

MONTHLY PROGRAM REPORT

APRIL 2003

COMMONWEALTH BIOGAS/PV MINI-GRID RENEWABLE RESOURCES
RD & D PROGRAM

*Making Renewables Part of an Affordable and Diverse
Electric System in California*

CONTRACT NO. 500-00-036

REPORT PREPARED BY: COMMONWEALTH ENERGY TEAM

Contractor Project Director: Patrick Lilly 360-906-0616
Commission Project Manager: Zhiqin Zhang 916-654-4063

Program Team Members: Commonwealth Energy Corporation (Commonwealth), Itron/Regional Economic Research (Itron/RER), CH₂MHill (CH₂), Endecon Engineering (Endecon), Renewable Energy Development Institute (REDI), Zaininger Engineering (ZECO).

PLANNED ACCOMPLISHMENTS FOR THIS PERIOD:

Project 0: Program Administration

Project-specific administration support under Task 0.8 was to continue relative to each active Project under the CE Program. Revisions and/or potential budget reallocations will continue to be reviewed and refined by the CE Project Director. Monthly Status Reports were expected to be drafted and submitted to the Commission for Project 1.1, Project 2.1, Project 2.2, Project 3.1, Project 3.2 and Project 3.3. Additionally, a Monthly Program Report was to be drafted and submitted as well.

Project 1.1: Program Planning and Analysis

It was anticipated that activity would continue, focusing on defining and prioritizing the top projects to be recommended for funding for Project 1.1.

ZECO was to begin the power flow analysis under Task 1.1.9b incorporating the projected BI-PV and biogas renewable generation capacity within the mini-grid.

Iron/RER planned to continue its market potential work under Task 1.1.7 and would also address the comments received from the Commission on the draft final report outline and resubmit it to the Commission for review.

Project 2.1: Enhanced Landfill Gas Production Using Bioreactors

The primary focus was to be on working with the leading candidate for the host bioreactor project, the Mid-Valley Landfill in Fontana, San Bernardino County. A formal kick-off meeting was planned for mid-April and the Project team was to visit the Yolo County Landfill Bioreactor site.

Project 2.2: Enhanced Energy Recovery through Optimization of Anaerobic Digestion and Microturbines

Information collection and analysis was to continue as related to process selection. Additionally, communication with developers of the technologies under consideration was expected to continue.

Project 3.1: Dairy Waste to Energy

The primary focus was to be centered on the preparation of a technical memorandum comparing existing digesters at RP-1 and RP-5 to other plug flow and complete-mix digestion projects.

Additionally, further developments of the testing protocols, which will implement some of the suggested projects identified in Project 1.1, were expected to continue. Efforts were to be undertaken to define an approach incorporating the results of the comparative analysis of technologies and the Mini-grid analysis into the process and site selection activities.

Project 3.2: Building- Integrated PV Testing and Evaluation Project

It was hoped that the IEUA-Commonwealth contract issues associated with the large systems testing would be resolved, which would enable the purchase orders for the equipment to be processed.

Project 3.3: Building Integrated PV on Public Facilities

REDI anticipated that the draft Evaluation Tools Package (ETP) would be submitted internally for review and comment, and that once comments were received they would be integrated and the ETP would be submitted to the Commission for review. Additionally, site visits were expected to continue in the collection of information on potential BI-PV Public Sector Project sites.

WHAT WAS ACCOMPLISHED THIS PERIOD:

Project 0: Program Administration

As anticipated, project specific administration support under Task 0.8 continued. Revisions/and or potential budget reallocations continue to be reviewed and refined by the Commission Project Manager and Commonwealth Program Director. Project Monthly Status Reports were drafted for Projects 1.1, 3.2 and 3.3. Additionally, the first monthly status reports for Projects 2.1, 2.2 and 3.1 were drafted and along with all the monthly status reports, submitted for internal team review.

Project 1.1: Program Planning and Analysis

Work progressed on the Task 1.1.2 Inventory report and agricultural database as CH₂ proceeded with addressing the Commission comments. Their primary focus was on collecting further information on food processing facilities and the clarification of information previously collected from the dairies in the Chino Basin.

