CLEAN AND RENEWABLE ENERGY POLICY AND PROGRAM RECOMMENDATIONS

REPORT OF THE CLEAN AND RENEWABLE ENERGY WORKING GROUP

September 2010

CHICAGO CLIMATE ACTION PLAN

OUR CITY. OUR FUTURE.
“I am confident that if we address the climate change challenge together, with creativity and boldness, then our city will continue to lead the world in designing a path to a more secure future.”

- Mayor Richard M. Daley, Preface to the Chicago Climate Action Plan
INTRODUCTION

Chicago is the third-largest city in the United States and is responsible for approximately 34.6 million metric tons of carbon dioxide equivalent (MMTCO$_2$e) each year.


CCAP Strategy 2 outlines the objective of reducing 5.33 MMTCO$_2$e (~34% of the overall goal) through increasing the proportion of “Clean and Renewable Energy Sources” providing power in and to Chicago. Achieving this ambitious goal will require a thoroughly new approach to energy production and consumption. The CCAP’s Clean and Renewable Energy Working Group has designed a set of policy and program recommendations to chart a course to advance this energy transition; however, the ultimate success of the plan will hinge on the strength of implementation efforts. This Clean and Renewable Energy Policy and Program Recommendations report is intended to be a living document, subject to regular assessments, progress checks, and amendments as the fast-changing energy sector evolves. Meeting the 2020 greenhouse gas reduction goal will require Chicago to be both strategically targeted and opportunistic in its approach by applying best practices as they are understood today while maintaining a creative and engaged process that encourages new ideas to bubble up over time. The CCAP creates a framework for establishing clean and renewable energy as Chicago’s new norm – and then engages the Chicago community to get the job done.

The Clean and Renewable Energy Policy and Program Recommendations are structured to provide a systematic approach to reducing barriers and optimizing resources. Chicago will:

» Advocate for essential policy and program changes at the state level to provide necessary support for robust development of clean and renewable energy.

» Catalyze path-breaking, high-profile “Marquee” projects to create success stories with replicable implementation blueprints.

» Target high-impact sectors where cost-effective installations can help bridge the transition to mainstream penetration.

» Lay the groundwork for mainstream penetration and a new social norm with respect to greenhouse gas reduction.

In conjunction with the other strategies outlined in the Chicago Climate Action Plan, strong and effective implementation of the Clean and Renewable Energy Policy and Program Recommendations will enable our city to make an important impact both here at home and around the world.
THE CLEAN AND RENEWABLE ENERGY WORKING GROUP

In 2009, the City of Chicago engaged the Environmental Law and Policy Center (ELPC) to convene a Clean and Renewable Energy Working Group of clean energy business, environmental and civic leaders. The group’s mission is to develop a portfolio of initiatives to help meet the CCAP goals for reducing greenhouse gas emissions by significantly increasing the supply of clean and renewable energy. ELPC, the City, and the Clean and Renewable Energy Working Group were assisted by expert consultants from the Chicago Manufacturing Center, Center for Neighborhood Technology and World Business Chicago.

The Clean and Renewable Energy Working Group (REWG) was charged with the following tasks:

- **Evaluate and refine the clean and renewable energy targets** and broad strategies in the 2008 Chicago Climate Action Plan.
- **Analyze baseline conditions**, including technology trends, cost curves, existing usage of clean and renewable energy in Chicago, barriers that are impeding development, and best practices that are helping other cities and states reach clean and renewable energy goals.
- **Recommend policies and programs** that will allow Chicago to meet its emission reduction targets, ushering in a new paradigm of energy generation and transmission.

The results of this effort are detailed in this report.
TARGET EVALUATION AND REFINEMENT

The 2008 Chicago Climate Action Plan Clean and Renewable Energy Strategy called for a reduction of 5.33 MMTCO₂e by 2020 -- 34% of the overall CCAP target.

