RightCycle

Relentless pursuit of a sustainable future

Fort Collins CLEAN

Recommendations for a 2-Year Solar Incentive Pilot Program

23 January 2011

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Proposed Local Solar Generation Program
Fort Collins, CO

Introduction

The City of Fort Collins and the Fort Collins Utilities engaged RightCycle to help develop a cost effective two-year pilot Clean Local Energy Accessible Now (CLEAN) program supported by revenues from a proposed 1% increase in Utilities electric rate charges and avoided compliance costs. The recommendations and associated analysis results for such a program are provided in this report.

Summary of Pilot Program Recommendations

1.		General Approach: The Utility purchases[1] wholesale renewable energy, "bundled" with all environmental attributes[2] according to a predefined contract with fixed price for a 20-year period.
2.	Eligible Technology:	New Rooftop[3] Solar Photovoltaic
3.	Program Size:	5 - 14 MW (over two years)
4.	Project size limits:	25kW to 1MW
5.	Pricing:	19¢ - 23¢/kWh based on project size
6.	Participant Eligibility:	Fort Collins Utilities customers only
7.	Locational Eligibility:	Fort Collins Utilities service area only

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[1] Purchase will occur through PRPA

[2] "Environmental Attributes" include Renewable Energy Credits (RECs), and Green House Gas (GHG) or any other emission reduction or resource conservation credit or valuation associated with the electricity generated,

[3] For purposes of this program, "rooftop" could also mean any standard built-environment, including sides of buildings, carports, paved parking lots, etc.

8. Project Eligibility:
    a. Site control
    b. Basic engineering plans and estimated output
    c. Application fee
    d. Reservation deposit
    e. Project milestones
9. Contract Allocation and Queuing Procedures:
    a. First come, first served queue for allocation of current and future allotments of program capacity
    b. Non-transferable
    c. 1MW limit per applicant per year
    d. Program capacity to be released annually or semi annually
    e. Applications accepted after the current allotment is filled will be granted a queue position. Such applications will not be processed until allocation is available.
    f. Applications not receiving allocated capacity under the contract offer in effect at time of submission may qualify for a full refund if withdrawn from the queue before the application is processed.
10. Project Milestone Timeline
    a. 45 days to submit proof of all applications required to permit project
    b. 90 days to submit detailed engineering drawings & order equipment
    c. 9 months to complete installation and begin delivering power
11. Application Fees and Deposits
    a. Application & connection study fee: $1,000 plus $10/kW
        (50% refunded if the Utility finds connection is not cost effective)
    b. Reservation deposit: $100/kW
12. Contract Cancelation
    a. Fort Collins Utilities retains rights to energy production and has the obligation to purchase at the fixed contract price for the entire 20 year contract term once the project is online and the reservation deposit has been refunded.
    b. Contract obligations are not affected by a transfer of facility ownership.

Background

Fort Collins Utilities (the Utility) is tasked with providing reliable, low cost electricity while meeting the City of Fort Collins' sustainability goals and Energy Plan, and Colorado State requirements. The City Council has also directed the Utility to reduce and ultimately eliminate the practice of purchasing unbundled Renewable Energy Credits (RECs) used to meet requirements instead of directly acquiring RECs through the purchase of renewable energy. Where practical, the Utility also seeks to support local economic growth both through the purchase of locally generated energy and through the promotion of opportunities to advance the City's reputation for effective innovation.

The City of Fort Collins retained RightCycle in September 2010 to assess key considerations for structuring and implementing a pilot CLEAN program for the City under the working title 'Fort Collins Solar Program' (FCSP). In the design process RightCycle engaged a broad range of stakeholders including staff from the City of Fort Collins, the Utility, the Platt River Power Authority, local solar industry representatives, and other interested stakeholders. RightCycle's analysis included comprehensive modeling of project costs and economic viability in relation to regional solar resource availability, technological, and market data, and full assessment of the avoided costs that would otherwise be paid under current practices.