Itron and ZECO participated in a meeting at the Commission to review and discuss comments received on both the Data Collection & Development of Mini-Grid T&D Information Final Report under Task 1.1.6, and the Development of Local Area Mini-Grid T&D Model Final Report under Task 1.1.9a.

Itron continued to run cash flow analyses as well as develop economic results through the market potential model for dairy/food processing, enhanced wastewater and landfill bioreactors. Additionally, the draft report has been developed addressing market and economic potential results for biogas and BI-PV within the Mini-grid.

CH₂ and Itron continue their work on the preliminary working draft of the Prioritization Report under Task 1.1.10. Although work will continue on the draft report, as reported previously, finalization will await the completion of the Mini-grid analyses.

Work continues on the Program Planning and Analysis (Project 1.1) Draft Final Report, under Task 1.1.11. In general there is limited work being completed on this task, as the CE Team awaits approval on the report outline from the Commission Project Manager, as well as the completion of the power flow studies. As reported previously, coordination of the key findings of this project was undertaken for the initial activities for Projects 2.1, 2.2, 3.1 and 3.3, to assure that the efforts on these tasks would be aligned with the key findings, which will be presented in the final report.

Project 2.1: Enhanced Landfill Gas Production Using Bioreactors

The primary focus of activity in April was the formal kick-off meeting, which was held in Sacramento on April 17th. The project goals, objectives, work elements and deliverables

were reviewed and, after a discussion to clarify the path forward, two conclusions were reached; 1) it is important for the Bioreactor Project to achieve advancement in the state-of-the-art bioreactor technology and, 2) it will be crucial for the CE Team to build on the success of the Yolo County Bioreactor project in order to assure that this goal is achieved. Additionally, it was determined that a better use of funds could be achieved by focusing on one bioreactor project rather than two separate projects.

Immediately following the kick-off meeting, a site visit was held at the Yolo County Landfill. This visit allowed the team to visit an existing bioreactor project constructed under Commission funding, as well as offered the opportunity for discussion with the Yolo County Project Manager, which will enable to CE Team to better understand the objectives and accomplishments to-date on the Yolo County bioreactor project.

Project 2.2: Enhanced Energy Recovery through Optimization of Anaerobic Digestion and Microturbines

Process selection continued in April, with information assembled on different processes that will be analyzed for the Process Selection Task. Data previously collected from the Sewage Treatment Database and Inventory Report under Project 1.1 was supplemented with detailed information on the process technologies currently being considered (ultrasound and thermal hydrolysis). Discussions with vendor contacts and firms with biogas cleaning expertise continued, as well as with Ingersoll-Rand (IR) in regard to their new fuel conditioning system and how it may be used for this project.

As with Project 1.1, progress on the Draft Process Selection Report continues to be somewhat limited, as the biogas portion of the report cannot be undertaken until the power flow work and results are completed. It is anticipated that these results will become available in late May or early June, at which point the process selection report will be completed.

Project 3.1: Dairy Waste to Energy

The primary focus of activity in April was on the assessment of the different technologies to attain the energy value of the manure, as well as the most effective manner for converting it to useful energy. This process involved the inclusion of both European and North American technologies, as well as utilizing information collected under Project 1.1. Inventory reports, and information obtained from vendors and organizations involved in animal waste generation.

As reported previously, collaboration with NIRAS continued, as they provided clarification & feedback on their earlier presentation to the CE Team, as well as the potential dairy waste to energy projects that have been identified under Project 1.1.

Efforts continue on the protocols initiated in March for testing process differences for the optimization of the biogas performance at RP-1 and RP-5. These protocols will allow bench and pilot testing during the design activities, which will help ensure successful projects.

Work continued on the comparative evaluation of plug flow and complete-mix digestion systems. The primary focus will be *on-farm* and *dairy-cluster* projects, and both European and North American technologies are being considered. Emphasis will be placed on the economic and environmental analyses of these systems, with the primary objective of guiding the Commonwealth Program toward pilot projects, which will be the most advantageous from technical, economical and environmental viewpoints. It is anticipated that a technical memorandum will be finalized and submitted to the Commission in May outlining these results.

