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CHAPTER III: California Comprehensive Residential Building Retrofit Program

A. Program Summary

The purpose of the California Comprehensive Residential Building Retrofit Program is to create jobs and stimulate the economy through a comprehensive program to implement energy retrofits in existing residential buildings¹¹. The Program will work with regional groups of local governments, utilities, community colleges, national and state energy and affordable housing programs, and private and public energy and building contracting experts to deliver a tiered approach to put Californians back to work. The Program will focus on deploying re-trained construction workers and contractors and youth entering the job market to improve the energy efficiency and comfort of California's existing housing, creating in the process a sustainable energy workforce. In addition to pursuing energy retrofits in market-rate housing, the Program will coordinate with and leverage affordable housing and neighborhood stabilization programs to bring the advantages of energy efficient housing to under-served, economically disadvantaged populations.

The California Comprehensive Residential Building Retrofit Program is intended to effectively contribute to California's ambitious energy savings and greenhouse gas emission (GHG) reduction goals established in the Energy Action Plan, the California Public Utilities Commission's (CPUC) Strategic Plan and the California Air Resources Board's (ARB) AB 32 Scoping Plan. These goals call for close collaboration between the Energy Commission, CPUC and ARB and coordination of the program delivery actions of each agency, including ARB climate change regulatory actions, Energy Commission establishment of standards and programs for residential retrofit (including the HERS II regulations for whole-house home energy ratings and energy audits), and the CPUC's direction to investor owned utilities (IOUs) regarding rebates and home performance programs aimed at dramatically exceeding past utility program accomplishment of comprehensive residential retrofits.

¹¹ The California Comprehensive Residential Building Retrofit program is targeted at all residential buildings, including single family homes, low-rise multi-family buildings and high-rise multi-family buildings. Where these Guidelines refer to "house" or "homes," those terms are intended to include both single family homes and multi-family buildings. The Energy Commission recognizes that multi-family buildings may provide opportunities for energy efficiency improvements that are uniquely applicable to multi-family buildings, and intends to enable the use of such energy efficiency improvements in those buildings.

B. Program Structure

The California Comprehensive Residential Building Retrofit Program will use a three tiered delivery approach to jump start the use of stimulus funds, enabling the use of 1) entry level labor and 2) single trade contractors with limited training in energy efficiency retrofits, and launch training and provide support to develop the highly skilled workforce that will enable the transition to 3) the whole-house, deep saving retrofits that are critical to achieving California and national energy and climate change mitigation goals.

The three tiers are:

Simple Checklist Approaches:

- 1) First Tier – Low-cost items that can be determined through visual inspection by a minimally trained person (low savings per home);
- 2) Second Tier – Measures that require installation by a specialty contractor (e.g., HVAC or Insulation Contractor) who can be trained in a short time to provide quality installation of measures within the scope of their specialty contractor license in conformance with the California Building Energy Efficiency Standards (Title 24, Part 6 and related Part 1 requirements) using field verification protocols specified by the Standards Reference Appendices (moderate savings per home);

Whole-house Retrofits Approach:

- 1) Third Tier – HERS II Rater based approach with Raters and building performance contractors trained to accomplish deeper, comprehensive retrofits (high savings per home).

(Refer to section D. of this Chapter for the measure checklists for each Tier.)

The first two tiers are based on simple checklist approaches that can be developed quickly and carried out with only limited training. The third tier is a deeper, comprehensive, whole-house retrofit approach that will rely on either 1) a Home Energy Rating System Program (HERS) Phase II Rater working in conjunction with specialty contractors to achieve whole-house retrofits or on 2) a HERS II Rater that is specially trained as a building performance contractor and is able to both perform the energy audit/rating needed to identify deep retrofits and supervise the installation through completion.

