CLIMATE ACTION RESERVE

China Adipic Acid Production Protocol V1.0

Workgroup Meeting 2

June 15 (USA) // June 16 (China), 2023

Simultaneous Translation

- This meeting we are utilizing simultaneous translation provided by Speed Asia
- To switch languages from English to Mandarin, select “Chinese” as highlighted below from your zoom panel.

- Attendees that are listening under the interpretation setting will be able to hear the translation at a higher volume, and English will be present at a lower volume
  - If listening in English, Mandarin will be present at a lower volume.
- Attendees that prefer Mandarin may follow along using Mandarin slides provided in chat
- Select “English” to hear speaker and translator. “Original Audio” will not have translators

Housekeeping

- Workgroup members have the opportunity to actively participate throughout the meeting
  - Ask that you keep yourselves muted unless / until you would like to speak
- Workgroup members should be aware of the pace of their speech to be mindful of the translators—please do not speak too fast
- We will ask and take questions throughout the session
  - Please use the raise your hand function
- All other attendees/observers are in listen-only mode
- Observers are free to submit questions in the question box
- We will follow up via email to answer any questions not addressed during the meeting
- The slides and a recording of the presentation will be posted online

Reserve Staff

- Rachel Mooney, Analytical Associate
  - Protocol development lead
- Craig Ebert, President
  - Protocol development oversight
- Holly Davison, Associate Director of Programs
  - Protocol development support
- Jordan Mao, Analytical Associate
  - Protocol development support

Workgroup Members

Organization (Alphabetical)	Name
Ascend Performance Materials	Chris Johnson
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AGENDA

- Process Overview
- Protocol Considerations
  - Startup testing
  - Defining Additionality
  - Bypass of Control Unit and Venting
  - Quantification
- Open Discussion
- Next Steps

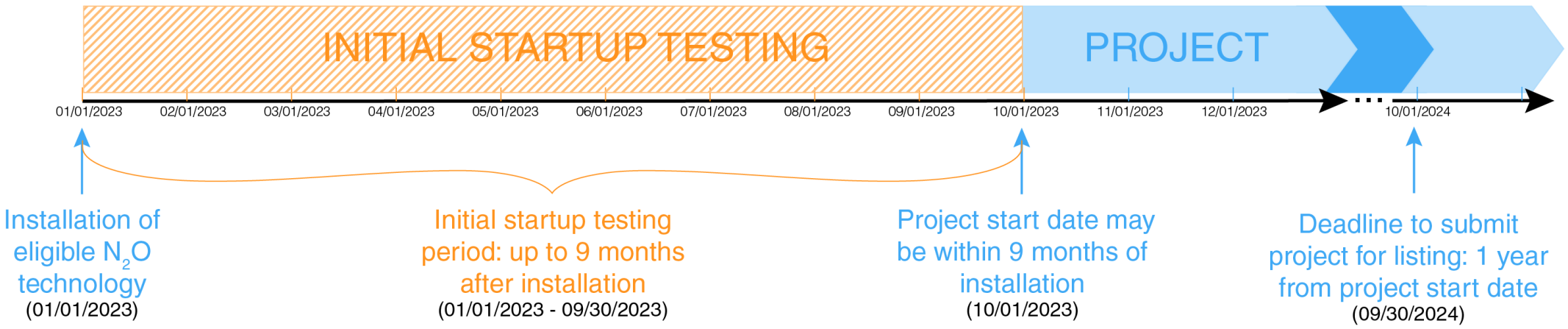
PROTOCOL CONSIDERATIONS

Startup Testing

- "The project start date is defined as the date on which production first commences after the installation or enhancement, excluding an initial startup period, …."
- The start-up testing is limited to 9 months for the purpose of testing the successful implementation of the abatement technology. Thus, the project developer may select the start date within 9 months of when production first commences after the installation or enhancement of the control technology.
- 12 months after completion of the startup testing and start date is selected
- Verifiable evidence of the duration of the start-up period must be presented to the verifier upon request. Documentation may include, but is not limited to, performance standard checks to confirm operability, internal communication, and/or project monitoring data.
- If startup testing is expected to exceed 9 months, contact the Reserve
- Added a figure (next slide) to provide further clarification

- Updated the above language (in red) based on feedback.

