CLAREMONT LOCALLY GROWN POWER

A CHERP INITIATIVE

GOALS

CARBON MITIGATION:	**26,658 Metric Tons/yr @ 1,000 MT/yr/$M or 2.3 lbs/yr/$**
JOB CREATION:	**557 Peak jobs created @ 12 Job-Years per $M**
ECONOMIC STIMULUS:	**12% growth in local economy / 2:1 return to State**
ECONOMIC JUSTICE:	**Low income households, renters, CalEnviroScreen**

PHASE I - Claremont

- Build and test GEN3 Prototype solar array.
- Establish a local solar manufacturing facility.
- Use non-profit model to keep all profits local.
- Install 6,000 5,400 kWh/yr systems (50% of homes) for a price of ± $800 per home.
- Retrofit 800 homes for a price of ± $500.
- Maximize multiplier on $6,500,000 DPI by installing lowest-income households and renters first.
- Produce 38.76 ac GWh/yr (35% of residential demand).
- Mitigate more than 26,600 Metric Tons/year Carbon.
- Create 557 total jobs, 124 are indirect sustained.
- Expand local retail economy by 12%.
- Increase property values by $175,000,000
- Increase local resiliency and quality of life.

PHASE II

- Install PV on remaining homes and businesses.
- Replicate and scale to other cities.

WHAT IS CLAREMONT LOCALLY GROWN POWER (CLGP)?

Claremont Locally Grown Power is sustainable energy *and* economics

Imagine a locally owned and operated, non-profit, 5,000 sq. ft. manufacturing plant, funded by the state, that produces high quality solar panels, skillfully made and carefully installed, by local workers/residents of our community. The benefits?

- Creates 156 direct middle class manufacturing and construction jobs.
- 557 total job growth, including indirect jobs.
- Saves residents money every month, maintained by cap-and-trade funding; projected to last 25+ years beyond that.
- Monthly savings - an increase in Disposable Personal Income (DPI) - are spent locally, increasing a family's quality of life and growing the local economy.
- DPI spending ($6.5 Million per year) increases city revenues by 12% and state revenues by a 2:1 ratio.

***Sustainable energy creating sustainable economics*.**

CLGP harnesses the total economic value of solar power

The economic benefit of solar power is divided into roughly two halves – manufacturing (the front half) and power production. Currently, most solar panels are manufactured overseas, sending the front-half economic benefits offshore. CLGP will capture the full potential value of solar by bringing manufacturing jobs home. Radically simplified solar-panel manufacturing, developed by idealPV (US patent 8,952,672), reduces costs by solving a 70-year-old fundamental shortcoming in solar power.

CGLP will leverage this technology breakthrough—licensed for manufacture exclusively in the United States—powered by Claremont's local labor force to create solar panels that are safe, efficient, and so cost effective that each panel harvests enough value every two years to build another panel. Claremont will create the economic power of its own **38.7GWh/yr power plant**, offsetting over **26,658 metric tons of CO_2 annually**.

How CLGP works to add economic value to Claremont

The economics of CLGP are driven by injecting the value of the solar energy already falling on Claremont directly into Claremont's retail economy. Solar panels and equipment made locally will be provided as an amenity to you on a sliding scale at little (±$800) or no cost up front and no lease. Just like the road in front of your home, CLGP energy makes Claremont a better place to live and contributes to the local economy. CLGP will use local labor to manufacture and install solar PV panels on your roof and connect the equipment to your electric service. Once the proper safety inspections are complete, the system will be switched on and your electric utility will decrease (on average) $860 annually (at 16¢ per kWh, 5,400 kWh per year). Studies indicate that consumers choose to spend savings locally, improving the local economy and generating sales tax. It is also well documented that reductions in utility bills raise property values.

CLGP uses local employment and, of course, the sun to inject about $6,500,000 per year into resident's local disposable personal income (DPI). This is income that Claremont's residents were once forced to export out of town to buy imported electricity that is now made available to spend locally. Increased retail consumer spending is increased income to Claremont's businesses. In turn, these businesses grow and hire - multiplying the economic effect

CLGP is designed to drive $29,360,000 annually into Claremont's local retail economy. The economy will be 12% larger permanently with continued maintenance of the infrastructure for next 25+ years.

Economic multiplier

Economic growth is magnified 4.5 times by containing manufacturing, installation and use to the same local economy together with targeting installation and DPI creation to Low and Moderate Income (LMI) households who will have a large Marginal Propensity to Consume (MPC) close to home.

In a local retail economy, increased income to someone, who needs and buys goods or services, will become a merchant's (employers') increased income. Income to everyone who is willing to buy locally empowers the local economy to expand. This simple fact causes a local retail economy to expand many times the original increased income to the original group of consumers who were willing to spend. Expansion is limited or even reversed when money is spent outside the local economy or when money is destroyed (for example, burned for fuel). Understanding the local economic effect of changes in income and employment of consumers is of critical importance to business and especially city governments. The US Department of Commerce, Bureau of Economic Analysis maintains the Regional Input-output Modeling System II (RIMSII) computer model to help business and governments understand the powerful economic multiplier effects of their choices. In addition, economists and major universities study the MPC of different consumer groups (Milan, Princeton, and Sufi, University of Chicago). From RIMSII we understand the powerful economic multiplier effect of income from manufacturing and reduced energy expense. From MPC we find that LMI households spend almost every dollar of increased income close to home, powerfully growing their local retail economy while very high-income households tend to save or invest outside of their local economy (stimulating the capital economy). The combined effect is for the local retail economy to add $3.50 to every LMI $1 increase in DPI, a 4.5 times multiplier.