The Tier Strategy

The Third Tier is the preferred Tier for California Comprehensive Residential Retrofit Program funding. It is intended to move California residential retrofit efforts as rapidly as possible to a whole-house approach, enabling measures to be considered for their interactive benefits and to

facilitate reaching the deeper energy efficiency retrofits required to meet California energy policy. However, the Third Tier requires more extensive training and development of new market capability. The First and Second Tier are intended to be transitional approaches to immediately expand the delivery of conventional measures through incremental training to entry level persons and to contractors focusing on quality installation approaches and providing information to homeowners that will encourage movement towards the higher Tier, deeper savings approaches.

The First Tier is an optional level that is not required to be provided by every applicant. It is possible that First Tier information could be provided through a combination of self-assessment, (potentially including online assessment tools), in-person and neighborhood workshop delivery approaches. The Second Tier also is not absolutely required if applicants demonstrate that relying solely on the Third Tier approach will lead to rapid start-up and delivery of retrofits recognizing the short time window that the ARRA funds are available and the more demanding training and program delivery needed by the Third Tier approach. Applicants are encouraged to develop Third Tier approaches as a fundamental program element, and provide a strategy for how their program will strongly transition towards Third Tier approaches over the course of the period that ARRA SEP funds are available.

First Tier

The First Tier checklist would be used by entry level persons with limited training, such as high school students/graduates entering the workforce or neighborhood organizations active in the community who are branching out to helping get simple energy saving items done in the local area. They would focus on simple measures that work in every home, such as installing CFLs, low flow showerheads and faucet aerators, identifying appliances that are near the end of their useful life and are good candidates for replacement with Energy Star/Consortium for Energy Efficiency (CEE) appliances. They may also provide advice to homeowners about behavioral measures that can be taken, such as lowering hot water temperatures to 120° F, properly operating windows for ventilation and free cooling and properly operating shades for keeping heat in during the winter and out during the summer. They would provide information fact sheets about other programs and resources in the community, including water conservation programs and utility rebates, and about do-it-yourself (D-I-Y) projects that the homeowner could consider. A major goal of the First Tier checklist approach is to encourage residential building owners to move to the more extensive retrofits achieved through the Second and Third Tiers.

The First Tier is optional. California Comprehensive Residential Building Retrofit Applicants who do not choose to conduct the First Tier would be expected to explain how this level of information is provided in the region where their programs operate and how they will coordinate with these First Tier approaches to insure that the participants in those First Tier initiatives are made aware of the Second Tier and Third Tier services that are provided by the Applicant.

Second Tier

The Second Tier checklist would be used by single trade contractors (specialty contractors) who would install the materials or equipment that appear on the checklist for which they are licensed to do work and are in business to provide. These might include HVAC contractors who replace furnaces, air conditioners or water heaters nearing the end of their useful lives with high efficiency equipment; electrical contractors who install lighting fixtures with high efficiency fixtures that use CFL or LED lamps; and insulation contractors who install attic and wall insulation. These contractors would employ many people from the construction trades who have been displaced by the bottom dropping out of the housing market and the tight economy's impact on discretionary income.

Unfortunately, many of these trades currently are dominated by low-bid competition that may result in poor installation quality and construction defects, which may dramatically reduce the energy efficiency benefits of the equipment and materials they are installing. Training for the Second Tier would explain the priority measures that are on the checklist and how to raise the quality of the installation of those measures. Participating contractors would be required to comply with state and local business licensing laws and to pull building permits. Measures would be required to meet all requirements for these building alterations specified by the Title 24 Building Energy Efficiency Standards. Measures for which the Title 24 Building Energy Efficiency Standards have established field verification protocols would have to be field verified in conformance with those protocols and follow all field verification procedures established by those Standards (HERS Phase I).

The Second Tier is not absolutely required for all California Comprehensive Residential Building Program applicants. If applicants choose to not provide the Second Tier approach, the proposal must explain how their program will lead to rapid start-up and delivery of retrofits recognizing the short time window that the ARRA funds are available and the more demanding training and program delivery needed by the Third Tier approach.

Third Tier

The Third Tier approach builds on the concepts of HERS II and Home Performance with Energy Star to deliver comprehensive, whole-house energy efficiency measures that consider the interactive nature of the energy features in a home.¹³ This is the level of residential retrofits that ultimately will be needed in all California homes if national and California energy efficiency and climate change goals are to be met.