RightCycle conducted an extensive review of best practices from comparable programs in relation to the City's specific goals, resources and constraints to identify key program design factors and appropriate solutions. Collaborative testing of preliminary analytical findings was then undertaken with likely FCSP participants, including PV system developers and property owners, following which a second workshop was organized to present preliminary findings, seek additional stakeholder input and align around preferred FCSP design options. This collaborative process lead to the recommendations contained in this document. Based on its investigations, RightCycle is confident that Fort Collins can deploy significant volumes of cost effective clean local energy in a timely fashion while delivering substantial economic benefits.

Program Goals:

The specific goal is to establish a two-year pilot program to demonstrate that Fort Collins can achieve significant volumes of clean local energy that is both cost effective and timely.

A successful program will meet the following general goals:

- Maintain economically attractive electric rates
- Accelerate fulfillment of renewable energy objectives
  - City of Fort Collins Energy, Sustainability, & GHG targets
  - State of Colorado Renewable Energy Standard compliance
- Maximize the generation of cost effective clean local energy
- Develop a robust and comprehensive local clean energy industry to serve regional solar development
- Support the local general economy
- Realize economies of scale
- Achieve national recognition for innovation
- Keep it simple to assure 100% success

Program Constraints

The pilot program is being designed to stay within an operational budget equal to no more than 1% of the Utility's gross electric revenues. This will serve to limit the impact on ratepayers, resulting in an average household monthly utility bill increase of 33¢ in 2011, and an additional 31¢ in 2012. As discussed in the detailed recommendations below, it should be noted that this program qualifies for a 300% State REC valuation multiplier that will allow replacement of additional unbundled RECs that the City would otherwise purchase separately. Separate funding related to the further retirement of unbundled RECs will be required, but this retirement may be achieved through application of those funds to expansion of the local solar program proposal.

Due to contract limitations under the City's power purchase agreements with the Platt River Power Authority (PRPA), the City may not purchase electricity directly from non-PRPA generation sources, with the exception of net-metered generators. As such, the CLEAN pilot project requires the cooperation and support of PRPA[4]. To gain this support the CLEAN pilot

[4] PRPA has expressed support conditional upon generation being located within the Utility's service area, and that no single non-PRPA generation source have a rated output capacity greater than 1MW.

project has been formulated in a manner that provides protections for both the other municipal members of PRPA and the bondholders. As with the City's current wind energy purchases, the City and PRPA have agreed to a buy-sell agreement allowing PRPA to purchase all energy generated from this program, and pass this purchase through to the City.

As a pilot program, it is also essential that the program successfully demonstrate practices that can form the foundation of future policies for meeting the City's long-term goals. To maximize the likelihood of success, the pilot program recommendations have been designed to minimize complexity and avoid implementation delays by focusing on proven, low-risk approaches. For this reason, achieving 100% success is both a program goal and a program constraint.

Methods

For purposes of determining the price to be paid for local solar generation under the program, recent solar irradiation data models of the monthly weather patterns and sun angles specific to the Fort Collins location were employed (TMY3 from NREL), and the costs of capturing the solar resource were evaluated.

Cost evaluation began with modeling individual systems with the appropriate components for each type and size category to establish predicted efficiency and energy output profiles over time.

Initial cost estimates were then developed with US market data on component prices, installed costs relative to size, and cost trends, including aggregated reporting from both public solar incentive programs and developer survey research reported by NREL. These figures were then reviewed against detailed estimates and cost breakdowns shared by individual developers, suppliers, installers, and their customers to identify specific cost components that may vary by location.

Additional location-specific data was collected on applicable State and Federal incentives, and all taxes, fees, and requirements impacting both installation and operation within the designated jurisdiction.

Once these values were determined:

- Financial modeling was performed against the energy output and costs over a 20-year analysis period to determine the necessary rate to be paid (¢/kWh) to achieve defined internal rates of return.

- Sensitivity analysis on these results was performed to establish confidence levels and preempt any unplanned liabilities.

The costs and benefits of the proposed generation and pricing were then evaluated against Fort Collins' current renewable energy procurement practices to determine the avoided costs (what the Utility would have otherwise be spent) and what if any premium (above the avoided costs) would need to be paid through a rate increase by the Utility. The cost of any price premium was used in turn to establish the achievable program size at a given budget.