Savings on energy bills from energy efficiency and solar directly adds to home values by at least $21,500 ($860 savings divided by a 4 percent mortgage rate), up to as much as 9 percent of the home value. It has been long established that energy cost savings are available to pay additional home loan principles and interest versus a home without a CHERP improvement (The Appraisal Journal pp. 401, Evidence of Rational Market Valuations for Home Energy Efficiency). Studies have validated that green-certified homes in California sell for up to 9% more.

Local taxpayers will also benefit from solar arrays installed on municipal buildings. Money saved by the city will initially help pay for household systems, using funds that would have been paid to utility companies for electricity. Once the program is paid for, all of the energy savings are passed on to taxpayers. By keeping it local, CLGP's construction phase generates more than 150 direct jobs, stimulating a total of over 550 jobs. For every utility dollar saved by harvesting sunlight and spent in the community, $3.50 more will be created in the business community for 25+ years, resulting in over 124 permanent, indirect retail jobs.

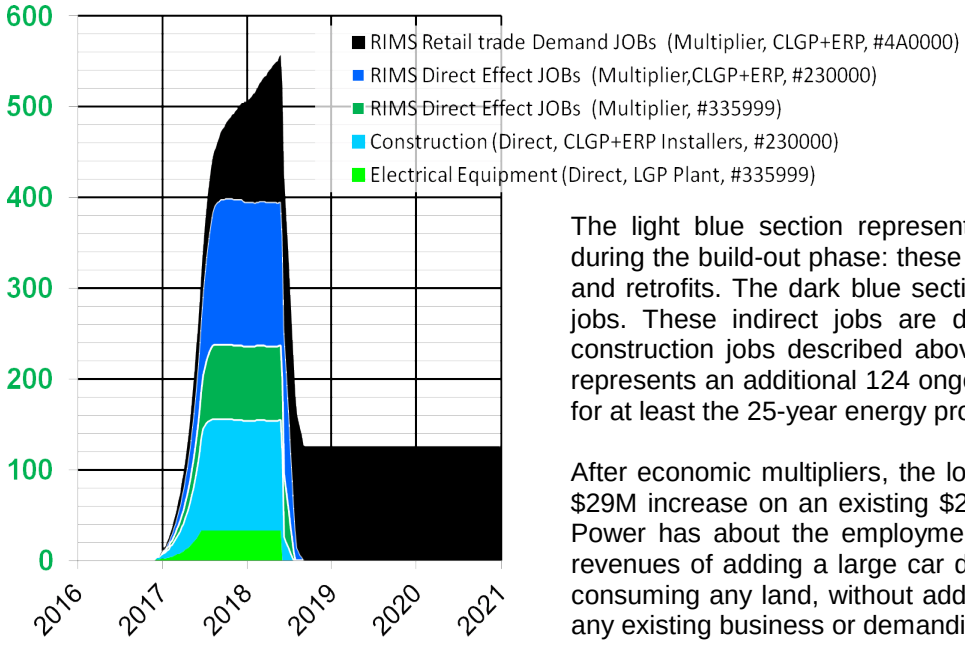
Glass, metal, plastic, and other components manufactured in and near Claremont will be used at your CLGP assembly plant first, followed by those produced elsewhere in the United States. Locally sourced and manufactured products support the local economy.

The CLGP program is designed to be funded by the state as a *revenue neutral* infrastructure program for five years. After the first five years, the program generates a $5,600,000 state revenue *surplus* each year for at least the next 19 years. *This creates a 2:1 ratio of output to input by the state at the 10th year*.

The state's support for the program may be in the form of loan guarantees for the construction phase and grants of increased tax revenues received by the state during the first five years of operation. The construction financing is paid off with municipal PPA sales, sales of federal tax incentives, solar incentives, community participation, donations and grants of increased state tax revenue.

HOW WILL CLGP CREATE JOBS?

CLGP creates both direct and indirect jobs in the city. Local workers will be trained and employed to manufacture, install, and service solar panels that are constructed using locally made materials whenever possible. These panels will then be installed on houses and/or commercial properties throughout the area at little or no charge to the property owner.



This graph illustrates the job creation potential of CLGP. The bright green section at the bottom represents 33 direct manufacturing jobs created by CLGP's solar panel assembly operation.

The light blue section represents 121 direct construction jobs created during the build-out phase: these are the workers needed for solar installs and retrofits. The dark blue section represents an additional 350 indirect jobs. These indirect jobs are driven by the direct manufacturing and construction jobs described above. Finally, the black portion of figure 1 represents an additional 124 ongoing, direct and indirect retail jobs added for at least the 25-year energy production life.

After economic multipliers, the local sales base impact is about +12%: a $29M increase on an existing $250M in sales. Claremont Locally Grown Power has about the employment, economic impact and increased city revenues of adding a large car dealership to the community. All without consuming any land, without adding any traffic, and without cannibalizing any existing business or demanding any new city infrastructure.

ADDITIONAL ECONOMIC DRIVERS

Note that the above analysis does not consider four additional positive knock-on effects:

1. Locally grown power installed on city property will avoid approx. $624,000 in utility costs currently paid from tax revenues to out-of-town utilities.
2. Increased energy efficiency, comfort, indoor air quality, and cooling effect of solar panels themselves will drive property tax revenues higher by about $200,000 per year.
3. Increased disposable income is also known to drive charitable giving higher, further adding to Claremont's quality of life.
4. Local control and energy independence from utility price inflation or supply.