The Third Tier focuses on "House as a System" principles, using diagnostic tools to insure high quality, well integrated measures that deliver not only energy efficiency and climate change

¹³ The Energy Commission will assist applicants proposing programs for multi-family buildings that are outside the scope of HERS II and Home Performance with Energy Star to develop Tier III approaches that provide parallel and comparable energy audit and field verification procedures.

mitigation, but also improved comfort, indoor air quality, and safer and quieter home environments. Measures would include building air sealing verified using blowerdoors, duct sealing verified using duct blasters, efficient duct design and installation verified through airflow measurement tools, insulation quality and thermal bypass avoidance verified through infrared cameras, and proper air conditioner refrigerant charge using gauges. This is the emerging future of providing high quality, whole-house retrofits that avoid the current construction defects that are ever-present in the marketplace.

California has an excellent base of HERS raters trained by the infrastructure that the Energy Commission has set up over the past 10 years for Title 24 and the recently adopted HERS II program that the Energy Commission adopted in December 2008. California also has a strong base of building performance contractors and well-developed training curricula developed by the California Building Performance Contractors Association over the past several years. This training curricula can be easily transferred to the Community College systems and other training organizations to rapidly replicate, and be expanded upon to include ongoing mentoring, apprenticeships, and on-the-job support for contractors and workers who endeavor to deliver high quality work. This field represents a major opportunity to re-deploy and re-skill California's hardest hit industry to provide highly sustainable and valuable services.

Each California Comprehensive Residential Retrofit program applicant is encouraged to provide an active Third Tier element. An applicant's program should also provide strategies for an active transition to delivery of the Third Tier approach.

1. Local Government Consortia

The California Comprehensive Residential Building Retrofit Program is designed to collaborate with consortia of local governments, utilities, community colleges, national and state energy and affordable housing programs, and private and public energy and building contracting experts in regions around the state that develop and operate programs to provide:

- a. targeted information to recruit residential building owners to participate;
- b. training and support for the workforce that will be deployed to provide each tier of retrofits (collaborating with the ARRA SEP Green Jobs Training Program);
- c. access to and facilitation of retrofit financing, through municipal financing programs, Energy Efficiency Conservation Block Grant EECBG funding, Department of Community Services and Development (CSD) or California Public Utilities Commission administered low-income weatherization programs, other U.S. Department of Housing and Urban Development (HUD) financing such as Energy Efficient Mortgages and other FHA and HUD financing, Energy Star financing, and utility or local program energy and water rebates and incentives;

- d. support of and engagement in field verification consistent with the California Home Energy Rating System Program to insure quality installations and to monitor program results;
- e. co-funding of incentives to seed programs that will be self-sustaining after the term of the ARRA funding expires.

The Energy Commission will enter into contracts with consortia of local government agencies, utilities, community colleges, national and state energy, affordable housing programs, and private and public energy and building contracting experts covering a region of the state that are prepared to actively pursue the California Comprehensive Residential Building Retrofit Program in their regions. The consortia must commit to hit the ground running to attack the residential retrofit opportunity in their region, through localized training and education of the persons involved in providing each tier of retrofits, coordination with local and regional efforts to provide financing and financial incentives, and targeted information to the homeowners in their areas to obtain program participation. Participating consortia will be encouraged to leverage and actively coordinate EECBG funding going to local governments in their regions that is targeted to residential retrofit and to commit to coordinate local municipal financing programs that already exist or are emerging in their regions with the California Comprehensive Residential Building Retrofit program. Also, participating consortia must commit to actively coordinating with other financing and incentive mechanisms at work in their communities, including in particular utility financing and incentives programs.

