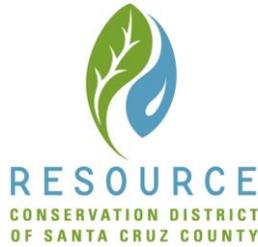


Recharge Net Metering (ReNeM) in the Pajaro Valley



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I. Introduction and Motivation

This document describes the details of a Recharge Net Metering (ReNeM) pilot program, which began in October 2016 in the service area of the Pajaro Valley Water Management Agency (PV Water). The program is being managed in collaboration with the University of California, Santa Cruz (UCSC) and the Resource Conservation District – Santa Cruz County (RCD). The program is to run initially for five years, to allow assessment as to whether it is beneficial for the Pajaro Valley Groundwater Basin (PVGB) and its residents, and whether it can be sustained over the long term.

The goal of this program is to test and demonstrate the effectiveness of a strategy to improve the quantity and quality of water resources in the PVGB, assisting PV Water and regional stakeholders in meeting demand, and helping to maintain sustainable and secure water supplies. Various projects in the existing Basin Management Plan (BMP) include elements of enhanced recharge (e.g., Harkins Slough project, recycled water blended with managed recharge water, Murphy Crossing project), but there is no equivalent to ReNeM. *ReNeM is not an alternative to projects in the BMP*; instead, *ReNeM is intended to supplement BMP efforts*, generating water resources to provide an additional measure of confidence that there will be time and opportunity for the BMP to be implemented and made successful.

The primary focus of the ReNeM program is on stormwater collection from hillslopes linked to infiltration, using a variety of techniques, to improve groundwater supplies. We refer to this as

"distributed stormwater collection - managed aquifer recharge, " or DSC-MAR. The functional goal the ReNeM program is to offset some of the on-the-ground costs associated with operation and maintenance of DSC-MAR projects. The most important of these O&M costs include: (a) loss of cropped or accessible acreage, and (b) maintenance of infiltration structures (basins, drywells, etc). The idea is to provide incentives so that landowners and tenants will consider development of DSC-MAR projects, even though there may be O&M costs associated with these systems. There are programs that can provide funding to support capital costs for design, development and installation (IRWM, Prop 1, etc.), but it is frequently a challenge to raise funding to support the O&M costs, in addition to funding for program administration, design and monitoring/verification. The ReNeM program will result in payment of rebates, by PV Water, to landowners and/or tenants who have ReNeM projects on their property. The size of the rebate will depend on the annual performance of individual DSC-MAR projects.

The ReNeM program is designed with flexibility, so that sites around the PVGB can be identified, tested and selected based on a combination of factors, including: the nature of local soils, connection to an underlying aquifer that has available storage, drainage area contributing runoff, space for site development, access for monitoring and verification of system performance, interest among landowners/tenants, permit requirements, and availability of capital funding for site design and implementation. The ReNeM program does not promise or guarantee that any of these conditions will be met at any specific site. Rather, the ReNeM program allows program collaborators and stakeholders to determine if this approach is viable, can be operated in an efficient way, will attract project partners, and will generate documented benefits as intended. The ReNeM pilot program will give PV Water and regional stakeholders an opportunity to assess whether it should be continued for the long term, and to develop a business plan for sustainability based on understanding of realistic resource, time, and personnel requirements. These and other issues are discussed in the rest of this document, and there are forms that interested parties can complete to request participation in the ReNeM program.

II. Program Components

The ReNeM program has these main components/procedures:

(1) The program goal is generate ~1000 ac-ft/yr in total of infiltration benefit across the PVGB, with perhaps 8-10 stormwater/recharge project sites put in operation over a five year period, each contributing ≥ 100 ac-ft/yr (in an average year). In general, this will involve collection of a

fraction of runoff from drainage areas of 100-1000 acres, and routing that water into a much smaller area (infiltration basin(s), dry wells, etc.) where infiltration can occur.

(2) A third-party certifier (TPC) will work in collaboration with stakeholders and PV Water to identify sites, raise funding in support of capital expenses for site development, collaborate on system designs, obtain permits, and oversee construction. Systems will be designed so as to allow accurate measurement and sampling to verify performance and benefits.