As shown in the following table, the primary avoided cost factors[5] found for Fort Collins were:

- The direct value of the energy produced.
- The impact of generation on Utility peak use Demand Charges.
- The value of RECs associated with the type and location of generation as established by state statute.

2010 Value of Avoided Costs

Qualifying Renewable Energy Source	REC State Value ¢/kWh	Energy Value ¢/kWh	Demand Charge Value ¢/kWh	Total Avoided Cost Value ¢/kWh
Out-of-State Wind Power	**4.08**	**2.02**	**0.24**	**6.34**
Local Solar PV	**12.24**	**2.02**	**0.24**	**14.50**

Note: Colorado legislation credits REC value required for State environmental compliance based on a variety of attributes. Taken together, the attributes of energy produced under the proposed program design are worth 3X those related to the imported wind energy in Fort Collins current contracts.

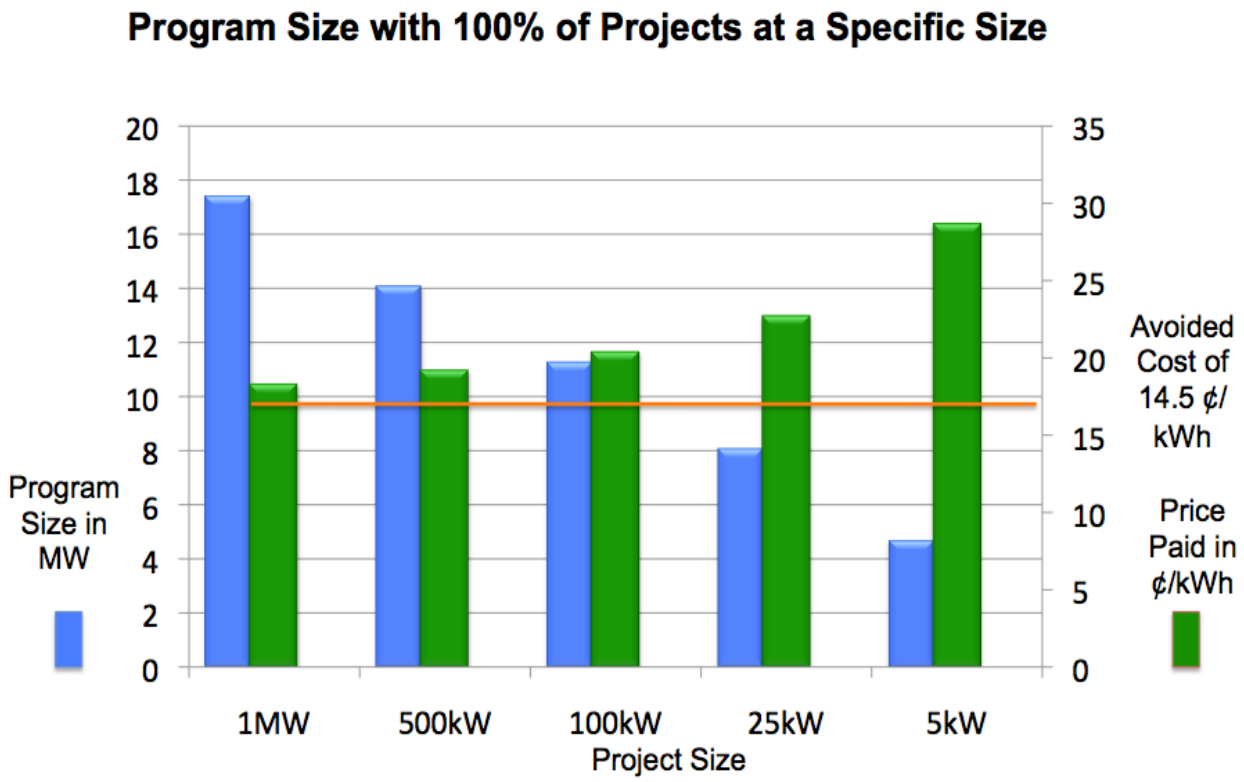
Additional factors were also evaluated but were found to have very limited direct cost impact for Fort Collins Utilities; these included:

- Avoided transmission and distribution line losses.
- Conventional generation efficiency effects.