The Energy Commission anticipates contracting with a prime contractor that has 1) sub-contracts with other members of the consortia that are proposed to receive ARRA SEP funding and 2) memorandum of understanding with members of the consortia that will actively coordinate with the regional program but not receive ARRA SEP funding. The Energy Commission anticipates that programs will have a government agency as the prime contractor, insuring a high level of local commitment to actively pursue the program as a regional priority and closely coordinate and leverage funding available to the local government. However, the Energy Commission will consider the alternative of a different member of the consortia serving as the prime contractor. For this latter case the applicant's proposal for ARRA SEP funding must justify why the alternate prime contractor is justified and is likely to insure a more effective regional program, and must demonstrate that a high level of commitment is maintained by the government members of the consortia, including coordination with and leveraging of funding available to the local government and pursuit of the program as a regional priority.

2. Collaboration with National Programs

The California Comprehensive Residential Building Retrofit Program will collaborate with the Home Performance with Energy Star Program (HPwES)¹⁴, administered by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE), for achieving comprehensive, whole-house retrofits. The Sacramento Utility District (SMUD) and each of California's IOUs are in the process of developing HPwES programs. Coordination with these HPwES programs will be strongly encouraged, including training and certification of building performance contractors consistent with HPwES guidelines.

The DOE has decided to allocate stimulus funds to enable their Building America teams to provide consultation for a neighborhood approach to achieve retrofits in existing homes. The DOE's concept is that their Building America teams, who have been working for several years with production builders to achieve zero energy in newly constructed homes, are uniquely able to assist with the evaluation of older tracts of existing homes, which were built around the same time with similar features (vintages), to determine probable energy efficiency measures that would be suitable for entire neighborhoods and could be implemented with similar mass delivery approaches as those that production builders use. Participating consortia will be encouraged to coordinate with this DOE approach.

The California Comprehensive Residential Building Retrofit Program also is interested in collaboration with HUD to coordinate with the variety of stimulus funded programs that they are conducting at the local level. This will include the Neighborhood Stabilization Program, weatherization and financing programs.

3. Collaboration with State and Utility Programs

The California Comprehensive Residential Building Retrofit Program needs to be strongly coordinated with the efforts of the CPUC and ARB as discussed in the Program Summary in section A. of this Chapter. In addition, the California Comprehensive Residential Building Retrofit Program needs to be coordinated to the extent feasible with California weatherization programs administered by both CSD and the CPUC.

Applicants must establish close working relationships with utility rebate and financing programs in their region. Programs should be designed to complement and expand on utility programs rather than duplicate or compete with them. Utility funding should be treated as an important element of the funding available for encouraging program participation and encouraging residential retrofits. Attention in particular should be placed on collaboration with utility HPwES and other utility whole-house performance

¹⁴ See http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_hpwes

program initiatives. Applicants must explain how collaboration with utility programs will be accomplished and redundancy will be avoided.

4. Targeting Economically Disadvantaged Areas

One area of emphasis for the California Comprehensive Residential Building Retrofit Program will be on coordinating with local programs in areas that have been the hardest hit by the economic downturn. These areas suffer when inadequate attention to housing construction quality and energy efficiency, particularly in lower-income neighborhoods, result in high energy bills and poor comfort conditions. The residents of this housing deserve strong attention to quality retrofits that reduce their energy bill burden as much as possible.

The foreclosed property targeted by the HUD Neighborhood Stabilization Program represents a special opportunity for the California Comprehensive Residential Building Retrofit Program. These foreclosed homes that stand vacant in need of rehabilitation to return them to satisfactory market condition are particularly strong candidates for comprehensive, whole-house retrofits, and provide an ideal learning environment for apprentices or recent trainees to learn on-the-job without the added complications of the presence of homeowners and personal property. The California Comprehensive Residential Building Retrofit Program will encourage local government participants to actively coordinate with their local Neighborhood Stabilization Program.

There also is an opportunity for the California Comprehensive Residential Building Retrofit Program to collaborate with low income weatherization programs, administered either by CSD or by the CPUC. This collaboration could work to achieve comprehensive retrofits in housing receiving weatherization program assistance consistent with the Second and Third Tiers of the California Comprehensive Residential Building Retrofit Program. This collaboration could be pursued using a “neighborhood approach” whereby neighborhoods that are made up of relatively homogeneous housing types and vintages could be evaluated to identify energy efficiency measures that would be expected to be consistently appropriate throughout the neighborhood. This neighborhood approach also could be considered for the income level immediately above that which is currently eligible for low-income weatherization programs, at approximately 200 – 300% of the poverty level.