THE ROLE OF idealPV

CLGP is made possible by idealPV technology which, among other advances, eliminates reverse conduction in solar cells. Reverse conduction is a major problem in solar panels, causing extreme heat as cells are forced into reverse bias. This leads to reduced efficiency and early failure. Eliminating reverse conduction removes over 50% of the rejection specifications for solar cells: CLGP can use solar cells that traditional manufacturers cannot, simply because the cells (otherwise perfectly good) cannot withstand reverse bias. Elimination of reverse conduction also eliminates costly and unreliable bypass diodes and their complex electrical connections. These advances simplify solar panel assembly, while adding durability, performance, longevity, and enhanced safety features.

Handcrafted Electricity

idealPV technology simplifies the solar panel assembly process to match the skills found in metropolitan labor pools, which creates local jobs and increases the quality of panel assembly and installation.

Examples:

1. Soldering the photovoltaic cells together: a job similar to a plumber soldering copper pipe.
2. Cutting the encapsulation film to shape: a task similar to textile or upholstery work.
3. Laminating the solar assembly: a laminator looks and works much like a large clothing press.
4. Installing the mounting frames: a job of fitting and gluing extruded aluminum frame rails, similar to the same task in carpentry.

Locally sourced materials and recycled solar cells

Additionally, glass, plastic film, aluminum extrusion, metal stamping, vacuum form molding and circuit board assembly will also be sourced locally, providing additional local benefits. We anticipate new businesses will arise to provide these and other components and subassemblies.

IdealPV offers a new, patented, module architecture that eliminates reverse conduction and decreases effective cell length. The idealPV approach stems from Rocky Mountain Institute's PV Balance of System Design Charrette of June, 2010.

The power electronics group identified a significant cost reduction that was available through joint optimization of module design and power electronics. This insight provided the seed for the idealPV concept. Since RMI's Charrette, the idealPV design was developed and tested by a small team of highly experienced engineers, resulting in our full-scale prototype modules.

While conventional solar panels require top grade solar panel encapsulation films and glass to withstand the kind of heat you find on a ceramic stovetop, CLGP panels are kinder and gentler to their materials (more like an ordinary window). CLGP solar panel can use glass and film materials that cost far less than those of conventional solar panels.

Beyond the economic benefits of locally grown power, idealPV solar panels outperform imported alternatives. idealPV panels in the same array may be aimed in different directions (such as south and east), and perform well when partially covered with dirt and snow, conditions which cause conventional panels to lose power and overheat.

idealPV solar panels realize these benefits:

- Use of readily available low cost silicon at high efficiency
- Elimination of reverse conduction: Means no hotspots and long, productive life.
- Ability to use Portrait and asymmetric installation: high dirt and snow tolerance
- Tolerance to differences in power, light, shade & heading mean more usable roof
- Interoperable with other panels & power levels allow future replacement/upgrade
- Greatly simplified assembly process with wide tolerances
- Are faster and safer to install and repair
- Entire systems may be checked and repaired in one hour
- Will not sustain a plasma arc, greatly reducing the risk of starting or spreading fire.
- A disconnected idealPV panel or array shuts itself and wiring down greatly reducing risks to fire fighters, maintenance personal and installers.

HOW WILL THE SOLAR PANELS BE PRODUCED?

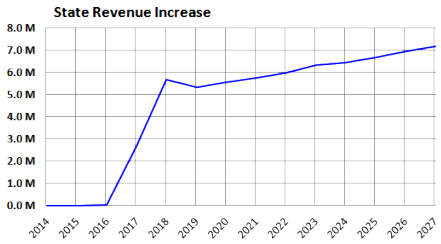
A plant capable of producing enough solar panels to completely equip a city of 36,000 residents in five years will occupy about 5,000 square feet of light industrial space housing about $150,000 of equipment. The equipment is standard in the solar industry. idealPV solar panels use 100% standard materials, processes, and procedures, and many materials, process and procedures have been eliminated altogether or simplified due to our patented technology.

Each idealPV panel produces ~330KWh per year of its 25+ year production life. Each will cost about $160 to build (about 45 minutes to assemble). The plant will produce up to 105,000 panels a year (50 panels/hour, five days/week) or enough for about 6,000 typical SoCal households per year.

HOW IS CLGP PAID FOR?

The Locally Grown Power Program is designed to be funded by the state as a revenue-neutral infrastructure program for five years. After the first five years, new revenue generated by program has completely offset the cost of the original grants, plus interest, and continuing new tax revenue generates a $5,400,000 state surplus each year for at least the next 19 years. By year 10 the program will have generated $2 in new revenue for every $1 in original grants, a 2:1 return to the state. The state's support for the program may be in the form of loan guarantees for the construction phase and grants of incremental tax revenues received by the state during the first five years of operation. The construction financing is paid off with municipal PPA sales, sales of federal tax incentives, solar incentives, community participation donations, and grants of increased state tax revenue.

PROGRAM FINANCE		
2016 - 2025	EOY 2020	
2.0:1	n/a	**State Revenue to State Investment Ratio**
$50.5 M	$5.6 M/Yr	**State Tax Revenue Increase***
$265.2 M	$29.2 M/Yr	State Tax Base Increase*
$46.9 M	Complete EO 2021	Gross Program Cost
$25.6 M	Complete EO 2021	**Net Program Cost to State****
*Revenue exceeds 2040		**Net of Federal ITC and MACRS



THE TWO PHASES OF CLGP JOB CREATION

The entire Phase I program takes two years to construct and the construction financing is retired by year five. Since the program only supplies 71%% of the electricity demand of half of the city's households, additional phases may be considered. In a later phase, the program may also offer commercial PPAs to local business. The margin could fund further household deployments, generating more retail spending which directly benefits local businesses.

