greenfield livestock projects will be considered by ARB on a case by case basis. An OPO/APD should provide detailed information on the project, including the specific project location (including geographic coordinates), what type of BCS devices will be installed, and any information available from EPA or other sources about baseline manure management in the local area, state, and adjoining states. Based on the information provided by the OPO/APD, ARB will determine whether or not the requirements of the regulation are met for that project.

e) The Livestock Protocol requires source testing be carried out according to an ARB-approved source test plan. What is the process for a project to get their source test plan approved?

Under the Livestock Protocol, a source test plan should be submitted to ARB prior to the start of source testing to allow ARB staff time to review the plan and work with the OPO/APD until an appropriate plan is developed. Once site-specific testing has been conducted under an ARB-approved source test plan, the project can no longer use the default destruction efficiency value, and instead must use the project-specific destruction efficiency value derived from source testing.

f) Is it possible for a livestock project to start reporting emission reductions after the project commencement date? For example, if a project's BCS starts actively producing and destroying methane before the monitoring equipment is fully installed, can the OPO/APD choose to delay reporting until everything is up and running?

Yes, the livestock project commencement date is defined as the date the BCS becomes operational. If this occurs before the reporting of emission reductions is possible, the first reporting period will start on a later date of the OPO's choosing after all monitoring equipment is in place. Please note that the reporting period start date is also beginning of the initial crediting period, as this is when the first verified GHG emission reductions would have taken place.

2. Quantification

- a) **ARB's Livestock Protocol does not prescribe acceptable methods to determine what percentage or fraction of manure is apportioned to anaerobic digestion, and what is apportioned to non-anaerobic storage/treatments systems. How should the OPO or APD calculate this value?**

The baseline value should be reflective of the actual practices of the dairy prior to installation of the BCS. Engineering estimates are acceptable. Verifiers may examine documentation of practices and speak with ARB staff to determine the validity of the estimate.

- b) **The Climate Action Reserve (CAR) has developed the optional Beta Livestock Calculation Tool to assist with the quantification of GHG emission reductions from projects using CAR's voluntary Livestock Project Protocol - does ARB recognize such tools or approve them for use under ARB's Livestock Protocol?**

No, ARB does not endorse the use of any external tools. Projects must meet the requirements of the Cap-and-Trade Regulation and ARB's Livestock Protocol to be eligible for the issuance of ARB offset credits. If stakeholders wish to use any tools as a means of cross-checking or assisting their quantification, ARB recommends that they ensure that the tools are compatible with ARB's protocols to avoid miscalculation or discrepancy. If any external tools are used by an OPO/APD, the verification team must ensure that all values returned reflect the requirements of ARB's Livestock Protocol.

- c) **The CAR voluntary livestock protocol has now set a maximum value for temperature of 29.5 degrees Celsius when calculating the van't Hoff-Arrhenius factor. Is there any plan for ARB to introduce the same upper temperature limit?**

The ARB compliance offset program is separate and independent from CAR's voluntary offset program. ARB will assess the need for any changes to its Livestock Protocol through a stakeholder process in the future. However when

calculating the van't Hoff-Arrhenius factor, as a practical matter, it cannot have a value exceeding 1.00. A value exceeding 1.00 would indicate more volatile solids (VS) are degraded than VS available for degradation.

d) What is the destruction efficiency for biogas injected into a natural gas transmission and distribution pipeline?

The default biogas destruction efficiency (BDE) used in Equation 5.6 is based on values specified in Table A.6.b of Appendix A of ARB's Livestock Protocol. The BDE for upgrade and injection into natural gas transmission and distribution pipelines is 0.98. No monitoring of destruction is required.

e) The Livestock Protocol calculates the monthly volatile solids (VS) that are available for degradation by adding the new solids for the current month to the undegraded solids remaining from the previous month. When a project transitions from an Early Action Protocol to the Livestock Protocol, does it carry over the VS remaining from the final month of early action calculations to determine the VS available in its first month as a compliance project?

Yes, the VS remaining from the final month reported under early action must be carried over to the first month reported under the compliance offset protocol (the Livestock Protocol).

f) The manure management options in Table A.1 are limited to 15 categories and do not capture every type of manure management that may be used. For farms that have a management system that doesn't fall into one of these categories, what MCF should be applied in equation 5.4?