The workplan, as originally conceived, sought GHG reductions from the following actions:

1. Upgrade power plants (2.5 MMTCO₂e)
2. Improve power plant efficiency (1.04 MMTCO₂e)
3. Build renewable electricity (3.0 MMTCO₂e)
4. Increase distributed generation (1.12 MMTCO₂e)
5. Promote household renewable power (0.28 MMTCO₂e)

The REWG’s analysis determined that, although the GHG reduction potential from Actions 1 and 2 is significant, feasibility is limited. The process for upgrading power plants for carbon capture and sequestration (CCS) is still experimental, and it is unlikely that the geology and economics of most of the coal plants in Illinois, including the Fisk and Crawford plants in Chicago, will support CCS retrofits. Furthermore, most of the economic drivers of the power market already provide coal plant owners incentives to maximize power plant efficiency, as feasible. It is likely that a combination of competition from natural gas and renewable energy supply resources, energy efficiency progress and declining electricity demand, and retrofitting requirements for compliance with state and federal air quality regulations will result in some older coal plants being closed before 2020. Some coal plants may also be refired with natural gas or biomass. These developments will result in avoided greenhouse gas emissions that are not fully reflected in current 2020 projections.
TARGET EVALUATION AND REFINEMENT

GHG reductions from greening the power supply and increasing distributed generation in Chicago

After the first two actions were eliminated, the remaining three actions were refined to better align with feasible and effective emission reduction opportunities that the CCAP could achieve through a combination of policy advocacy and direct action. The major elements of the REWG’s recommendations include actions designed to:

» Green the power supply in Illinois
» Increase clean and renewable distributed generation in Chicago

The Illinois Renewable Energy Standard (RES) requires Illinois electric utilities and alternative retail electric suppliers to purchase electricity from renewable energy resources, subject to a cost cap, according to the following schedule:

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>&lt;2025</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>2%</td>
<td>4%</td>
<td>5%</td>
<td>6%</td>
<td>7%</td>
<td>8%</td>
<td>9%</td>
<td>10%</td>
<td>1.5% per year to 25% by 2025</td>
</tr>
</tbody>
</table>

However, full implementation of the RES is not guaranteed. Meeting the aggressive targets will require the Illinois Power Agency (IPA) to procure approximately 22 million MWh of renewable power by 2020, more than three times the amount procured in 2009. That will require changes in state policy and the IPA’s procurement practices. The CCAP can play a lead role in advocating for the policy changes necessary to ensure full implementation of the Illinois RES. Chicago is responsible for approximately 18% of the electricity consumed in the state, and its proportional “share” of the carbon reductions from a fully-implemented RES will grow from approximately 0.8 MMTCO₂e in 2009 to approximately 2.6 MMTCO₂e in 2020.

Increasing Clean and Renewable Distributed Generation in Chicago
Distributed generation (DG) is energy supplied by clean and renewable technologies that are connected at the distribution level of the electric grid (“behind the meter”). DG installations are typically located on or within homes and buildings, and they are much smaller than the utility-scale resources that are connected to the grid at the transmission level. Right now, because of a variety of barriers discussed below, there is a very limited supply of DG resources in Chicago. The Clean and Renewable Energy Policy and Program Recommendations are aimed at dramatically increasing local DG installations and energy production over the next decade. If the high penetration rates described on page 16 of this report are reached, DG could reduce emissions in Chicago by approximately 1.4 MMTCO₂e in 2020.

Full Implementation of the Illinois Renewable Energy Standard Plus Aggressive Penetration of Distributed Generation in Chicago Would Achieve Emission Reductions of Approximately 4.0 MMTCO₂e by 2020. This projection falls 1.3 MMTCO₂e short of meeting the CCAP’s initial 2020 goal of 5.3 MMTCO₂e because of the challenges associated with implementing the coal plant actions. The gap will be made up by increasing reductions in other areas; the CCAP’s overall greenhouse gas reduction target of 25% below 1990 levels by 2020 will be maintained. It is important to note that clean energy technology, policy and economic drivers are undergoing rapid change. “Game changing” factors that could drive clean and renewable energy installations and associated greenhouse gas reductions beyond currently anticipated levels are discussed on page 20.
The baseline conditions analysis was conducted to assess the strengths and weaknesses of the Chicago market for clean and renewable energy, pinpoint barriers to increasing development and help identify the most promising opportunities for achieving greenhouse gas reductions. The REWG project team conducted more than fifty interviews and reviewed analyses from a wide variety of secondary sources.