PHASE I – THE PILOT

In Phase 1.a, the Locally Grown Power production facility is equipped, workers trained, production ramped from zero, and the first year's production installed on municipal infrastructure. The municipal government becomes net zero.

In Phase 1.b, the residential community is built out over the next year. Every year from this point forward, the community will be receiving the economic input of its own 38.7GWh (38.7 million KWh per year) distributed power plant. This is about 1% of the capacity of Hoover Dam.

PHASE II – R&D IMPROVEMENTS MADE AND REPLICATION IN OTHER CITIES

In Phase II, there are a number of options:

- Since the initial CLGP solar program was designed to satisfy about 35 percent of the original residential community power demand, a CLGP II program may be instituted to make the entire residential community energy independent.
- A CLGP program may also be implemented to make the commercial, schools, and university communities energy independent as well.
- Cap and Trade revenues may be used to maintain systems for 25 years *after cessation* of C&T program
- Lessons learned, systems and processes will be catalogued.
- Ongoing R&D projects will be identified for improvements in assembly, processes, materials and electronics.
- CLGP will be replicated in other CHERP cities

HOW IDEALPV HELPS THE LOCAL AND GLOBAL COMMUNITY

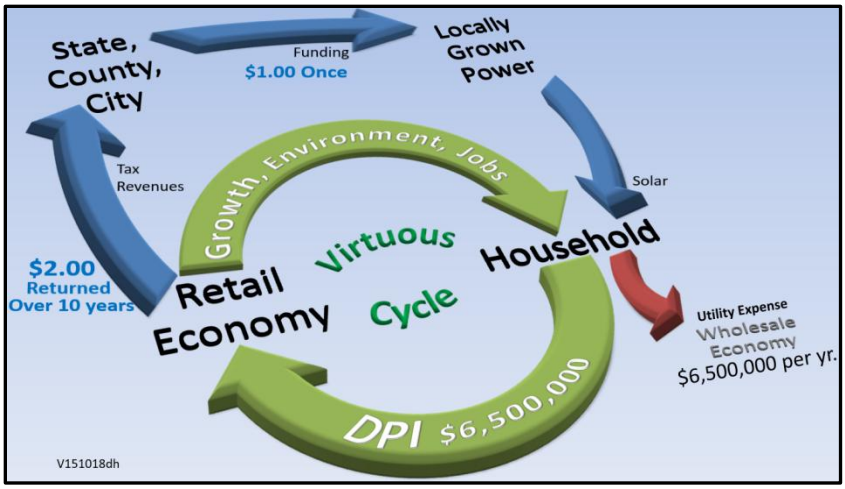
The idealPV technology provides for positive environmental payback in many respects. The notion of solar power as a clean, renewable resource is at the point of installation and use. However, one must consider the entire component construction cycle to account for the whole picture. Roughly, 5% of all cells manufactured cannot be used by conventional solar panel manufactures. The reason is technical: the cells must withstand a certain amount of reverse voltage because of the way the panels are built and controlled. The discarded cells are as efficient as prime cells, produce just as much power, but are discarded if the reverse voltage tests too low or the reverse current is too concentrated. When discarded, the energy used to make those cells is lost. Even worse, they are often melted down to start over in making a new cell.

The idealPV technology permits cells with very low breakdown voltage to be used at full efficiency. Thus, these so-called "non-prime" cells may be used in producing full power panels at a greatly reduced cell cost. Think of them as "zero carbon cells." Though these cells are mostly made in Asia, the carbon produced "there" has a warming impact "here."

idealPV has patents pending in the United States and throughout Europe. Further patent applications are planned. idealPV is committed to no foreign competition for its franchisees and limited franchise territories.

THE VIRTUOUS CYCLE

In macroeconomic terms, electricity goes from a commodity imported from outside the community, to a locally-produced and consumed supply. This ignites an accelerating local virtual cycle: converting an economic drain on the community into an investment in the community which pays returns to the community – as an annuity, year after year – far beyond the initial investment.



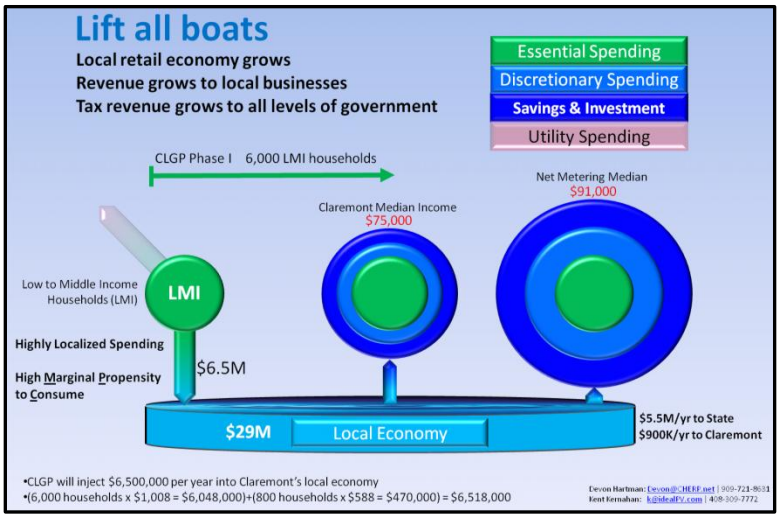
The economics of CLGP are self-sustaining. Two years of power production from one panel pays for another panel, i.e., doubling every two years. Were the panels made available to the panel laborers at cost, a panel would cost less than two days labor, but the worker would save twenty days' worth of labor over the panel's lifetime, thus a 10X return.