In instances where a project's baseline manure management system does not clearly fall into one of the categories listed in Table A.1, ARB will make a case-by-case determination of the appropriate category based on which category most closely matches the manure management system.

- g) How does ARB view the carryover of a negative calculation of emission reductions from one vintage to another? Livestock projects may generate negative emission reductions during cold winter months. If the reporting period does not line up with the calendar year, it is possible for a reporting period to contain a vintage with a negative number of emission reductions and a vintage with a positive number of emission reductions.**

ARB evaluates emissions reductions by reporting period and not by calendar year. Since a reporting period does not have to coincide with a calendar year, a project's reporting period may contain a period with increased emissions and a period with emission reductions. For example, a project with a reporting period from July 2013 through June 2014 would sum the emissions increases from July through December 2013 with the emission reductions from January to June 2014 to obtain the emission reductions for the entire reporting period.

- h) Equation 5.3 does not specify zeroing out the VS carryover following months in which the baseline lagoon would have been cleaned. Does this omission imply that OPOs or APDs do not have to account for baseline lagoon cleaning?**

No, the OPO/APD must model the baseline accurately. If the lagoon would have been cleaned out in the baseline scenario, the VS carryover must be zeroed out in the calculation.

- i) A project has a 1 to 7 day gap in data and wishes to use data substitution per Appendix B of the Livestock Protocol. However, there is another data gap of several hours that occurred a few days after the longer gap. As a result, the project developer cannot use the 95% upper or lower confidence interval of the 72 hours after the longer gap without overlapping with the shorter data gap. How should the project developer implement the data substitution requirements?**

In the event of overlapping gaps that hinder data substitution, the OPO/APD must discard the valid data between the gaps and combine the gaps to form one continuous gap. The data substitution method in Appendix B must then be applied to the new data gap. If the duration of the continuous data gap is greater than one week, data substitution cannot be used and no credits may be generated for that time period.

- j) Suppose a project that uses a continuous methane analyzer is missing extended periods (>seven days) of methane concentration data. Biogas flow was recorded and the destruction device was operational during these gaps. Since the Livestock Protocol does not specifically address continuous vs. discontinuous methane readings, how should the OPO/APD account for these long periods of missing methane concentration data, since data substitution per the guidelines in Appendix B is not possible?**

For gaps in methane concentration only, the OPO/APD does not need to forgo the reporting of emission reductions during the gaps as long as each gap is less than one quarter (three months) in length. Instead, the OPO/APD may assign a reasonable and conservative substitute value to fill these gaps. The substitute value must be reviewed and accepted by the verifier and in most cases should be a straight or weighted average that is based on the project's recorded methane concentration readings, unless another value is deemed more appropriate (and conservative).

- k) The Livestock early action quantification methodology allows for site-specific destruction efficiency values to be used if provided by a "state or local agency accredited source test service provider". However, very few states have accreditation programs. Would it be acceptable for a project to hire a source test service provider that is not accredited by an agency if it can be shown that this provider carries out stack testing for official regulatory permitting use?**

Early action offset projects located in states that do not have accreditation programs may hire an unaccredited service provider, as long as said provider carries out tests for official regulatory permitting use and demonstrates experience in the relevant testing procedures. The service provider must show that the work being conducted to meet the Livestock Protocol requirements is the same procedure that has been accepted to meet a regulatory requirement.

- l) If the OPO can demonstrate that there is no operational change or that operational changes in the project scenario would result in lower CO₂ emissions compared to the baseline, can CO_{2,net} in Equation 5.11 be set to zero without calculating electricity consumption and/or stationary and mobile consumption?**

The OPO must use "calculations or estimates" of emissions from mobile and stationary sources as well as grid-delivered electricity to show the verifier that the project CO₂ emissions are less than or equal to the baseline scenario (Section 5.4 of the Livestock Protocol). Providing records will not suffice; a quantitative analysis must be performed.

- m) Is it necessary for an OPO to fix an error which results in fewer emission reductions? More specifically, if a livestock project is adjusting flow data based on meter drift and it's easier for them to apply the drift to an entire month's worth of data, even if the problem only covers a partial month, may the OPO simply apply the drift to the entire month if doing so would result in a lower estimate of emission reductions? Or must the OPO fix the error and apply the drift correctly, even if it results in a higher estimate of emission reductions?**

Yes, all correctable errors must be fixed even if the correction results in a higher estimate of emission reductions.