[5] These avoided cost values are based on 2010 energy rates, current supplier quotes, market rates reported by the US Dept. of Energy and recent renewable energy contracts held by the City. Future rates and contract costs will vary based on the cost of energy and RECs.

- Improved reliability value.
- Reduced air pollution control costs.
- Reduced water use costs.
- Generation time of day pricing impacts.

Economies of scale realized by larger projects reduce the required premium under this program. As the price paid per kWh approaches the total avoided cost value for the Utility, the size of the program can be expanded without increasing the budget, as illustrated in the following chart.



Detailed Recommendations

1. General Approach

Recommendation:

To optimize results in Fort Collins, the most appropriate program model is the market-driving power purchasing approach broadly known as feed-in-tariffs. These renewable energy purchasing programs have recently become known in the United States as Clean Local Energy Accessible Now (CLEAN) programs.

CLEAN Program Features:

- The wholesale purchase of renewable energy with all environmental attributes and credits transferred to the purchaser along with the energy
- A predefined contract offered by a Utility to local renewable energy suppliers
- A predefined fixed price for a 20-year period

Rationale:

The CLEAN approach has been highly successful because it works with the market - it provides a simple, streamlined and transparent market opportunity in which sellers can participate at the lowest possible prices due to reduced risks and greater economies of scale. This approach has consistently resulted in an effective market response, driving dramatically greater deployment of renewable generation while achieving substantially lower prices than other approaches. [World wide, CLEAN style programs have been responsible for 90% of PV solar installations in recent years while driving costs down steadily in all participating markets.] CLEAN programs grant equal market access to all eligible sellers, allowing local utility customers to successfully compete in becoming renewable energy entrepreneurs.

State and local governments have established mandatory renewable energy targets for utilities. CLEAN programs are an effective mechanism for meeting these targets and accelerating the transition from fossil fuels to clean energy. As potentially the first "CLEAN" program to be adopted in the US under the new terminology, Fort Collins has the opportunity to leverage its early position to gain national recognition while building upon the experience of prior programs in design and implementation.

2. Eligible Technology

Recommendation: New Rooftop Solar Photovoltaic[6]

Rationale:

It is important to minimize complexity in a pilot program since the participants must gain experience with implementation procedures. These include administrative, engineering, and planning elements of project development, in addition to any applicable taxation, zoning, and building permit questions. Selecting a single initial technology supports the general pilot program approach of keeping it simple. In considering ground mounted solar PV, the City's Zoning Department noted concerns that these projects would require either a variance for most projects or adoption of a zoning amendment, either of which would delay deployment. Ground mounted systems may also be subject to environmental review, risking further delays. These systems and additional technologies can be accommodated in the comprehensive program that is anticipated to follow a successful pilot program.

Solar PV generation taps the largest renewable resource available within the Fort Collins Utilities service territory and presents the widest opportunities for installation, applicable to a large portion of Utility customers. Cost reductions achieved through the pilot program will be applicable to all project sizes, permanently lowering the cost of solar in Fort Collins across the board and thereby increasing the potential of other existing solar programs such as net metering. Rooftop installation in particular also provides widely distributed generation closest to electrical loads; this largely eliminates potential issues with distribution grid interconnection and power integration while avoiding line losses that would otherwise be incurred. The successful similar program in San Antonio and the proposed program in Los Angeles both have likewise restricted projects to solar rooftop installation.

Only new projects are eligible since the primary purpose of the program is to increase the amount of renewable energy generated and used in Fort Collins. Since existing facilities are already providing power, there would be no net increase and no benefit to the City would result from allowing their participation.