Figure 3.1


INITIAL STARTUP TESTING
PROJECT
01/01/2023
02/01/2023
03/01/2023
04/01/2023
05/01/2023
06/01/2023
07/01/2023
08/01/2023
09/01/2023
10/01/2023
11/01/2023
12/01/2023
10/01/2024
Installation of eligible N_2O technology (01/01/2023)
Initial startup testing period: up to 9 months after installation (01/01/2023 - 09/30/2023)
Project start date may be within 9 months of installation (10/01/2023)
Deadline to submit project for listing: 1 year from project start date (09/30/2024)

Baseline Abatement Efficiency

- How will the protocol handle situations where the project falls below the 90% baseline but is still abating, just at a lower efficiency?
  - We do not intend on viewing this as “negative credits.”
  - If control falls below 90%, the project **cannot** claim credits during the time when abatement falls below 90%
  - If control is above 90%, the project can claim credits during the time period when abatement is above 90%

Comments? Other considerations?

Defining Additionality: Production Cap

- Production cap only intended to send signal to the market that increasing AA production solely for producing credits will not be allowed
  - No intent to put any limits at all on current production capacity
  - Intent is to increase confidence in quality of any credits and therefore a higher price
- Is there a production capacity permitting requirement in China? If not, what is the most appropriate alternative method for determining a production cap on a facility?
  - Is there an appropriate method to evaluating production eligible for crediting that does not limit the facility's business operations or place unnecessary restrictions?
  - How credible would any production cap be?

Bypass of Control Unit and Venting

- Issue is how to treat situations when emission control equipment is not working properly
- Any alternative method must meet the following criteria:
  - May only be used to account for non-N2O control unit parameters;
  - May only be used to account for rare events that represent less than **[TBD]**% of total emissions in a reporting period; and
  - Methods must be conservative in nature and utilize actual flow, N2O concentration, and/or adipic acid production data from the project.
- Should we establish an upper limit to quantify instances of bypass/venting that aren't directly monitored? 25%? 10%?
  - How do we handle situations where it exceeds the upper limit?

Quantification

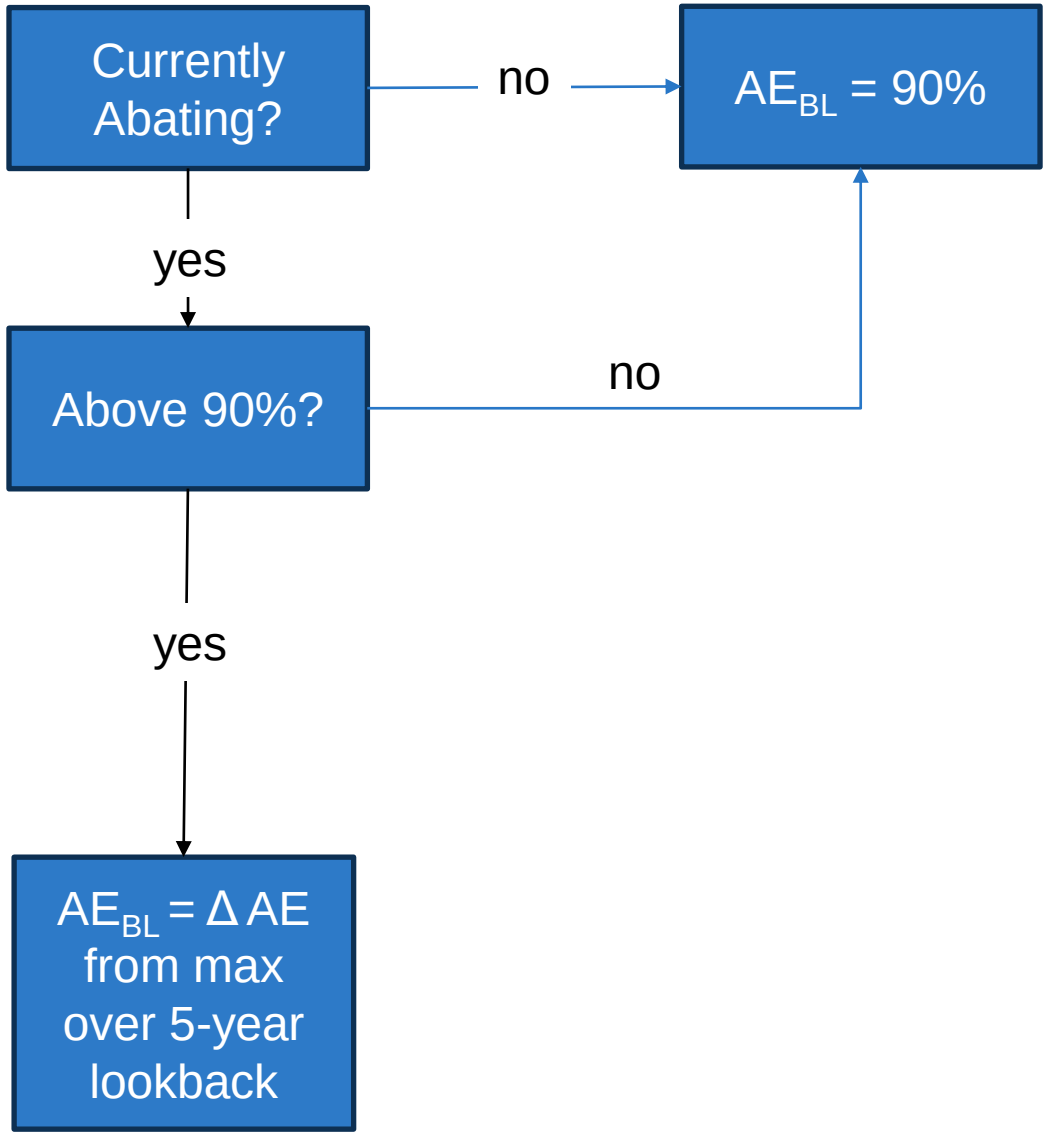
- Changes in the equations from US Version
  - Removed the choice for static and dynamic baseline approaches to a 90% baseline
    - No need for any lookback period since a 90% baseline is the starting assumption
  - Several parameters rely on a lookback period; however, this approach is not relevant for China, where it is more appropriate to rely on data only for the reporting period.
    - Equations 5.4; 5.8; 5.9; 5.11; 5.12; 5.14
  - Added flexibility in the units used for flow and concentration to minimize errors in quantification due to different units in the monitoring equipment compared to equations