(3) The initial TPC is to be a team of collaborators from UCSC and the RCD.

(4) The TPC will work with local stakeholders (land owners, tenants, etc) on each project to secure site access and install instrumentation that will permit monitoring, including a component of automated, real-time monitoring accessible by cellular or internet connection. Monitoring will help to assure proper system function and document benefits.

(5) The TPC will prepare an annual ReNeM report, including a quantitative assessment of infiltration benefit achieved for each site.

(6) The infiltration benefit achieved each year will determine the amount of the rebate issued by PV Water. The PV Water Board of Directors have approved this initial formula for rebates:

$$\text{Rebate} = W_{50} \times (Inf_{\text{tot}} - Inf_{\text{inc}})$$

where,

Rebate = Rebate issued by PV Water (\$)

W_{50} = 50% of unit water cost at project location (augmentation fee) (\$/ac-ft)

Inf_{tot} = total infiltration documented by the TPC at the project site (ac-ft)

Inf_{inc} = incidental infiltration that would have occurred without the project (ac-ft)

The augmentation fee paid to PV Water varies with location around the basin, being higher within the delivered water zone close to the coast, and lower in the rest of the basin. The rebate formula links the rebate to project performance, providing an incentive to keep each project functional and operating efficiently. The 50% multiplier used for calculation of the rebate accounts for the facts that: (a) not all water that infiltrates into the ground becomes recharge, and (b) not all recharge is recoverable. The formula also subtracts incidental infiltration that is independent of the ReNeM project.

As an example, for a project generating 100 ac-ft of infiltration benefit, as of Winter 2017, the Rebate would be ~\$9,500 to \$11,750 depending on whether the site is inside or outside of the delivered water service area. Options for changing this formula could be considered during the pilot period, if desired, by returning to the PV Water Board of Directors for approval. A final pilot ReNeM program report will consider alternatives for calculating benefits and rebates.

(7) The TPC will work with PV Water and stakeholders to solicit interest from the service area. There will be periodic calls for statements of interest, and the TPC will evaluate those statements based on available data, site visits, preliminary data collection, monitoring and other information. Potential participants will be asked to sign a site access agreement, so that ReNeM personnel can visit potential sites and gather data and samples.

(8) There will be multiple phases of site assessment. These are described in detail in the next section of this document. In the initial phase, information about potential project sites will not be publicized. Once a site advances to a stage where there is to be a significant investment of public and grant funds for project development, with the agreement of the landowner/tenant, the name and nature of the site will be listed on a ReNeM web site maintained by the RCD. The TPC and PV Water will work with landowners and tenants to maintain privacy to the extent possible, but ultimately the development and operation of the ReNeM program is intended to be a public process - it is important that others in the region are able to learn how the program works and what project sites are successful.

(9) Projects that are selected based on results of site assessment will be prioritized for fund-raising for design, permitting, and capital costs. Raising funds to build a project may take some time, as may permitting, but the goal is to have multiple projects "in the pipeline" that can be made active as part of the ReNeM program as funds and time become available.

(10) The number and size of projects that can be made active each year will depend on available resources, both for TPC participation and for design, permitting, and installation. In general, the ReNeM pilot program is intended to support 1-2 new projects per year, along with maintenance of existing projects from year to year (pending demonstration of viability and success for each project). It may be that fewer projects will be needed to meet the overall goal of generating 1000 ac-ft/yr of infiltration benefit.

III. Stages of Assessment and Participation

A. Goals of Assessment. Sites that are proposed for evaluation for participation in the ReNeM program will be subjected to one or more stages of assessment. The assessment is important so that projects that are developed have a good chance for success, because they are placed where there are appropriate conditions, willing landowners/tenants, good access for measurement and validation, and other features. There are three general stages for ReNeM project development: Stage 1 Assessment, Stage 2 Assessment, and Invitation to participate in developing an active project.