- n) Should a livestock project conduct its quantification separately for different calendar years, or should the entire reporting period be treated as one period for quantification? CAR has usually split things by vintage year, but there is no specific guidance for this in the Livestock Protocol or the regulation.**

The reporting period should not be split up by calendar year (vintage) for quantification purposes. The reporting period should be treated as a single time period.

- o) If a complete mix, plug flow, or fixed film digester has a flexible cover installed, should the OPO/APD assign a biogas collection efficiency (BCE) of 95% or 98%?**

Complete mix, plug flow, or fixed film digesters with enclosed vessel covers can be assigned a BCE of 98%. An enclosed vessel is a complete mix, plug flow, or fixed film digester that is topped by a hardened or dual membrane flexible cover that provides a complete enclosure to the digester itself. If the cover is not an enclosed vessel, the OPO/APD must provide verifiable evidence that the digester (and corresponding cover) in question achieves the same biogas capture efficiency as an enclosed vessel cover would to justify assigning a BCE of 98%. If the cover is not an enclosed vessel and the OPO/APD cannot provide verifiable evidence its digester (and corresponding cover) warrants a BCE of 98%, the digester must be assigned a BCE of 95%.

- p) **In Equation 5.6, $CH_{4,conc}$ is defined as the “Measured methane concentration of Biogas from the most recent methane concentration measurement.” This phrasing assumes the project will use quarterly measurements, rather than something more frequent than quarterly (e.g. monthly). If a project is using a continuous analyzer rather than taking quarterly measurements, should this value be the quarterly average rather than the most recent measurement? Would such an averaging approach be viewed as a nonconformance with the Livestock Protocol?**

If the project is using a continuous analyzer but running the quantification on a monthly basis, the monthly value should be the straight or weighted average for that month. There is no negative consequence to the quantification if the OPO/APD calculates the value of $CH_{4,meter}$ on a continuous basis, following the frequency of their data acquisition system, and simply average the results for each month. This would not be considered a non-conformance.

- q) **For projects that totalize flow and record the totalized flow value on a daily basis, is data substitution per Appendix B required if one to seven days of recording are missed, or can the actual flow that was logged during the gap be used in the project calculations? In this scenario, the flow meter was working properly but the running total was not recorded by a data logger or onsite staff.**

In the above case, the project should use the actual logged totalized flow data, and can at best receive a Qualified Positive Offset Verification Statement at the close of verification services. The project should not use Appendix B's data substitution methodology in such a case.

- r) **Livestock projects utilizing totalized readings to supplement more frequent recording may not be able to meet the exact timeframes for upper or lower confidence intervals when applying data substitution, as described in Appendix B of the Livestock Protocol. Should these projects utilize the Livestock Protocol's methodology for data substitution, and – if so – how should the confidence intervals be applied?**

All projects should utilize data substitution where appropriate, following the requirements in Appendix B. For projects utilizing totalized readings, these requirements should be followed as closely as possible given the available data. Slight deviations (i.e., deviations of up to 12 hours) from the confidence interval time frames laid out in the Livestock Protocol would be acceptable in these instances. For

example, if a reading on day 0 was taken at 8 am and the reading on day 3 was taken at noon there would be 76 hours between readings. This would be acceptable for meeting the 72 hour requirement for one to seven days of missing data.

3. Monitoring Requirements

a) Destruction devices monitoring systems may not be possible to install on some devices like boilers, etc. Must these destruction devices be excluded from the GHG emission reduction calculations, or is there some tolerance in relation to the OPO/APD demonstrating operation of the destruction device?

Yes, if the monitoring devices are absent or cannot show operation, the portion of gas delivered to these systems will be ineligible for crediting. Monitoring devices are required on destruction devices to document methane destruction. Section 6 of ARB's Livestock Protocol specifies the monitoring requirements for the methane capture and control system.

b) Does each individual metering device need to meet the requirements for the $\pm 5\%$ calibration threshold, or can this requirement be demonstrated through engineering calculations that a metering system on aggregate meets the requirements. Is it possible for an OPO/APD to use meters that do not meet the accuracy requirements as specified in the Livestock Protocol?