The distributed CLGP model is designed to express the economic power of the technology as more local employment and increases in household disposable personal income. The local supply chain and economic activity multiplies regional economic output. This expands market demand making CLGP and idealPV self-sustaining. CLGP utilizes public/private funding to achieve critical mass of economic output above which the program is self-funding.

In comparison to the CLGP model, the centralized, outsourced model currently in use is designed to concentrate economic benefits to individuals and entities controlling low cost labor by extracting economic activity from the markets served. This approach decreases economic output within the target market ultimately depressing its demand. In renewable energy, the current, outsourced model is built on capturing government subsidies and is therefore not sustainable.

CLGP is sustainable energy and economics.

High Marginal Propensity to Consume (MPC) and highly localized spending patterns are well-accepted characteristics of Low and Moderate Income (LMI) households. Funds that are no longer demanded for utility spending tend to be immediately re-allocated to other essential spending in the local retail economy.



Spending by LMI households generates income for local businesses and households of all income levels. High-income households tend to hold capital directly or indirectly that generate income from the retail economy and so experience growth as the retail sector grows.

The retail economy is also an important source of tax revenue for all levels of government. Economic growth and tax revenues are rapidly stimulated by CLGP due to behavior of the LMI households CLGP serves and the generation of direct employment created by CLGP manufacturing, installation and maintaince.

CLGP expands tax revenue much more than the tax revenue expended to create and maintain it.

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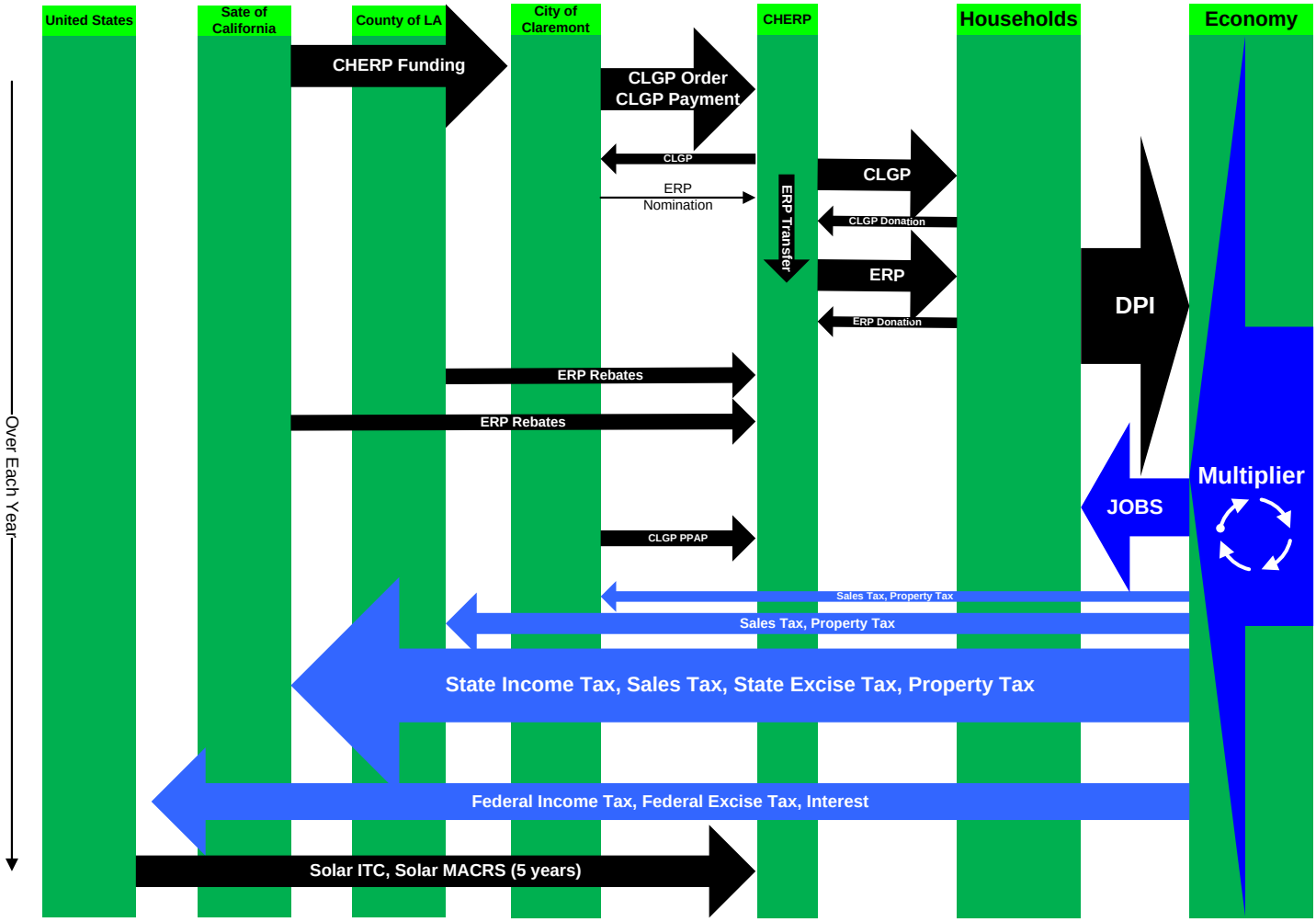
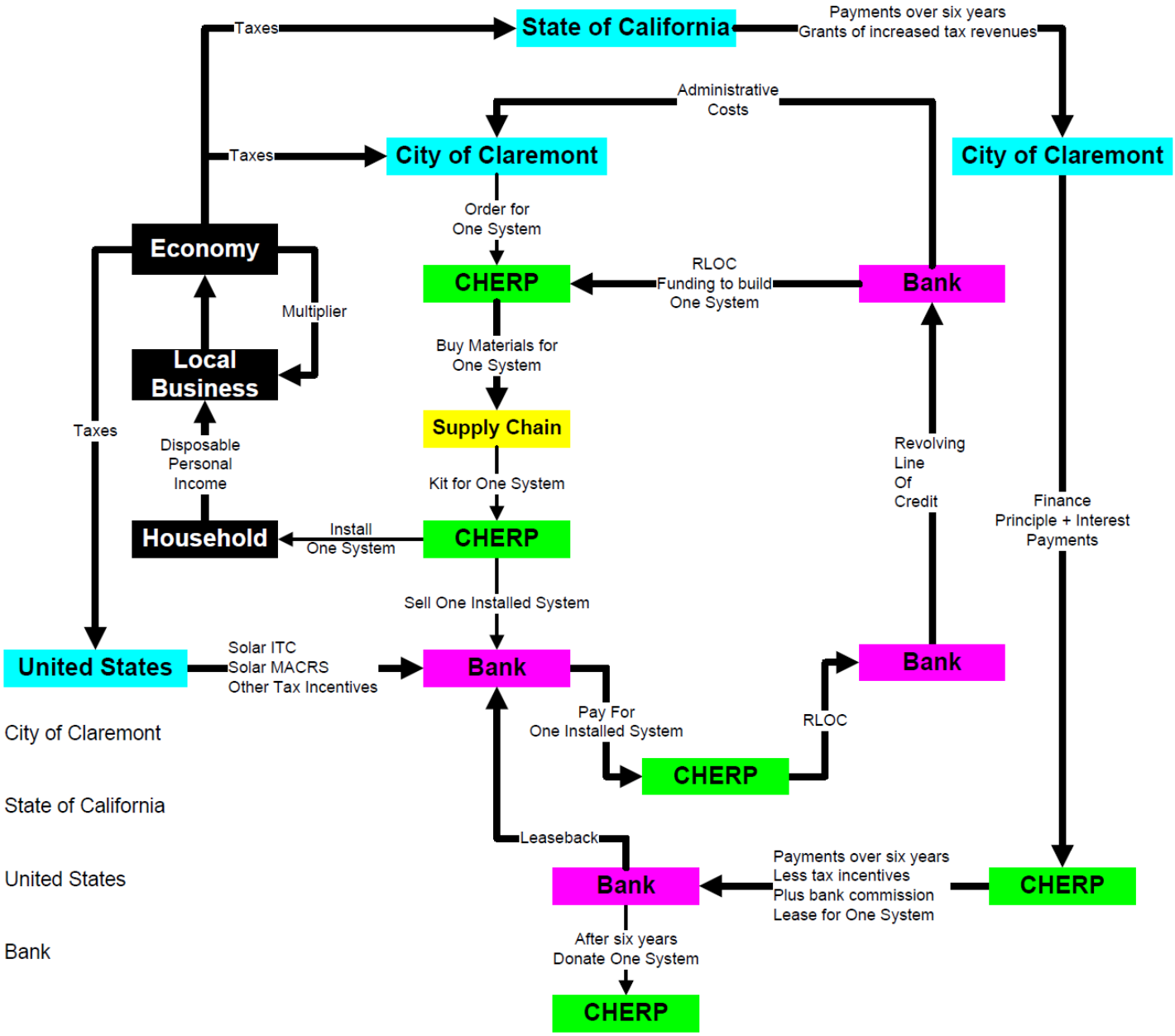
APPENDIX A – CASH FLOWS