In addition to local research, the project team looked at more than 25 programs and practices from cities and states across the country that are engaged in ambitious efforts to increase clean and renewable energy generation within their borders. Although each city has a unique set of economic and institutional resources to utilize and policy drivers to leverage, there is much to be learned from the programs that work well in other places.

Based on the REWG’s analysis of Chicago’s unique conditions, emission reduction goals, baseline energy use and projections, current levels of public awareness, acceptance and demand, value and effort assessments and the best renewable energy practices nationwide, the REWG arrived at the following conclusions that provided guidance for the development of the recommendations in this report:

- Policy changes at the state level are needed to create market conditions conducive to increasing clean and renewable energy generation in Illinois and Chicago. The CCAP can help by becoming a strong advocate for these changes.
- Technical, financial, logistical, workforce and informational barriers are creating significant impediments to the development of an active market for clean and renewable energy in Chicago. The CCAP is well-positioned to serve as the convening agent of an effort specifically designed to overcome these barriers.
- Large energy-consuming entities within the commercial, industrial, multi-family residential and municipal sectors are high-impact targets for clean and renewable energy installations and, accordingly, emissions reductions. The CCAP can prioritize these sectors in its implementation plans.
- Clean and renewable energy must approach mainstream penetration in Chicago to meet the CCAP’s 2020 and 2050 emission reduction goals. A systematic, multi-year strategy is needed to lay the groundwork for establishing clean and renewable energy as Chicago’s new norm.

Source: Spire Solar, The Chicago Center for Green Technology
POLICY AND PROGRAM RECOMMENDATIONS

Based on conclusions from the baseline conditions analysis, the REWG developed recommendations for policy and program changes that both drive the market and smooth the road ahead, supporting a new cleaner energy paradigm. Recommendations are designed to result in greenhouse gas and other pollutant reductions from the development of renewable energy, as defined in the Illinois Power Agency Act, including wind power, solar energy, and also clean geothermal (e.g. ground source heat pumps), clean high-efficiency combined heat and power (CHP) and waste heat recovery. Some elements of the strategy must be addressed through policy advocacy at the state level (pages 7-8), as state policy is the essential catalyst for greening the grid through implementation of the Illinois RES and increasing clean and renewable distributed generation in Chicago. Other elements - particularly those intended to facilitate local distributed generation – can be implemented through local programs and policy changes at the city level. A three-tiered approach to increasing distributed generation in Chicago through direct action at the city-level is outlined on pages 8-14. The state policy advocacy recommendations and direct action recommendations should be implemented on parallel paths, as both are essential to the CCAP’s success.

Outline of the CCAP Clean and Renewable Energy Policy and Program Recommendations

State Policy Advocacy
Greening the Power Supply - Ensure Successful Implementation of the Illinois RES
Improve Illinois’ Net Metering Rules
Advocate for Enhanced Market Structures and Regulatory Systems that Incentivize Clean Energy

Local Programs and Policies
Catalyze Pathbreaking “Marquee” Projects
  Provide Technical Resources
  Close Financial Gaps
  Eliminate Logistical Barriers
  Create Opportunities for Hands-On Training and Public Outreach
  Develop and Disseminate Model Project Blueprints
Target High Impact Sectors
  Apply Implementation Blueprints from Marquee Projects Initiative
  Integrate Clean and Renewable Energy Requirements and Opportunities Into Existing Programs
  Build Awareness Among Key Decision Makers
Lay the Groundwork for Mainstream Penetration
  Adopt a Property-Assessed Clean Energy Program
  Make Renewable Energy the New Building Standard
  Streamline the Permitting Process
  Protect Investments - Solar Access Rights
  Reduce Information Gaps
STATE POLICY ADVOCACY

As the Midwest’s population center and its business and political hub, Chicago can wield considerable influence in ongoing and future policy debates concerning policies that will be critical to the success or failure of the CCAP. This section describes opportunities to take a collaborative, sustained, and aggressive approach to advocate for state-level policies that will drive markets for clean and renewable energy across Illinois.