5. Coordination with Workforce Training

Fundamental to the success of the California Comprehensive Residential Building Retrofit Program is the provision of training and ongoing mentoring, apprenticeships and support for the workers necessary to deliver each of the tiers of the Program. Training of these workers will be coordinated with the Energy Commission’s ARRA SEP funded Green Jobs Training Program.

The Green Jobs Training Program is working with public, private and nonprofit partners to develop a comprehensive, sustainable green workforce development program in California. This Program intends to leverage existing workforce partnerships by coordinating with state agencies, the State's Community College system and local workforce investment boards. At the local level the Green Jobs Training Program will be working with the 49 local workforce investment areas, which provide regional "one-stop centers" for assessment, training and placement for job seekers and businesses, and have long-standing relationships with local government and civic leaders, economic development agencies, labor and community organizations, and businesses. In addition this Program will be working with the State's investor owned utilities (IOUs) and publicly owned utilities (POUs), which operate energy training centers that provide education and workforce training related to energy efficiency.

Local participants in the California Comprehensive Residential Building Retrofit Program will be expected to actively coordinate with the Green Jobs Training Program. Applicants also are encouraged to coordinate with previously established workforce development and training organizations that the applicants have experience working with.

6. Funding Leveraging and Sustainability

The California Comprehensive Residential Building Retrofit Program is intended to create jobs, re-employ displaced workers, and re-train the hardest hit construction industry as a means of meeting the DOE's SEP goal of strategic intervention that causes lasting changes in the market. It is intended to jump start the effort to meet California's aggressive Energy Action Plan goals to achieve an average of 40% savings in existing California residences by 2020. The Program intends to achieve sustainability after the term of the ARRA funds through three means: 1) coordinating with local financing initiatives; 2) leveraging local funding; and 3) seeding self-sustaining training approaches that will make permanent improvements to the skill level of the people who will be needed to deliver residential retrofits.

7. Project Reporting

All requirements related to ARRA sub recipient and vendor reporting and tracking must be adhered to as well as any other state and federal reporting requirements for energy related ARRA funds.

C. Evaluation Criteria

The following criteria will be used for evaluating proposals in response to the solicitation:

1. Leveraging of funding – extent to which ARRA SEP funding is matched by and coordinated with financing, incentives and program administration resources identified and committed by the applicant, including EECBG funding targeted at residential retrofit, municipal financing, state and national program resources and financing, utility incentives and financing, and other local government and consortia resources;
2. Sustainability – extent to which the applicant’s program will create lasting changes in the market, enabling the accomplishment of California’s climate change and energy savings goals for comprehensive residential retrofits and continue to stimulate job creation and revitalization of the economy; reasoning and evidence presented in the applicant’s proposal demonstrating sustainability; extent to which the applicant’s program establishes an active Third Tier element and proposes a strategy for transitioning to the Third Tier over the time period that ARRA SEP funding is available;
3. Economically Disadvantaged Areas¹⁵ – extent to which the applicant’s program is targeted to create jobs and enhance the economy in economically disadvantaged areas of the state that have been particularly impacted by California’s housing and economic crisis;
4. Total Job Creation and Retention – extent to which all resources brought together by the applicant will create jobs;
5. Total Energy, Peak Demand and GHG Emissions Reductions – extent to which all resources brought together by the applicant will result in energy savings and peak demand and GHG emissions reductions;
6. Program Cost Effectiveness – cost effectiveness in terms of energy saved per dollar invested; U.S. DOE expects that ARRA programs achieve no less than 10 million source Btu’s saved per \$1,000 spent; dollars spent include only the ARRA SEP funds; savings are those resulting from the total dollars spent, including leveraged funding.
7. Time Criticality – extent to which the applicant establishes certainty that the ARRA SEP funding will be expended in the completion of actual energy retrofits by March 31, 2012 and will provide accurate information monitoring implementation progress so that resources can be re-allocated as necessary by July 1, 2010
8. Conformance with California Law – extent to which applicant insures compliance with California contractor licensing law, pulling of building permits compliance with Title 24 field verification protocols and procedures (HERS I), compliance with HERS II regulations for whole-house home energy ratings and energy audits;
9. Collaboration with National and State Programs – extent to which the applicant collaborates with national and state programs, including but not limited to Home