Baseline Abatement Efficiency

- Baseline abatement efficiency is incorporated in Equation 5.2 Baseline Emissions (Section 5.1)
- AAPs with no existing abatement or previous abatement <90% will utilize a 90% baseline
- In instances where an AAP has achieved N2O abatement greater than 90% and enhances the abatement technology, the project baseline should be adjusted based on the maximum level of abatement achieved over the previous five years.
- Projects that were/are registered under another offset program are required to follow transfer processes outlined in the Reserve Offset Program Manual
- How should we handle projects that were reporting under other programs, stopped abating, and now want to list under our program?
- Are there AAPs with current N2O abatement levels above 90%?
- No facilities in China were identified to be actively reporting to the CDM. Is this correct?

Feedback?

Pre-existing Projects – not continuously reporting



Reserve's Transfer Process

- Qualifying projects that have been previously listed or registered under another program may transfer if it meets the start date requirements in the Reserve Offset Program Manual Sections 2.4.3 (page 10) and transfer requirements in Section 3.7 (page 38)
  - Other offset programs may define start dates differently than the Reserve protocol, but pre-existing projects transferring to the Reserve will use start dates as defined in the Reserve protocol
  - Projects listed under another program will have to de-list before being approved for listing
- Must meet continuous reporting requirements by:
  - Reporting under the previous program up until the date it begins reporting with the Reserve; or
  - Submitting a Zero Credit Reporting Period Acknowledgement Form and Monitoring Report for gaps in reporting (section 3.4.5 and section 3.4.6, pages 34-35)

Equation 5.2. Baseline Emissions

$$BE = \left[\left(TE_{RP,N_2O} \times (1 - AE_{BL}) \right) + (HNO_{3\,Ratio} \times AA_{RP} \times 0.0025) \right] \times GWP_{N_2O} \times (1 - ld)$$