Recommendations


The Illinois RES represents the largest single source of carbon reduction in the CCAP (approximately 2.6 MMTCO₂e in 2020) and successful implementation is essential to meeting Chicago’s greenhouse gas reduction goals. The City and other CCAP partners should be prepared to engage with state policymakers to strengthen and defend the RES over time as changing circumstances require; new, unanticipated challenges and opportunities are sure to arise. The REWG identified a number of short-term policy recommendations that are necessary to ensure that Illinois is able to meet its RES targets:

» Advocate for improving the process for procuring renewable energy. The Illinois Power Agency’s auction should be structured to keep the costs of compliance low and maximize procurement of renewable energy from Illinois-based projects. The primary means for accomplishing these goals are:
  » Procuring the majority of renewable energy credits (RECs) through long-term contracts (10-20 years).
  » Extending the “in-state preference” for renewable energy.
» CCAP partners supported successful legislation in 2010 (now Public Act 096-1437) that introduced a graduated solar “ramp-up” schedule in the RES, building to a 6% solar “carve-out” to be met by 2015. These interim procurement requirements for solar RECs will enable solar projects to develop immediately, rather than waiting until 2015.
» Support efforts to identify possible in-state transmission constraints that may potentially limit bringing Illinois wind power to Illinois markets.

Source: Rural Electric Convenience Cooperative of Auburn, Farmersville, IL
Improve Illinois’ Net Metering Rules
Net metering promotes the development of distributed renewable energy projects at homes, farms, and businesses by allowing customers to use the existing electric grid to essentially “store” excess energy until it is needed for on-site use. The Illinois General Assembly enacted a “first-generation” net metering policy in 2007. Since that time, many states have expanded and improved their net metering policies. States with “best practice” net metering rules, such as Colorado and New Jersey, have been much more successful than Illinois in ramping up markets for distributed generation. The REWG identified several changes that would dramatically improve net metering in Illinois. The City and CCAP partners should support state legislation that will:

- Expand the size of facilities eligible for “true” net metering from 40 KW to at least 2 MW, allowing commercial and industrial entities to receive full credit for the energy they produce on site.
- Eliminate customer participation limits or expand the existing program cap to at least 5% of peak demand.
- Develop a “meter aggregation” or “community” net metering option to allow net metering on properties owned or leased by multiple utility customers, such as condominium or apartment buildings.

Advocate for Enhanced Market Structures and Regulatory Systems that Incentivize Distributed Clean and Renewable Energy
The existing utility rate structure and state policy framework play major roles in encouraging or discouraging distributed clean and renewable energy generation. CCAP partners should work to identify and eliminate local tariffs and policies that burden distributed generation (DG) and replace them with favorable tariffs and policies. The REWG identified several initial priorities, including:

- Supporting efforts to integrate solar hot water, geothermal energy and CHP into Illinois’ natural gas efficiency programs.
- Advocating at the Illinois Commerce Commission for “DG friendly” tariffs that encourage distributed generation by lowering flat customer charges and increasing high-use per-kWh energy charges. Local tariffs and policies that unreasonably burden DG (e.g. excessive stand-by rates, backup rates, and exit fees) should be replaced with more balanced alternatives.
- Advocating for a program within the implementation framework for the Illinois solar carve out that would enable DG solar systems to supply a portion of the solar RECs procured for compliance with the statute. Residential and smaller commercial solar system owners cannot effectively sell RECs into the existing Illinois Power Agency auction process. Illinois could instead offer up-front rebates, production-based incentives and/or feed-in tariffs in exchange for RECs generated by small solar systems.
- Participating in collaborative efforts to develop smart grid infrastructure and advocating for implementation that favors clean and renewable energy.