Project 3.2: Building- Integrated PV (BI-PV) Testing and Evaluation Project

Progress continues with the review of the purchase orders, however as of this reporting period, no purchase orders have been issued.

The assembly of the data acquisition system (DAS) for large systems testing was completed and Endecon Engineering submitted the draft final report to the Commission for review.

Limited procurement and planning continued for the installation of the small systems. An update was received regarding the potential use of the PVUSA facility, and all indications are, that the site will not be available when systems need to be installed.

Project 3.3: Building-Integrated PV (BI-PV) on Public Facilities

REDI incorporated the comments and feedback received from the industry peer review of the Evaluation Tools Package, and prepared and anticipates submitting the draft report to Itron and Commonwealth within the first week of May.

Site visits continued in April along with technical/economical analysis reports for potential BI-PV project clients. REDI continued to work with Commonwealth Energy on the ESP contract for the public sector clients who have chosen not to purchase systems directly.

How we are doing compared to plan:

Of the currently active projects, Project 1.1, Project 2.1, Project 2.2, Project 3.2 and Project 3.3, Project 1.1, Project 2.1 and Project 3.2 have task *components*, which are running behind schedule. However, the majority of the Projects/Tasks are proceeding along schedule. Following are the delays that have been encountered. It is important to note, that the minor delays, should not impact the overall individual Project's targeted completion dates.

- **Project 0:** Itron has experienced delays in presenting the Project Monthly Status and Program Monthly Progress Reports. It is anticipated that by June, the submitted reports will be up-to-date and current.
- **Project 1.1:** The CE Team continues to experience difficulties in the gathering of data, which delays the completion of the Agricultural facilities database and Inventory report. Itron has continued to experience delays in the development of biogas project prototypes. This continues to delay the completion of the Mini-Grid market potential assessment report. ZECO experienced delays in receiving and addressing comments within the Task 1.1.6 and 1.1.9a reports, and as such, the Task 1.1.9b Power Flow Analysis Report (T&D Model) has been slightly delayed. CH₂ continues to await the power flow analysis in order to proceed with the Prioritized List of PV and Biogas Projects.
- **Project 2.1:** As previously reported in March, the overall project start-date was delayed pending the completion of the Landfill Bioreactor Database and Inventory Report (Task 1.1.3). As of April, the Project is moving forward and work is proceeding as anticipated.
- **Project 3.2:** Delays continued as requests for information were submitted to the IEUA Board of Directors from Commonwealth Energy in regard to the approval of the Commonwealth-IEUA BI-PV power sales agreement. This delay has residual affects on other Project 3.2 tasks, and will additionally affect Project 3.3. However, as the contractual issue is resolved, Project 3.2 and Project 3.3 will move forward quickly. As of the end of April, IEUA had responded to and fulfilled the information requests from Commonwealth, and with IEUA Board approval, a contract was entered into.

SIGNIFICANT PROBLEMS OR CHANGES:

As indicated above, Project 0, Project 1.1. and Project 3.2 all have tasks, which are currently behind schedule. Some of these task delays may impact overall Project completion dates, and as reported, a revised scheduled (Contract Exhibit B) is in process, and will be submitted to the Commission for review and approval. Current Program progress and expenditures will result in the Program being completed on time and within budget.

EXPECTED ACCOMPLISHMENTS DURING THE NEXT PERIOD:

Project 0: Program Administration

Project-specific administration support under Task 0.8 will continue relative to each active Project under the CE Program. Revisions and/or potential budget reallocations will continue to be reviewed and refined by the CE Program Director. Monthly Status Reports will be drafted and submitted to the Commission for Project 1.1, Project 2.2, Project 2.2, Project 3.1, Project 3.2 and Project 3.3. Additionally, a Monthly Program Report will be drafted as well.

It is anticipated that CE Program Invoice # 5 will be drafted and submitted either at the end of May or early June. This invoice is expected to cover Project 1.1, Task 1.1.6 and Task 1.1.9a, as well as Project 3.2, Task 3.2.2a(2).