[6] For purposes of this program, "rooftop" could also mean any standard built-environment, including sides of buildings, carports, paved parking lots, etc

3. Program Size

Recommendation: 5 – 14 MW (over two years)

Rationale:

The program size is determined by the funding, proposed as 1% of Utility revenues, available to pay any cost premium above current avoided costs. If the full value of avoided costs is considered, using a 3 times (3x) multiplier for the RECs under the proposed local solar program, the premium is an average of 6¢/kWh. If additional funding is available for retirement of more unbundled RECs that are currently purchased in the City's REC portfolio, then a larger local solar program can be supported, as shown in the following table:

CLEAN Solar Program Size	State 3X REC Value applied	RECs Acquired	Contribution to RPS target	Additional REC replacement funding required
5.35 MW	No	8,000	0.6%	No
5.35 MW	Yes	24,000	1.7%	No
10 MW	Yes	43,000	3%	Yes
14 MW	Yes	60,000	4.25%	Yes

5.35 MW is the program size that would be supported solely by the proposed 1% rate increase. If the city does not make use of the 3X multiplier, this replaces 8,000 RECs (0.6% toward the RPS targets), leaving over 32,000 unbundled RECs to be replaced through other means at additional cost (increasing based on energy usage to nearly 40,000 by 2018, plus an additional 72,000 after the 2020 RPS step increase). If the 3X valuation is applied, this size program will replace a total of 24,000 RECs (1.6% toward the RPS target).

14 MW is the maximum program size supported by the 1% rate increase if additional funding for required unbundled REC replacement is also allocated to this program to take advantage of the permanent 3X multiplier offered by the State for programs in operation prior to July 2015. This would result in 60,000 RECs, contribute 4.25% toward the RPS targets, and would maximize local economic development and allow rapid full retirement of unbundled RECs.

A 10 MW mid sized program would contribute 3% toward the RPS target, replace the current unbundled RECs if the CLEAN solar 3X credit and all current Wyoming wind power bundled RECs are used. This would still require separate additional funding to acquire the RECs beyond those included in the 5.35 MW program.

4. Project size limits

Recommendation: 25kW to 1MW

Rationale:

Larger systems are more cost effective, supporting economies of scale and rapidly building efficient installation experience and total installed capacity at lower energy purchase prices for the Utility. Inclusion of larger systems also maximizes the use of available large roof areas. The expertise and efficiency developed in these installations can be applied at all scales, reducing the costs of smaller installations.

A 1MW limit serves to ensure that no single project holds more than 10% of the program.

The 25kW initial minimum project size is recommended in line with the goal of keeping the pilot program simple. The minimum size limit reduces the number of applications needed to fill the capacity of the program and avoids overwhelming the project approval process as this pilot program gets started.

Additionally, smaller projects are relatively cost ineffective until regional economies of scale are reached and would therefore decrease the achievable program size. Furthermore, non-corporate entities will often have challenges associated with using the full tax benefits associated with renewable energy projects.

San Antonio opened its program in 2010 with project sizes limited to between 25kW and 500kW systems.

5. Pricing

Recommendation: 19¢ - 23¢/kWh based on project size

Prices Required at Specific Project Sizes

System Size	5kW[1]	25kW	100kW	500kW	1MW
Price Paid[2] (¢/kWh)	28.69	22.74	20.41	19.23	18.33

1. The 5kW rate is listed for illustrative purposes only
2. Prices are based on a 6.5% IRR and assume tax benefits are fully consumed including the ITC and accelerated depreciation

Rationale:

In order to attract development of new renewable energy generation, the price offered must reflect the cost of production, which in turn is related to project size and achievable economies of scale. Pricing should be set at rates designed to allow comparable and reasonable profitability in all size ranges to support a diversity of installations.

Previous programs offering substantially higher rates were unnecessarily attractive and immediately oversubscribed, resulting in avoidable ratepayer impacts. The prices listed are estimated for late 2011 facility deployment and are subject to revision as indicated by market conditions. Final pricing will be included when the application submission date is established.

6. Participant Eligibility

Recommendation: Fort Collins Utilities customers only

Rationale:

This eligibility requirement supports local ownership and control of facilities, ensuring that payments are directed to participating residents and improving the local economy. This also effectively inhibits the potential for a "land rush" by non-local owners, while project allocation and project size limits ensure that no local entity will dominate the program.

7. Locational Eligibility

Recommendation: Fort Collins Utilities service area only

Rationale:

In practice, this means generation connected directly to the City's distribution grid. Interconnection at the distribution level supports generation close to load, avoiding wheeling and transmission costs as well as transmission line and transformer losses that would render projects uneconomic while adding substantial complexity to program design.