Section 6.1 of ARB's Livestock Protocol requires that every device used to calculate GHG emission reductions must meet the $\pm 5\%$ accuracy requirement. If a field check on a piece of equipment reveals the equipment was operating outside of the required $\pm 5\%$ threshold, calibration by the manufacturer or a certified service provider is required for that piece of equipment. Appendix B contains methodologies for limited replacement of missing data, or data from devices out of calibration. An OPO/APD may not use meters that do not meet that accuracy requirements set forth in the Livestock Protocol.

c) If a cogeneration plant is operated by a third party other than the OPO/APD, and it takes biogas from a digester through a meter that is used for billing - is that meter considered a revenue meter, and considered as meeting the accuracy requirements of ARB's Livestock Protocol (similar to the Mandatory Reporting Regulation)?

Yes, the meter used for billing is acceptable under the meter accuracy requirements of ARB's Livestock Protocol. Data from the cogeneration plant demonstrating destruction is still required to meet the requirements of the Livestock Protocol.

d) If a livestock project does not want to claim credits for a destruction device, does that device need to be metered?

All biogas produced by the digester must be metered to accurately account for project emissions. A device that is not associated with any claimed credits would need to be metered unless it is physically isolated from the rest of the system (i.e. a valve is shut) to the satisfaction of the verifier that no biogas flowed to the device.

e) What happens in a situation where the destruction device monitoring equipment or other monitoring equipment is inoperable?

Pursuant to Section 6 of ARB's Livestock Protocol, when a meter/monitoring device that is used to monitor whether a destruction device is functioning properly breaks down, no credits will be issued to the project for any metered biogas going to that device during the down time.

In situations where the flow rate or methane concentration monitoring equipment is inoperable or outside the accuracy requirements of the Livestock Protocol, the OPO/APD must apply the data substitution methodology provided in Appendix B. The missing or replaced data should be identified in the projects records, and values substituted according to Appendix B.

f) What if a boiler does not have hourly operational monitoring?

A boiler is considered a destruction device. Therefore, there must be monitoring devices detecting whether the boiler is functioning properly. Any malfunction in these types of monitoring devices will result in no crediting. Biogas sent to boilers, internal combustion engines, flaring devices, and biogas cleanup systems without monitoring capabilities to meet the requirement of ARB's Livestock Protocol will be ineligible for ARB offset credits during the period operational monitoring equipment is inoperable.

For the malfunction of devices that monitor methane concentration and flow rate, the substitution methodology is specified in Appendix B.1 of ARB's Livestock Protocol.

- g) In the Livestock Protocol, the project definition states, "The biogas control system must destroy methane gas that would otherwise have been emitted to the atmosphere in the absence of the offset project from uncontrolled anaerobic treatment and/or storage of manure." There are permeable, geotextile/foam lagoon cover products on the market that are specifically designed to control odor. A few studies describe the ability of these types of covers to oxidize methane or act as a medium on which methanotrophic bacteria can grow. However, it is possible that the actual amount of methane oxidized by these covers is negligible. Would a livestock operation with odor control lagoon covers installed in the baseline meet the "uncontrolled anaerobic (manure) treatment and/or storage" requirement in the project definition?**

Yes, ARB has determined that there is insufficient evidence to classify odor control covers as methane capture/destruction devices. Baseline lagoons with odor control covers are considered to be "uncontrolled anaerobic manure treatment and/or storage facilities" under the project definition.

- h) The Livestock Protocol does not distinguish between a meter that is drifting because of calibration drift and a meter that is drifting because it is dirty. For some meters, the manufacturer recommends that the meter be thoroughly cleaned and then checked again if the field check shows drift. If the second check passes, the manufacturer does not recommend sending it back for recalibration. If a project follows this procedure, can the OPO use the "as found" percent drift for any potential data adjustments rather than sending the meter back for calibration?**

The as-found condition of a field check must always be recorded (in percent drift). If the meter is found to be measuring outside of the +/- 5% threshold for accuracy, the data must be adjusted for the period beginning with the last successful field check or calibration event up until the meter is confirmed to be in calibration. If, at the time of the failed field check, the meter is cleaned and checked again and the as-left condition is found to be within the accuracy threshold, a full calibration is not required for that piece of equipment. This shall be considered a failed field check followed by a successful field check. The data adjustment shall be based on the percent drift recorded at the time of the failed field check. However, if the as-left condition remains outside of the +/- 5% accuracy threshold, calibration is required by the manufacturer or a certified service provider for that piece of equipment.