Project 1.1: Program Planning and Analysis

Activity will continue to focus on defining and prioritizing the top projects to be recommended for funding for Project 1.1. While awaiting the power flow analysis, the CE Team anticipates identifying and evaluating other prioritization criteria for projects that meet other objectives of the Program.

ZECO will continue the power flow model implementation analysis under Task 1.1.9b. Additionally, it is anticipated that the Task 1.1.6 and Task 1.1.9a Final Reports will be submitted to the Commission.

Itron anticipates completing the preparation of the BI-PV and biogas market potential assessment and draft report under Task 1.1.7. Additionally, Itron anticipates completing the draft final report on generation profiles for Task 1.1.8, which will then be forwarded internally to the CE Team for review prior to being forwarded to the Commission.

Project 2.1: Enhanced Landfill Gas Production

The primary focus of activity will be the development of the waste characterization report for the Mid-Valley landfill in Fontana, San Bernardino County. The CE team will clarify the research objectives of the Mid-Valley project based upon discussions at the kick-off meeting. Attention will be devoted to ensuring the project builds on the results of the current Yolo County bioreactor project. Additionally, planning activity will focus on research at one bioreactor site, not two as originally planned.

A final activity to be conducted in May, will be coordinating the activity between San Bernardino County staff and project and/or regulatory staff who worked on the Yolo County project.

Project 2.2: Enhanced Energy Recovery through Optimization of Anaerobic Digestion and Microturbines

Information collection and analysis will continue as related to process selection. Additionally, communication with technology developers under consideration will continue, and CH₂ anticipates that the preparation of the draft process selection report will begin in May.

Project 3.1: Dairy Waste to Energy

The primary focus in May will be on finalizing the draft technical memorandum comparing the existing digesters at RP-1 and RP-5 to other plug flow and complete-mix digestion projects.

Two important meetings will be held on April 30th and May 1st. The first meeting will involve Federal, State and local officials who will be reviewing environmental concerns related to digestion projects. The second meeting will be a site visit to Langerwerf Dairy, which has been successfully operating for over 20 years.

Other activities in May will include further development of the testing protocols that will implement some of the suggested projects identified in Project 1.1. It is anticipated that the preliminary findings from Project 1.1 will be available in late May, and as such, activities can continue for Project 3.1 according to current schedule. If the results from the expanded power flow study are not available until later, the Project 3.1 schedule may need to be adjusted.

Project 3.2: Building-Integrated PV (BI-PV) Testing and Evaluation Project

It is anticipated that the Commonwealth Legal Department will review the Project and the pending purchase orders and sign them on behalf of Commonwealth Energy. Additionally, it is anticipated that purchase orders need to be issued for two of the three 20kW systems.