Where,			Units
BE	=	Baseline emissions during the reporting period	tCO_2e
$TE_{RP,N2O}$	=	Measured total N_2O emissions in off gas during the reporting period '*RP*' before any emissions control treatment (e.g., abatement), see Equation 5.3	tN_2O
AE_{BL}	=	Baseline N_2O abatement efficiency; equal to the maximum abatement achieved in the baseline over a 5-year lookback period, or equal to 90% if there was no previous abatement or previous abatement was below 90%. See Section 5.1.2 for details.	%, as a decimal
HNO_{3Ratio}	=	Ratio of HNO_3 to AA, see Equation 5.4.	$tHNO_3/tAA$
AA_{RP}	=	Measured adipic acid production in the project reporting period '*RP*'	tAA
0.0025	=	IPCC emission factor for N_2O emissions per HNO_3 production	$tN_2O/tHNO_3$
GWP_{N2O}	=	Global warming potential of N_2O	tCO_2e/tN_2O
ld	=	The proportion of adipic acid production in the reporting period assessed as being due to leakage into the project facility	

Equation 5.4. Nitric Acid Use Ratio

$$HNO_{3_{Ratio}} = \sout{avg}\left(\frac{\sout{HNO_{3_y}}}{\sout{AA_y}}\right) - \frac{HNO_{3_{RP}}}{AA_{RP}}$$

Where,			Units
$HNO_{3,Ratio}$	=	Ratio of nitric acid (HNO_3) to adipic acid	$tHNO_3/tAA$
~~HNO_{3y}~~	=	~~Annual tonnes of HNO_3 used as an input for adipic acid production in a given year during the baseline look-back period (5 years)~~	~~t~~
~~AA_y~~	=	~~Annual tonnes adipic acid in a given year during the baseline look-back period (5 years)~~	~~t~~
$HNO_{3,RP}$	=	HNO_3 used as an input for adipic acid production in project reporting period	t
AA_{RP}	=	Measured adipic acid production in the project reporting period	t

Equation 5.8. Project Carbon Dioxide Emissions from Hydrocarbon Use

$$CO_{2_{HC}} = \sum_{cu,p} \left(\rho_{HC} \times Q_{HC,RP} \times EF_{HC,RP} \right) - \sum_{cu,b} \left(\rho_{HC} \times Q_{HC,avg} \times EF_{HC,avg} \right)$$

Where,			Units
CO_{2HC}	=	Net GHG emissions as CO_2 from converted hydrocarbon during the reporting period	tCO_2e
ρ_{HC}	=	Hydrocarbon density	t/m^3
~~$Q_{HC,avg}$~~	~~=~~	~~Historical average annual quantity of hydrocarbon, with two or more molecules of carbon (i.e., not methane), during the baseline look-back period (5 years)~~	~~m^3~~
$Q_{HC,RP}$	=	Quantity of hydrocarbon, with two or more molecules of carbon (i.e., not methane), input during the reporting period *'RP'*	m^3
~~$EF_{HC,avg}$~~	~~=~~	~~Historical average annual carbon emission factor of hydrocarbon, with two or more molecules of carbon, from use during the baseline look-back period (5 years)~~	~~tCO_2e/tHC~~
$EF_{HC,RP}$	=	Carbon emission factor of hydrocarbon use during the reporting period *'RP'*	tCO_2e/tHC
cu	=	Each installed N_2O emissions control unit (e.g., thermal reduction unit, adiabatic reactor, absorption media, or other N_2O abatement device)	

Equation 5.9. Project Methane Emissions from Hydrocarbon Use

$$CH_{4_{HC}} = \sum_{cu} \rho_{CH_4} \times (Q_{CH_{4,RP}} - \sout{Q_{CH_{4,avg}}}) \times GWP_{CH_4}$$

Where,			Units
CH_{4HC}	=	Net GHG emissions as CH_4 from unconverted hydrocarbon (methane) during the reporting period	tCO_2e
ρ_{CH4}	=	Methane density	t/m^3
$Q_{CH4,RP}$	=	Quantity of methane used during the reporting period	m^3
~~$Q_{CH4,avg}$~~	~~=~~	~~Historical average annual quantity of methane used during the baseline look-back period (5 years)~~	~~m^3~~
GWP_{CH4}	=	Global warming potential of CH_4	tCO_2e/tCH_4
cu	=	Each installed N_2O emissions control unit (e.g., thermal reduction unit, adiabatic reactor, absorption media, or other N_2O abatement device)	

Equation 5.11. Project Emissions from Steam Export

$$SE = \left[\frac{\left(\sout{ST_{avg}} - ST_{RP}\right) \times OH_{RP}}{\eta_{ST}}\right] \times EF_{ST}$$