- i) **This question pertains to livestock projects with daily total biogas flow readings (measured continuously, totaled and recorded daily) and hourly engine operational status (power generation information provided by the utility, in kilowatt-hours (kWh). In this case, there is no direct link between the operational status in any given hour and the biogas flow in that hour. However, it is possible to convert the daily methane flow total to an expected kWh output (based on the BTU content of CH₄), which can be compared to the actual kWh output. Can the OPO show that the kWh output for the day corresponded to the flow total for the day or must they apply a discount to the engine's destruction efficiency value when calculating biogas destruction efficiency (BDE) for that day (Box 6.1 on page 27)?**

The brake-specific fuel consumption (BSFC) can be used with the kWh output to determine theoretical fuel consumption. The OPO can employ this procedure to avoid the BDE discount mentioned above, provided the totaled biogas flow corresponds with the theoretical fuel consumption and the verifier confirms that the estimate derived from the BSFC is within the +/-5% accuracy threshold prescribed by the Livestock Protocol. If the OPO cannot meet these conditions, the BDE discount must be applied.

- j) **Section 6.1 of the Livestock Protocol states that portable instruments "shall be calibrated at least annually by the manufacturer or at an ISO 17025 accredited laboratory." If the manufacturer of the portable instrument recommends a more frequent calibration schedule, which guidance is the OPO/APD obligated to follow?**

The OPO/APD must always satisfy the requirements in the Livestock Protocol. However, if manufacturer specifies a more frequent calibration schedule, that schedule must also be followed. Note that in addition to requiring calibrations at least annually, Section 6.1 also states that all flow meters and methane analyzers must be "calibrated...per manufacturer's specifications or every five years, whichever is more frequent." Therefore, the manufacturer's schedule must be followed to the extent that the recommended calibration schedule is more frequent than specified in the Livestock Protocol. If the manufacturer-recommended calibration schedule is less frequent than specified in the Livestock Protocol (i.e., less frequent than annual), the portable instrument must still be calibrated at least annually in accordance with Section 6.1.

- k) **If a project destruction device was taken out of service before the end of the reporting period and not reactivated, does the field calibration check of the associated flow meter need to take place within two months of the end**

of the reporting period, or can the check take place around the time that the device was deactivated?

If the flow meter is field checked around the time the destruction device is taken out of service that check can serve to meet the QA/QC requirement of the Livestock Protocol. A subsequent check within two months of the end of the reporting period is not necessary unless the device is reactivated.

- I) How is “hourly” defined in regards to the operational activity monitoring requirement in the Livestock Protocol? Does “hourly” mean that gaps in operational data cannot be longer than one hour, or can a project meet the requirement if destruction device operation is recorded at least once per hour?**

The typical time between readings should ideally be one hour or less. However, the hourly operational activity monitoring requirement can be met if the device is shown to be operating at least once per hour-long block of time, within reason. For example, the total amount of biogas sent to the destruction device in the following scenario can be considered destroyed:

| Timestamp | Flow (scfm) | Operating? |
|-----------|-------------|------------------|
| 1:00 | 1000 | Yes |
| 1:15 | 1000 | - (data missing) |
| 1:30 | 1000 | - (data missing) |
| 1:45 | 1000 | (data missing) |
| 2:00 | 1000 | - (data missing) |
| 2:15 | 1000 | - (data missing) |
| 2:30 | 1000 | Yes |
| 2:45 | 1000 | Yes |
| 3:00 | 1000 | Yes |

However, if the device has more-frequent-than-hourly monitoring, and records a period of nonoperation (not just missing data) less than one hour, the device will not be considered operational for that time period even if there is a record in the hour block

California Air Resources Board
October 23, 2014

showing operation. For example the biogas sent the destruction device between 2:00 and 2:44 would not be considered destroyed:

| Timestamp | Flow (scfm) | Operating? |
|-----------|-------------|------------|
| 1:00 | 1000 | Yes |
| 1:15 | 1000 | Yes |
| 1:30 | 1000 | Yes |
| 1:45 | 1000 | Yes |
| 2:00 | 1000 | No |
| 2:15 | 1000 | No |
| 2:30 | 1000 | No |
| 2:45 | 1000 | Yes |
| 3:00 | 1000 | Yes |