¹⁵ Economically disadvantaged areas shall be determined by the unemployment rate from the Employment Development Department Labor Market Information Division, Report 400 for the Month of June 2009. <http://www.labormarketinfo.edd.ca.gov/>.

Performance with Energy Star; programs administered by HUD targeting low and moderate income housing, such as the Neighborhood Stabilization Program, Energy Efficient Mortgages and other HUD financing; Energy Commission efforts to establish programs to conduct home energy ratings at the time of sale and inclusion of ratings in multiple listing services; programs administered by the CPUC, CSD and/or ARB; the Green Jobs Training Program; extent to which the applicant's program actively coordinates with utility programs and explains how collaboration with utility programs will be accomplished and redundancy will be avoided;

Additional evaluation criteria may be specified in the solicitation document.

D. Measure Checklists

First Tier – Low-cost Walk-through Using Newly Trained Entry Level Labor

- Provide and/or Install
 - CFLs, Low-flow Showerheads, Faucet Aerators
- Identify Appliances Near End of Useful Life that are Eligible for Utility Rebates
 - Energy Star Appliances - Refrigerator, Dish Washer, Clothes Washer
- Provide Information on Ways to Operate home to save energy, D-I-Y Measures, available Rebates, Tax Credits and Financing

Second Tier – Installation Retrofits Using Newly Trained Single Trade Contractors

- Install Attic Insulation (pull permit and comply with T-24 retrofit insulation R-value)
- Insulate Un-Insulated Walls (pull permit and comply with T-24 field verification)
- Install Floor Insulation or duct replacement (pull permit and comply with T-24 field verification)
- Complete Building Envelope Sealing (pull permit, comply with T-24 field verification)
- Complete Duct Sealing (pull permit and comply with T-24 field verification)
- Replace near end of useful life air conditioner or furnace with CEE qualifying model (pull permit, comply with T-24 refrigerant charge, airflow and duct sealing verification)
- Replace near end of useful life water heater with CEE model (solar water heating)
- Install Cool Roof when reroofing (pull permit and comply with T-24 alterations reqs.)
- Install Radiant Barrier (pull permit and comply with T-24 criteria)
- Install Energy Star Windows (pull permit and comply with T-24 alterations reqs.)
- Install WaterSense Toilets, Showerheads, Landscape Irrigation Controllers

Third Tier – Whole-House Deep Retrofits Using HERS Phase II

- California Energy Audit/California HERS Rating
- Integrated approach that addresses all of the home's energy using features, resulting not only in energy savings but also often more valued comfort, indoor air quality, combustion safety, noise attenuation benefits which increase program participation
- Meshes with approaches used for EPA/DOE Home Performance with Energy Star program; deep retrofits are required to meet Energy Action Plan goals for existing residential buildings (40% savings in every home by 2020)

- Correct Thermal Barrier Defects – these defects allow cold and hot air from the attic, crawlspace or outside to leak into the interior walls and under insulation substantially reducing the effectiveness of insulation (assisted with blowerdoor and IR camera)
- Correct Duct Leakage (assisted with ductblaster)
- Correct Insulation Defects (assisted with blowerdoor and IR camera)
- Correct Combustion Safety Hazards
- Correct Air Conditioner and Furnace Installation Defects (assisted with refrigerant charge gauges and airflow devices)
- Install all Second Tier measures determined cost effective and applicable for the house
- Install PV System that is well integrated with energy efficiency