B. Stage 1 Assessment. Stage 1 assessment occurs after a landowner/tenant provides basic information indicating interest in the program, and completes and submits a "Stage 1 Landowner Request for Assistance" (www.rcdsantacruz.org/ReNeM). The Stage 1 Landowner Request for Assistance is essential so that TPC staff can secure information about the site and visit as needed to gather preliminary samples or make measurements. The Stage 1 Landowner Request for Assistance will continue to apply if a proposed site is advanced to Stage 2, as described in the next section. Completion of the Stage 1 Landowner Request for Assistance does not ensure that a proposed site will become part of the ReNeM program. Data collected as part of a Stage 1 assessment will be treated as confidential, to the extent allowed based on funding sources in support of the work. In general, this means that proposed project locations will not be made public unless there is approval or a specific request to do so from the landowner/tenant.

A Stage 1 Assessment may include evaluation of: site location, drainage area, soil and aquifer conditions, potential for runoff generation, access under dry and wet conditions, and potential for engineering modifications to collect runoff. Photographs may be taken, sketches and maps may be drawn, and conditions at the proposed site will be compared to conditions at other sites, to help identify sites that are the most likely to be successful. There may be a preliminary assessment of water quality, with samples analyzed by the TPC or PV Water.

A Stage 1 Assessment will also consider locations of other (Stage 2 and Active) ReNeM projects and potential projects. These and additional factors will help to set a priority for moving the proposed site to the next stage of development. The TPC intends to provide feedback of the request for Stage 1 Assessment within 12 months of the request being filed. In many cases, a response will be prepared more rapidly. At least once per water year, TPC personnel will review the status of proposed, developing and active projects, and assess how many new (potential) sites should be advanced to a Stage 2 Assessment.

C. Stage 2 Assessment. A Stage 2 Assessment may include one or more of these activities:

- A more detailed desktop/computer assessment of site conditions, including analysis of soils, aquifer conditions, well logs, and modeled runoff.
- One or more site visits coordinated with the landowner/tenant, to collect additional data and/or samples.
- Drilling of exploratory boreholes, potentially with coring to recover subsurface samples.
- Evaluation of potential for the site to host habitat for threatened or endangered species, and other factors that could impact permitting requirements.
- Preliminary engineering design, to assess potential project site, operation, and cost to develop.

– More extensive sampling to assess of water quality.

Sites undergoing Stage 2 Assessment will be listed on the ReNeM web site as being "in consideration" for inclusion in the program. At this stage, the name of the project could include a public identifier (family name(s), site name) or a generic name (at preference of landowner/tenant). However, if a project is to be incorporated into the ReNeM program as an Active project, the name and general location of the project will be listed on the ReNeM site by that time. In addition, site performance information for all Active ReNeM projects will be considered to be public information once a project is incorporated and operated as part of the ReNeM program. This is essential so that operation of the program is transparent.

At least once per water year, TPC personnel will review the status of sites that have undergone Stage 2 Assessment, and rank these projects as to their priority for attempting to secure funding for full development. Factors that will be considering in ranking potential projects include: potential to infiltrate ≥ 100 ac-ft/yr during a typical water year, site location compared to other (active or pending) ReNeM projects, ease of site access (under both dry and wet conditions), potential for negative environmental impact (e.g., endangered or threatened species), water quality, the presence of high percolation rate soils, space in an underlying aquifer, favorable aquifer properties, a high ratio of benefit to cost, potential for securing funding for planning and capital costs.

Some sites that undergo Stage 2 assessment will not be advanced, and others might be deferred if there are better options (likely to generate greater benefits, cheaper/easier to develop, etc.). The highest priority sites that have completed Stage 2 Assessment will be advanced to development, and an invitation for ReNeM participation will be issued by PV Water.

D. ReNeM Invitation. An invitation will be issued by PV Water for sites that have passed through Stage 1 and Stage 2 Assessments with favorable results, and appear to have a reasonable chance for becoming active. At this point, the landowner/tenant will be invited to join the ReNeM program, and the TPC/PV Water will take the lead on preparing and submitting proposals for capital and engineering costs, and for permitting and other activities needed to make the project active. The invitation to join the ReNeM program will originate with PV Water, with copy to the TPC team, and will be sent to landowner(s) of record. It will include an explanation of next steps, and ask that interested landowner(s) sign and return a rebate application.