In line with other eligibility criteria, the purchase of locally generated power also supports local ownership and control of facilities and directs payments to City residents, resulting in maximum economic benefits to Fort Collins.

All existing programs restrict projects to their own service territories.

8. Project Eligibility

Recommendation:

a. Site control
b. Basic engineering plans and estimated output
c. Application fee
d. Reservation deposit
e. Project milestones

Rationale:

The purpose of project eligibility criteria is to ensure that projects have a high probability of successful completion and that viable projects are not displaced by speculative or unrealistic proposals. The criteria need to be sufficient to ensure that contracts are only allocated to such proposals, but at the same time not so restrictive as to discourage proposals that would otherwise be viable. These eligibility criteria are intentionally simplified to avoid unnecessary administrative barriers, but are generally comparable to other programs.

Securing site control is essential to ensure that the applicant has legal authority to proceed with installation at the designated location.

Basic single line engineering plans and estimated output are essential to determine the size of the contract allocation and the amount of program capacity reserved for each provider.

As detailed below, a significant application fee and deposit ensure that applicants have a stake in successful project outcomes and have an incentive to meet milestones.

Establishing project milestones defines continuing eligibility by specific measurable criteria.

9. Contract Allocation and Queuing

Recommendation:

a. First come, first served queue for allocation of current and future program capacity
    - Applications and queue position for both program capacity and interconnection capacity will be offered on a first come, first served basis in the order of application submission.

b. Non-transferable
    - Applications and reservations are assigned to the original location and owner/applicant only and are non-transferrable.

c. 1MW per applicant per year
    - The total program capacity allocated to any one applicant shall not exceed 1MW (1,000kW) per year. An applicant may have multiple projects up to this combined annual limit.

d. Program capacity to be released annually or semi annually
    - Program capacity is intended for annual release under updated contract price offers. The Utility may choose to adjust the release period and new capacity with 60 days notice.

e. Applications accepted after the current allotted capacity is filled will be granted a position in the queue.
    - Such applications will not be processed until allocation of capacity is available.

f. Applications not receiving allocated capacity may be eligible for refund.
    - Applications in queue not receiving allocated capacity under the contract offer in effect at time of submission may withdraw from the queue with a full refund either:

a. Up to 30 days following the formal announcement of a subsequent contract offer.
b. In the event of termination of the program.
c. If no additional allotment is provided for a period of 18 months.

Rationale:

The proposed program is designed to attract only the most cost effective projects, resulting in a quantity of applications commensurate with the available program capacity. This is expected to avoid an excessive rush in submissions and result in an orderly uptake of reservations while the "first come, first served" allocation of capacity allotment is fair, rewards early action, and encourages timely planning and application submission. These features would not be achieved through use of a lottery system, and use of subjective criteria would raise issues of accuracy and fairness while adding a significant burden on staff time and resources. All applications meeting the eligibility criteria will be treated equally.

Applications will not be transferable in order to avoid speculation or surrogate procurement by ineligible entities and to discourage potential applicants from taking a position in the allocation queue before they are ready to proceed with the project.

As the total capacity allocation granted to any single person or business is limited to 1MW annually, any applications representing capacity exceeding this limit will be given a position in the allocation queue for future periods commensurate with allocation eligibility.

Program capacity will be released periodically (annually or semi annually) with at least 60 days prior notice in order to ensure equal access to the application period for all participants and to ensure predictable contract cash flow obligations that fall within the program's predefined budget. Applications will be allowed to hold a position in the queue to take up any capacity that becomes available under the terms on offer at time of submission. Such applications will not be processed until allocation is available in order to avoid incurring premature study and reservation expenses on applicants and City agencies.

While applicants may retain their position in queue pending planned release of additional program capacity, the rates offered in future contracts will not be known until at least 60 days in advance. As such,

applicants will have the option to withdraw their applications and receive a full refund of application fees once the new contract terms are announced. Likewise, they may withdraw and receive a full refund if the program is terminated or new allocations are delayed by more than six months.