LOCAL PROGRAMS AND POLICIES: FOCUS ON DISTRIBUTED GENERATION
Catalyze Pathbreaking “Marquee” Projects
The American Recovery and Reinvestment Act (ARRA) was designed by the President and Congress to stimulate the economy in the short term, while laying the groundwork for a more robust, less volatile economic future. Energy efficiency and renewable energy projects present excellent opportunities to achieve these goals. This fit was emphasized in the federal legislation, which provided billions of dollars in energy-efficiency and conservation block grants, loan guarantees, investment tax credits, and recovery zone bonds for clean energy-oriented projects.
These resources created a unique window of opportunity for Chicago; however, it will take more than money to get projects off the ground. The Chicago market for clean and renewable energy is disaggregated, and perceptions of financial risk are high. The Chicago real-estate market does not yet recognize the incremental value that renewable energy systems can provide for a home or building. Chicago needs success stories, both to drive demand and enable supply-side industries to grow.

Recommendations

The REWG recommends that the City act as a convening agent to bring together public and private partners to develop and construct high-profile, integrated and cost-effective clean and renewable energy projects. Building owners, facility managers, project developers, installers, third-party financiers, code and permit officials and utility representatives all have roles to play in implementing successful projects. The Marquee Projects Initiative should optimize the resources and expertise of this broad range of stakeholders. It should identify projects that, when implemented successfully, will serve as “proof of concept” models for the broader community. The Initiative’s work plan should be designed to overcome the clean and renewable energy barriers that were identified in the REWG’s baseline conditions analysis, including technical, financial, policy, logistical, workforce and educational barriers. With that in mind, key elements of the work plan should address the following needs:

Provide Technical Resources

Building owners and facility managers sometimes do not have the technical expertise necessary to assess which types of clean and/or renewable energy system would be suitable for their building, how to optimize a system’s design and integration, or how to analyze the project’s likely return-on-investment. The Marquee Projects Initiative should bring resources to the table to help building owners assemble the needed technical information or provide an index of knowledgeable consultants. Having this up-front work completed will allow project developers to seek sources of financing in fast-paced, competitive credit markets and apply for grants with quick turnaround periods.

Close Financial Gaps

There are good opportunities available today to develop a bankable project based on a combination of financing sources: grants, tax credits, loan guarantees, the value of accelerated depreciation, renewable energy credit aggregation, low-interest financing and power purchase agreements. The Marquee Projects Initiative should help project developers navigate the complexities of these financial tools and identify sources of funding to close small financial gaps that would otherwise prevent good projects from moving forward.

In 2009, a ten Megawatt solar PV facility was installed on a 39-acre brownfield site in the West Pullman Industrial Redevelopment Area on Chicago’s South Side. Private equity, buttressed by federal loan guarantees, will provide financing for the project. The City of Chicago has authorized a long-term, market-rate lease for the land, tax incentives, as well as expedited zoning, permitting, and environmental review.

Source: ELPC
Reduce Logistical Barriers
Real or perceived logistical hurdles associated with permitting, zoning, environmental review and interconnection can impede project development. Through the Marquee Projects Initiative, stakeholders should systematically examine the process of obtaining logistical approvals (e.g., permits, environmental review, zoning approvals) and identify opportunities to smooth the road.

Create Opportunities for Hands-on Training and Public Outreach
The Marquee Projects can serve as hands-on training tools for students entering clean and renewable energy trades through area community colleges and apprenticeship programs. These projects should also incorporate consumer-oriented educational exhibits in publicly accessible locations to capture opportunities to build public awareness about clean and renewable energy systems.

Develop and Disseminate Model Project Blueprints
Lessons learned from implementation of the Marquee Projects, as well as the information about the nuts and bolts of project development -- technical considerations, financial prospectuses and logistical elements -- should be assembled into project blueprints. These should be disseminated to prospective project developers and building owners in the broader Chicago market, particularly in target market sectors for clean and renewable energy systems (see next section).