Once the invitation has been accepted and the rebate application received, the project will enter the queue for activation and will be listed on the ReNeM website as having been selected.

This is not a promise that the site will be made operational, as it is still required that the TPC obtain permits, engineering designs, cost estimates, funding, etc. Once a project has been placed in the queue for activation, it will remain in the queue (or in operation, once the project is established) unless the landowner(s) or the TPC team determine that the project is no longer desired or viable.

Frequently Asked Questions about Recharge Net Metering in the Pajaro Valley

We have received many questions about the Recharge Net Metering pilot program in the Pajaro Valley. Here are some answers to some of the most common questions.

• *Who pays for Recharge Net Metering (ReNeM)?*

There are three sets of costs associated with this pilot program:

- (1) Site evaluation and permitting, project design and installation, ReNeM administration
- (2) Project validation (once a project is made operational), to certify performance
- (3) Project operation and maintenance, loss of access/use of land

At present, UCSC and RCD partners are collaborating as the "Third Party Certifier" (TPC) for ReNeM, writing proposals in collaboration with the Pajaro Valley Water Management Agency (PV Water), to various federal, state, and private entities to cover costs for (1) and (2). Different groups/agencies/funding sources are interested in different aspects of the program, so multiple grants/funding streams are needed. The rebates paid as an incentive to land owners and tenants who host ReNeM projects are paid by PV Water from operating funds, as with other rebate programs, as an offset for costs (3). Over the long term, this funding model will likely change, as it requires a lot of effort to raise funds for (1) and (2) from external sources. Ideally, a sustainable ReNeM program would be self-supporting, based on the value of benefits achieved.

The cost to PV Water for participating in the ReNeM pilot program, mainly funds for rebates - item (3) in the list above - is favorable compared to the cost for alternative water supplies. The ReNeM-based rebate is a fraction of the cost of augmentation charges received from PV Water customers. Because it contributes to enhanced groundwater recharge and storage, ReNeM provides additional water for PV Water customers, helping to maintain the revenue stream that supports the health and sustainability of the Pajaro Valley Groundwater Basin. From the perspective of PV Water, ReNeM should be revenue neutral or net positive for PV Water over the long term.

• *Why are UCSC and RCD collaborating as the Third Party Certifier (TPC) for ReNeM*

The UCSC and RCD team have demonstrated interest in working with willing partners in a non-regulatory manner to enhance freshwater resources and help to maintain viable supplies to sustain regional agriculture, domestic use, and environmental flows. Separating the project development and certification from PV Water operations allows the TPC team to target different kinds of funding sources, and also avoids burdening limited PV Water resources and staff time.

The TPC will identify project sites that have the right conditions, and have a good chance to produce ≥ 100 ac-ft/yr of infiltration benefit during a typical water year. The TPC will keep PV Water personnel informed about activities, plans, problems, etc. as the program operates, and will seek advice from PV Water staff as the projects develop. The TPC will report to PV Water each year, and PV Water will administer the ReNeM rebates for program participants. One goal of the pilot program is to develop a long-term plan for carrying the project forward, for the long term. These responsibilities could be handled by a different group, perhaps within PV Water, as an ad-hoc community group, or a hired consultant.

• ***Why not open the ReNeM pilot program to everyone who wants to participate?***

Not all locations are equally suitable. UCSC and RCD personnel are completing a regional mapping and modeling project to assess stormwater collection linked to managed recharge; this work will help with an initial screening for new field sites. There are fixed costs for sites that generate 1 ac-ft or 100 ac-ft of benefit. In a world of limited resources, personnel, and time, it makes sense to focus at first on sites that meet the programmatic goal of generating ≥ 100 ac-ft/yr of benefit during a typical year. Of course, others can institute practices that the ReNeM pilot program helps to demonstrate as being effective, and there may be many more programs in the future that provide incentives for these projects. But it is important to set limits on initial ReNeM activities to give the pilot program a chance to succeed, identify challenges, demonstrate benefits, and develop a sustainable operating model.