Symbol	Description
CLGP	Solar Generating Stations (Claremont Locally Grown Power)
DPI	Disposable Personal Income
ERP	Energy Retrofit Projects
FRSS	FirstResponderSafeSolar.org
ITC	Investment Tax Credit
LMI	Low and Moderate Income households
MACRS	Modified Accelerated Cost Recovery System (accelerated depreciation)
MPC	Marginal Propensity to Consume
PPAP	Power Purchase Agreement Program
RIMSII	Regional Input-output Modeling System II
SAS	SparkArrestingSolar.org
TOU	Time Of Use electric rates that vary by time.



APPENDIX B – FINANCIAL FLOWS



City of Claremont

State of California

United States

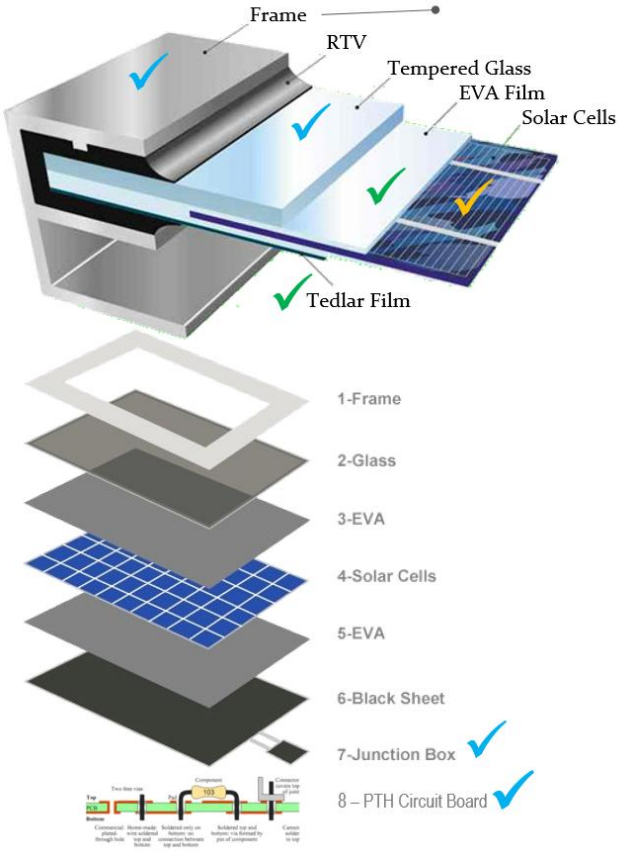
Bank

APPENDIX C – CLGP COMPONENTS

CLGP components:

- ✓ Proudly made in LA County USA
- ✓ Made in California
- ✓ Made in USA

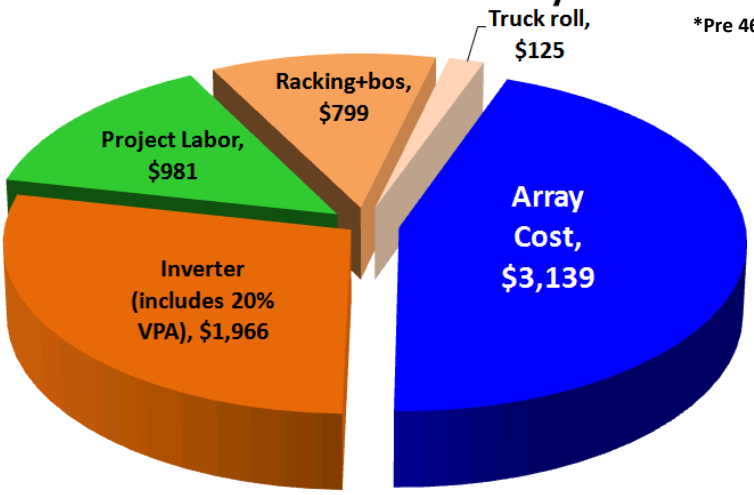
Solar Panels – 8 components



Installation Components

Pre-tax Installed System Cost $7,010*

*Pre 46% discount from ITC, MARCS



System: 16 panel, 5,400 kWh ac per year
with SAS plasma arc suppression and FRSS safety disconnect features

APPENDIX D – MILESTONES

(✓ Completed, ⅄ In-process, ○ Open)

- ⅄ 2011 **Concept**: Define Inventor Nationalism principles, Synthetic Solar Panel concept, SSP architecture, SSP specification definition including hot spot and arc suppression, **define design rules including use of failure mode effects analysis (FMEA is an aerospace design for quality methodology) to the level of zero single point to catastrophic failure (no single point of failure may damage anything outside of the product)**, Select team.
  Initial Development: Develop FOZHS equations, FOZHS mathematics verification, simulation modeling, generation 1 preliminary design, patent application submitted, certification plan, draft product manual, **review design and testability meetings with ETL (UL)**, build and characterize test panels, back annotate models, detailed solar simulations, develop mathematics for zero current switching/model predictive control (ZCS/MPC high efficiency digital control),
  Build and verify subsystems of **GEN 1 electronics**: Controller software architecture, design initial LGP financial model, integrated software/hardware simulations, FMEA, Initial software coding, Initial field testing, **recreate/document UL1703 hot spot identification test**.
- ⅄ 2012 **GEN1** integrated electronics: Specifications, architecture, develop equations, develop model, simulate, develop circuit design, FMEA, develop circuit board, build prototypes, bring up prototypes, verify prototypes, field test. **Integrate operational plan and financial plan into single financial model**. Design and **prototype GEN 1 electronics enclosure**.
  Additional discussions with VDE and Fraunhofer lead to "UL1703 pre-aged" composite testing procedure (build panels with pre-stressed cells prior to UL1703 certification).
  Collect input from solar panel manufacturers and evaluate retrofit device.
  Settle on Non Profit local manufacturing model. Begin cost simplification/cost reduction of electronics. Begin vacuum form design.
  Rewrite financial model to focus on tax revenue return.
- ✓ 2013 **GEN2** integrated electronics: Specifications, architect, develop equations, develop model, simulate, **develop circuit design, FMEA, develop circuit board, build prototypes, bring up prototypes, verify prototypes, field test**. Design and prototype GEN 2 (vacuum formed) electronics enclosure. Continue to collect input from community organizations, city staff, and city political.
- ✓ 2014 **GEN3** integrated electronic design for production (polish cost, simplification, shrink): Specifications, architect, develop equations, develop model, simulate, **develop circuit design, FMEA, develop circuit board, and hold formal UL design review**.
  Choose Launch City – Claremont.
- ✓ Nov 2014 – July 2015 **Patent Issued**, Develop demonstrations and additional documentation. **Do un-encapsulated solar cell, voltage, current and temperature verification to recreate panel level thermal verification done in 2011**. Peer review physics/math and field installation/maintenance. Refine Bus Model and Demographics for: **Maximum local/state economic Stimulus AND economic/environmental Justice**

  Patent, Experimental Results and White Papers: http://idealpv.com/patents.html

- ✓ **Oct 2015 – Nov 2015**
  Modify existing plan for **GEN3 prototype phase**: idealPV system and control system for 2 months of outdoor testing and ETL (UL)/CEC pre-test reports. Design racking, testing protocols, monitoring/reporting protocols.
- ✓ **July 2015 – Dec 2015**
  Develop local Claremont Board of Advisors representing: City, Accounting, Physics, Electronics, Manufacturing, Training, Finance, Economics, Community Foundation, Chamber of Commerce