Project 3.3: Building-Integrated PV (BI-PV) on Public Facilities

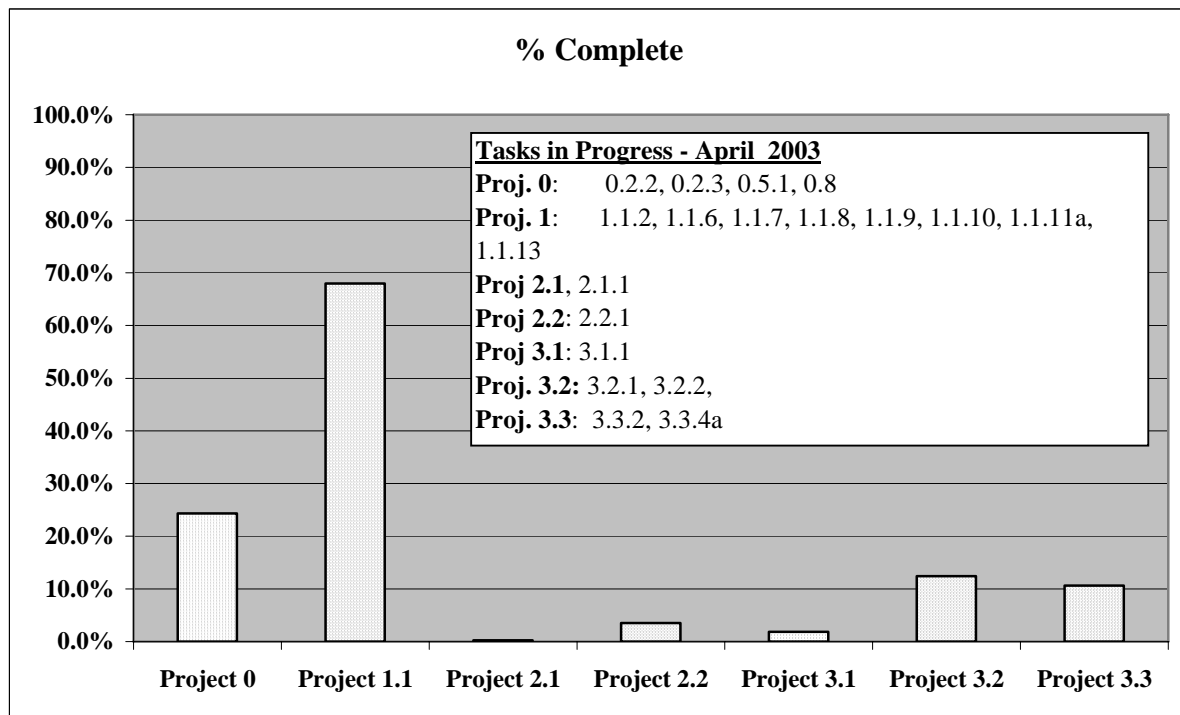
REDI anticipates that they will submit the draft Evaluation Tools Package to Itron and Commonwealth for review and comments. Once they receive comments, they anticipate incorporating these edits, as well as the revisions suggested from the peer reviewers, with an intended goal of submitting the draft final Evaluation Tools Package to the Commission in June.

Additionally, REDI plans to develop protocol proposals for 10 identified sites and begin assessment. They will also continue to work with Commonwealth in developing the ESP funding for Public Sector BI-PV projects.

OVERVIEW OF PROGRAM STATUS:

Figure 1 below summarizes the overall Commonwealth Program status by project number and task as of the end of the current reporting period.

Figure 1: Summary of Program Status – Project Percentage Complete



Overview of Program Fiscal Status:

Table 1 and Figure 2 below summarize the fiscal status of the Commonwealth Program by Project as of the end of the current reporting period.

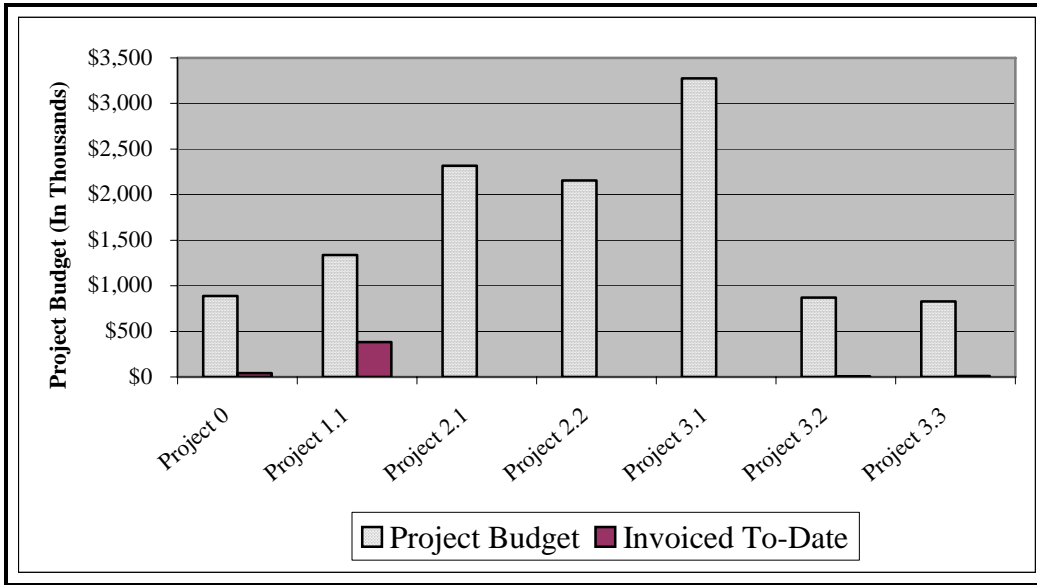
Table 1: Cumulative Program Fiscal Status By Project