• ***What happens if a ReNeM pilot program site does not perform as intended?***

Sites that don't meet design criteria will be improved in subsequent years or shut down. Rebates are based on performance, and if the performance is insufficient (or if operating a site proves to be excessively challenging in other ways), then other locations will be given a higher priority for operation going forward.

• ***How was the ReNeM rebate formula developed?***

The rebate formula was developed by the TPC in collaboration with PV Water, and following discussion with potential ReNeM participants. The formula needs to result in enough benefit to justify participation, but not so much that the rebates are unfavorable to PV Water and would not be approved by the PV Water Board of Directors. We don't intend that the initial formula will be "locked in" permanently. It may be adjusted based on feedback from project

participants, and/or if changes are needed to provide support for ReNeM operations. The formula is specifically not tied to the area of land used or the nature of crops that are not grown - this was done on purpose. Instead, annual rebate payments are tied to performance in terms of water infiltration, so that there is an incentive to keep functioning projects working (or improving them, to get a larger rebate), and it avoids assigning a value for an action that is not taken (like not growing a particular crop). ReNeM also avoids linking the rebate to recharge, per se, but instead bases the rebate on infiltration, which is easier to measure. Other approaches are possible, and it will be interesting to see if this formula works.

• ***What will be the impact on water quality?***

Studies at the Harkins Slough project site (operated by PV Water) show a net improvement in water quality during infiltration, with a up to 50% load reduction in NO₃. Additional testing in Summer 2015 and 2016 showed that augmenting the soil with a carbon source, such as redwood chips, can enhance nitrate removal. ReNeM project sites will be developed to allow monitoring and operation based on water quality. It is important to remember that the loss of recharge (because of changes in land use, climate, and other factors) causes harm to water quality. In the Pajaro Valley, where there is extensive irrigation and salt and nutrient rich water can percolate into aquifers, there is a big risk to water quality from *not recharging*. Groundwater basins developed for agriculture tend to accumulate salts; the benefits of dilution by recharge are critical for sustaining supplies, and raising water levels can help to reconnect aquifers to streams, providing an outlet for salts and nutrients. ReNeM projects can also help to improve surface water quality, contribute to stormwater management goals, and limit export of sediment and nutrients from impacted watersheds.

• ***Will ReNeM divert water that is important to streamflow?***

No. ReNeM focuses on DSC-MAR, which collects a small fraction of hillslope runoff that goes to streams, mainly during major rain events when these streams and regional rivers are experiencing high flow (and even flood) conditions. Typical drainage areas for ReNeM projects are 100-1000 acres, and only some of the water flowing from these areas will be collected. No water will be diverted from active streams, and the downstream impact of DSC-MAR operations will be minimal. In fact, ReNeM will ultimately improve streamflow conditions by raising groundwater levels and helping surface water and groundwater to "reconnect" across the landscape. This will result in increased baseflow and improved water quality. DSC-MAR will

also reduce sediment and nutrient export. ReNeM will be provide a net benefit for both groundwater and surface water, and to both supply and quality.

• ***Why should PV Water run a ReNeM program?***

PV Water developed and is implementing a BMP, in collaboration with regional partners and stakeholders. The BMP is moving the Pajaro Valley Groundwater Basin towards a balance of inflows and outflows. However, it will take some years before the BMP is fully implemented, and in the interim, there remains a need to enhance groundwater supplies. This will help to make up for the historic groundwater deficit. In addition, hydrologic variability means that there will be wetter and dryer years; the ReNeM approach is designed to take advantage of opportunities to improve water resources that may occur for only a few weeks each year, and maybe only during 4 or 5 years out of 10. For example, during the recent drought, at one site currently developed for stormwater collection, it was possible to meet infiltration design targets (>100 ac-ft/yr) because the high intensity of rain events produced a lot of runoff. Running a ReNeM program, with projects placed around the basin, can help to support the broader BMP effort, engage stakeholders, and provide an extra measure of confidence in resource sustainability for the long term.