- ○ **Jan - June, 2016**
  1st Round fundraising - $300,000 to complete licensing and GEN3 outdoor prototyping and testing
- ○ **June 2016 – July 2016**
  Construct and verify Prototype and control arrays
- ○ **July 2016 – August 2016**
  Complete Prototype testing and reporting
- ○ **June 2016 – August 2016**
  2nd Round fundraising - $800,000 to launch 5,000 sq. ft. manufacturing facility
- ○ **August 2016 – Dec 2016**
  Launch Manufacturing Facility,
  Begin regional ROP/Workforce dev training for both factory and installations

CLAREMONT LOCALLY GROWN POWER
EXECUTIVE SUMMARY OF BENEFITS – PHASE 1

We are currently in the process of raising $300,000 to build and test the mobile demonstration GEN3 Prototype array, and $800,000 to open the manufacturing facility, and certify the first production panels. We expect to complete both steps in about 8 months.

OUR GOALS

CARBON MITIGATION:	**26,658 Metric Tons/yr @ 1,000 MT/yr/$M or 2.3 lbs/yr/$**
JOB CREATION:	**557 Peak jobs created @ 12 Job-Years per $M**
ECONOMIC STIMULUS:	**12% growth in local economy / 2:1 return to State**
ECONOMIC JUSTICE:	**Low income households, renters, CalEnviroScreen**

METHODS

SOLAR ON ALL MUNICIPAL BUILDINGS TO NET ZERO
SOLAR ON 6,000 LMI HOUSEHOLDS FOR 70% REDUCTION
RETROFIT 800 LMI HOUSEHOLDS FOR 30% REDUCTION
EXPLOIT NEW TECHNOLOGY, PREPARE FOR REPLICATION TO OTHER CITIES

ECONOMY — 12% Local Growth, 557 Jobs, 2:1 return to the State

ECONOMIC JUSTICE
LMI Households, renters, and CalEnviroScreen 2.0 (91-95%) served first
Largest economic benefit to local economy is new DPI (savings) to LMI households
DPI created per year..... $6,500,000 per year

CITY REVENUES
Net increase in City Budget position per yr (+ST+PT-UT+ Savings).....$905,555 per year
Net increase in total local economic activity .....12% per year
Increase in local Property Values $151,000,000

STATE REVENUES
State Loan to CLGP is revenue neutral from day one and paid back in 5 years
Revenue to State through taxes on DPI by year 2021 (5 years) .....$5,400,000 per year
Revenue to State through taxes on DPI by year 2027 (10 years) ..... $7,100,000 per year
Revenue to State will continue to grow for 25 years post C&T program ..... 25+ years
Ratio of Loan Output to Revenue Input ..... 2:1 after 10 years

JOBS
Direct Manufacturing Jobs for 2.5 years 33
Direct Construction Jobs for 2.5 years..... 123
Indirect Jobs for 2.5 years..... 401
Total Direct and Indirect Jobs for 2.5 years 557
On-going indirect, permanent retail jobs for 25+ years..... 124
Jobs per $M spent..... 12 Job-Years per $M
Permanent jobs are created and initial grants are offset by increased state revenues.

CARBON MITIGATION — 26,700 Metric Tons per Year

CITY: ..... 2,600 Metric Tons per Year
RESIDENCES FROM SOLAR ..... 22,300 Metric Tons per Year
RESIDENCES FROM RETROFITS.....1,800 Metric Tons per year

QUALITY OF LIFE

ENERGY AS AN AMENITY (LIKE THE ROADS, TREES AND EDUCATION) FOR ALL IN CLAREMONT
Energy independence - free from price escalation
Real Estate more affordable because of energy efficiency (more quality for same money)
Homes upgraded are more comfortable, durable, healthier and safer
Homes now better able to protect residents from increased heat predicted for Inland Empire
LMI households in CalEnviroScreen areas now better protected from myriad negative environmental shocks

TECHNOLOGY Efficiency, low cost, simplicity, reliability and safety

"We have examined: idealPV Proof for Forward Only Zero Hot Spot (FOZHS) (US Patent 8,952,672)

1. **There is no doubt that the statements made in the proof are correct.**
2. **The many potential ramifications of this proof and patent are indeed compelling and warrant testing and verification in a prototype phase."**

Richard G. Olson, Ph.D., Professor of History of Science Emeritus, Harvey Mudd College
Richard Haskell, Ph.D., Biomedical optics, Biophysics, Laser physics, Physics, Quantum optics, Harvey Mudd College

No Hot Spots: Longer production lifetime by reducing materials aging, mechanical stress and heat cycling.

Only cell efficiency maters: Reduces cost by eliminating the reverse bias requirements of conventional panels.

Reduces internal wiring and other losses: Improves efficiency, relaxes costs on internal wiring and connections.

Extinguishes DC Plasma Arc (SAS): Reduces risk of igniting and spreading fire.

Turns off when disconnected (FRSS): Reduces risk of high voltage shock to fire, repair & installation personnel.

Vmp and Voc fixed over temperature: Improves ac power yield, reduces electrical stress, Simplifies site planning.

Peak power over a dynamic range of voltages: Dirt or shadows that affect one module do not impair any other.

Install array from the top down with bottom jbox: Installers work with gravity facing up roof for higher productivity.

Mount multiple headings and angles in the same string: Installation plan can maximize TOU revenues.

MPP matches any power idealPV or any other 60-cell module: Allows for future replacement and upgrades.

Shadow and dirt effect minimized by 80/20 horizontal substrings: Maximizes usable roof by tolerating vents.

Non-contact health signal: A handheld wand can detect panel health making system diagnosis simple.

CLGP is sustainable energy and economics

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