Project Number	Project Budget	Invoiced To-Date (\$)	Fiscal Status *
Project 0	\$ 889,771	\$43,375 **	OT
Project 1.1	\$1,336,613	\$382,216**	OT
Project 2.1	\$2,315,999	0	OT
Project 2.2	\$2,153,740	0	OT
Project 3.1	\$3,274,664	0	OT
Project 3.2	\$ 870,099	\$8,514**	OT
Project 3.3	\$ 827,686	\$9,000**	OT

*Fiscal Status = (OT) "On Track", (OB) "OverBudget", (UB) "UnderBudget"

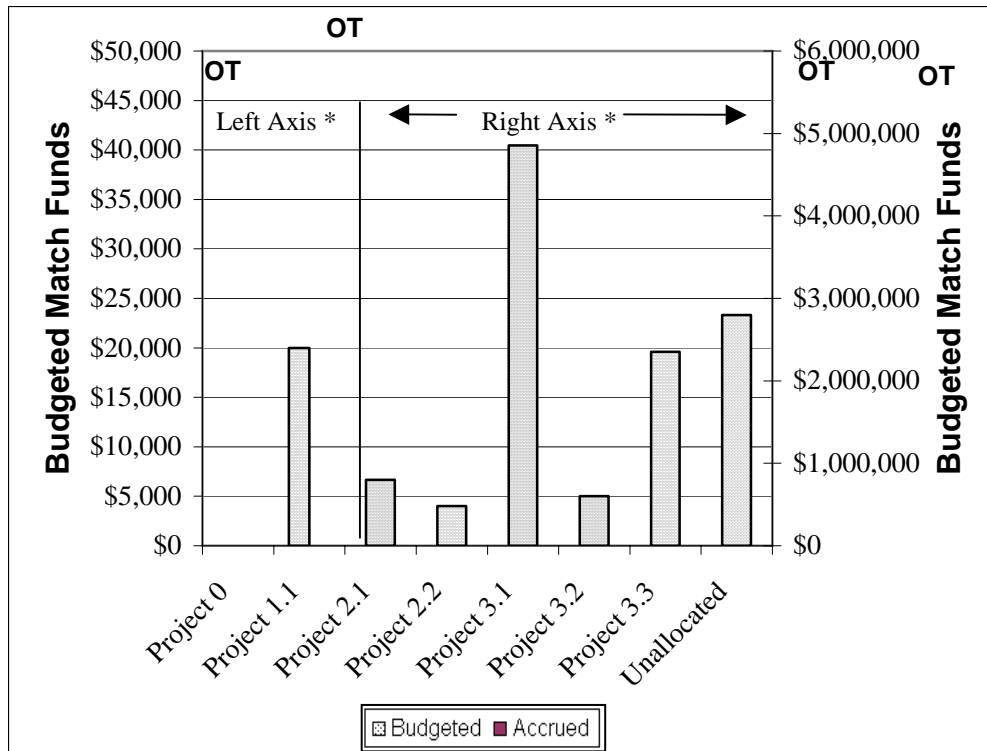
** Invoice Amount Shown after 10% retention withheld.

Figure 2: Program Fiscal Status



*Fiscal Status = (OT) "On Track", (OB) "OverBudget", (UB) "UnderBudget"

Figure 3: Program Fiscal Status Match Funds



* The Budgeted Match Funds for Project 1.1 are significantly lower than Projects 2.1 through Project 3.3, therefore, we have utilized a left and right axis with differing value levels, which allows us to better highlight the Project Match Funds.