Sacramento, offering similarly cost effective pricing, experienced an orderly application submission process, meeting allocated capacity over the course of seven days, and employing a comparable secondary space-available queue to fill projects that were withdrawn from the initial allotment.

10. Project Milestone Timeline

Recommendation:

a. 45 days to submit all permit applications
b. 90 days to submit detailed engineering drawings & order equipment
c. 9 months to complete installation and deliver power

Rationale:

Firm timelines are necessary in order to ensure that projects proceed, delivering renewable energy on schedule both to meet City and state targets, and to allow the City to realize the benefits of early progress and the available but time-limited incentives. Projects that are not prepared to proceed in a timely fashion will be dropped from the queue to make room for others, and may reapply. This practice is in line with other successful programs in the US.

While many applicants may be ready to proceed immediately and deliver energy well in advance of the contract requirements, ample time is allowed to reasonably accommodate all applicants, and to allow for both unforeseen events and more predictable delays related to winter weather patterns.

11. Application Fees and Deposits

Recommendation:

a. Application & connection study fee: $1,000 plus $10/kW
   (50% refunded if utility finds connection is not cost effective)
b. Reservation deposit: Plus $100/kW

Rationale:

Application fees and deposits serve two functions: self-regulation and cost recovery. Application review fees and deposits are standard practice to cover the costs incurred by city departments and to encourage potential applicants to seriously consider their ability to perform. The proposed deposits are larger than used in other programs but are proportional to project size, are refunded at completion, and represent a meaningful good faith commitment without creating a significant burden to any serious project.

Significant but reasonable fees and deposits act as a strong incentive for applicants to regulate their own project's viability, eligibility and development. This can dramatically reduce the number of poorly planned or problematic applications and discourage speculative submissions from displacing serious projects, while greatly reducing the burden on City staff. This in turn leads to speedier evaluation and approval of applications, permits, and inter-connection for participants, and reduced program administrative costs.

The Utility does not anticipate connection issues in built up areas. However, if a project is proposed for a marginal area, the applicant should bear some responsibility for site selection and not receive a full refund if interconnection to the site is not found to be cost effective after review and field study by the City.

The reservation deposit will be due once the application has been approved, the connection review completed, and a contract offer tendered by the Utility.

12. Contract Cancellation

Recommendation:

a. Fort Collins Utilities has both the right and the obligation to purchase all energy produced by the project at the fixed contract price for the entire 20 year contract term after project is on line and reservation deposit refunded.
b. Contract obligations are not effected by transfer of facility ownership

Rationale:

Both buyer and seller must be assured of long-term value and benefits. This allows producers to secure low risk/low cost financing in order to operate profitably under the contract rates offered by the Utility, and guarantees the Utility a predictable fixed price source of qualifying renewable energy while conventional energy prices continue to rise over time. Failure to secure rights to purchase all energy produced by each facility would leave the Utility vulnerable to loss were the owner to seek other higher priced markets in the future.

Change of ownership may be necessary under a variety of circumstances, and is allowable as long as it continues to conform to current participant eligibility and allocation criteria.

Effects Beyond Utility Costs:
Community Goals and Social Value

The additional value categories listed below will result in benefits realized by the community as a whole, and therefore the City may choose to consider them when investing in renewable procurement practices or choosing between alternative programs.

Community goals and social values, including direct economic investment and job growth, are highly significant factors of value to the Fort Collins community; however, these do not represent direct benefits or cost avoidance values managed by Fort Collins Utilities. As such, no financial valuation has been assigned in the RightCycle assessment for the following benefits:

- o Direct Employment
- o Green Business Leadership and Development
- o City Reputation/State and National Profile
- o Fort Collins Energy Plan
- o Fort Collins Sustainability Goals – 20% GHG reduction by 2020 (vs 2005 base year)
- o Fort Collins' Council preference to phase out use of RECs in favor of actual renewable generation for meeting RPS standards
- o Colorado Climate Action Plan
- o National or State Green House Gas emission avoidance value (if not included in current REC value)
- o Healthcare: long-term cost reductions attributable to avoided emissions
- o Criteria air pollutant compliance and control value: PM2.5 &10, VOC, NO_x, SO_2
- o Price stability
- o Diversification of Energy Supply