Where,			Units
SE	=	Emissions from net change in steam export during the reporting period	tCO_2e
~~ST_{avg}~~	~~=~~	~~Average annual steam export during the baseline look-back period (5 years)~~	~~MW~~
ST_{RP}	=	Project steam export during the reporting period *'RP'*	MW
OH_{RP}	=	Operating hours in reporting period *'RP'*	hours
η_{ST}	=	Efficiency of steam generation	fraction
EF_{ST}	=	Fuel emission factor for steam generation	tCO_2e / MWh

Equation 5.12. Project Emissions from Off Gas Utilization

$$OGU = \left[\frac{\left(\sout{EE_{avg}} - EE_{RP}\right) \times OH_{RP}}{\eta_r}\right] \times EF_r$$

Where,			Units
OGU	=	Emissions from net change in off gas utilization during the reporting period	tCO_2e
~~*EEavg*~~	~~=~~	~~Average annual energy export from off gas utilization during the baseline look-back period (5 years)~~	~~MW~~
EERP	=	Project energy export from off gas utilization during the reporting period *'RP'*	MW
OHRP	=	Operating hours in reporting period *'RP'*	hours
η_r	=	Efficiency of replaced technology *'r'*	fraction
EFr	=	Fuel emission factor for replaced technology *'r'*	tCO_2e / MWh

Equation 5.14. Project Emissions from Fossil Fuel and Electricity Use

$CO_{2,net} = PE_{CO_2,EL,FF} - BE_{CO_2,EL,FF}$			
Where,			Units
$CO_{2,net}$	=	Net increase in CO_2 emissions from increased fossil fuel and/or electricity use due to project activity	tCO_2
$BE_{CO2,EL,FF}$	=	~~Average~~ Total baseline CO_2 emissions from fossil fuel and/or electricity use from operation of N_2O abatement technology during the reporting period ~~during the baseline look-back (5 years -~~(see equation below)	tCO_2
$PE_{CO2,EL,FF}$	=	Total project CO_2 emissions from fossil fuel and/or electricity use from operation of N_2O abatement technology during the reporting period (see equation below)	tCO_2

Equation 5.14. Project Emissions from Fossil Fuel and Electricity Use

All CO_2 emissions associated with fossil fuel and/or electricity consumption from operation of N_2O abatement technology are calculated using the equation:

$$CO_{2,EL,FF} = \left(QE_{avg} \times EF_{CO_2,E}\right) + \left[\left(QF_{avg} \times EF_{CO_2,F}\right) \times 0.001\right]$$

Where,			Units
$CO_{2,EL,FF}$	=	CO_2 emissions from fossil fuel and/or electricity consumption from operation of N_2O abatement technology	tCO_2
QE_{avg}	=	Quantity of grid-connected electricity consumed from operation of N_2O abatement technology~~; average amount during each year, *BLy*, of the baseline look-back period or annual amount~~ during the reporting period	MWh
$EF_{CO2,E}$	=	CO_2 emission factor for electricity used	tCO_2/MWh
QF_{avg}	=	Quantity of fossil fuel consumed from operation of N_2O abatement technology; average amount ~~during each year, *BLy*, of the baseline look-back period or annual amount~~ during the reporting period	MMBtu or gallons
$EF_{CO2,F}$	=	Fuel-specific emission factor *f* from Appendix C	kg CO_2/MMBtu or kg CO_2/gallon
0.001	=	Conversion factor from kg to metric tons	

Other Comments

- Please provide other comments on the draft that we did not raise already during this meeting
  - REMINDER: The entire draft is open for discussion now, as well as during public comment

NEXT STEPS

Next steps

- ***For Interested Stakeholders:***
  - Observers can still submit Local Engagement Form
  - Email interest to sign up for updates as an observer
  - Email us feedback anytime
- ***For Reserve:***
  - Compile notes summary on discussion
  - Post recording, notes, and presentation to the webpage
  - Incorporate feedback from workgroup discussion into the draft
  - Share the workgroup draft with workgroup in next few weeks
- ***For Workgroup:***
  - Email feedback from today's meeting (by June 30, 2023)
  - Look out for the workgroup draft

Key contacts

- ***Climate Action Reserve:***

  Protocol development lead:

  Rachel Mooney, Analytical Associate

  Email: rmooney@climateactionreserve.org

CLIMATE ACTION RESERVE

THANK YOU!