LOCAL PROGRAMS AND POLICIES: FOCUS ON DISTRIBUTED GENERATION
Target High-Impact Sectors

Chicago can use the lessons learned from the Marquee Projects Initiative to begin building a bridge to economy-wide clean and renewable energy by focusing first on high-impact targets: the commercial and industrial (C&I) sectors, large residential buildings and institutional facilities. Changes made in these buildings can generally produce greater overall greenhouse gas reductions at lower cost and build a strong foundation for mainstream penetration.

High-Impact Targets Produce High-Impact Returns
A study of 2005 Chicago energy usage and greenhouse gas emissions showed...
that although small and large C&I facilities comprise less than 8% of Chicago’s building stock, they were responsible for over 50% of all Chicago’s overall GHG emissions. There are also other reasons why targeting these sectors may be particularly productive. The economics of renewable energy projects usually improve with scale. For example, 2008 data from the California Solar Initiative showed that “solar installations 500 kW and larger cost 17% less on a per-watt basis than residential installations, most of which are smaller than 10 kW” (Interstate Renewable Energy Council, “U.S. Solar Market Trends 2008,” July 2009). Commercial, industrial and large institutional facilities are also able to take advantage of financial tools – e.g., tax credits for eligible for-profit owners, clean energy bonds for government entities, power purchase agreements – in ways that smaller facilities and homes are less able to do. Owners of public or institutional buildings such as schools, hospitals, houses of worship, community centers, libraries and government facilities, can typically tolerate a longer-term return-on-investment, because there is a low risk that these buildings will be sold before the energy investments are recouped. Bundling clean and renewable energy investments in these sectors with energy efficiency improvements will allow for even greater emissions reductions at lower cost.

**Recommendations**

**Apply Implementation Blueprints from the Marquee Projects Initiative**

Project blueprints that model the lessons learned from the Marquee Projects Initiative can help to overcome barriers that limit the growth of clean energy in target sectors.

- Blueprints should contain “how-to” information about the technical aspects of project development, assembling financial resources to create bankable projects with attractive returns, logistical procedures required for project approval and references to resources in the Chicago area.
- CCAP partners should be opportunistic in seeking out delivery mechanisms for project blueprints. The programs discussed below offer initial opportunities to target decision-makers.

**Integrate Clean and Renewable Energy Requirements and Opportunities Into Existing City Programs**

By expanding the scope of established programs to include clean and renewable energy priorities, the City can utilize existing relationships with developers and the business community, as well as make efficient use of staff resources.

- Amend the City’s Sustainable Development Policy and Green Matrix Program to integrate clean and renewable energy requirements for facilities that receive public funding support through City programs.
- Utilize existing Green Business networks (Green Office Challenge, Green Hotels Initiative, Green Chicago Restaurant Co-op, Green Museums Initiative, Chicago Industrial Rebuild Program) to recruit facilities to install clean and renewable energy.
- Bundle together on-site clean and renewable energy installations with on-going energy-efficiency upgrades at Chicago’s municipal buildings, libraries, schools, community centers, etc.
- Maximize the amount of Chicago-sourced renewable energy procured by the City (as feasible, given financial constraints) to comply with the 20% clean energy commitment in the 2001 Energy Plan.

**Build Awareness Among Key Decision-Makers**

Knowledge about clean and renewable energy options is limited among decision-makers in high-impact sectors. In interviews with thirteen Chicago-based property managers, only four said they were familiar or somewhat familiar with combined heat & power (CHP) technology, even though installations can often yield attractive investment returns. This information gap calls for well-organized, relevant and current information delivered via accessible and trusted...
channels. The CCAP can play a role in enhancing information delivery by:

- Engaging independent organizations (not-for-profits, universities, etc.) to present educational road-shows that provide unbiased information about clean and renewable energy opportunities, tailored to sector-specific audiences.
- Installing interactive, educational exhibits with renewable energy installations in publicly visible locations.

**Identify and Address Interconnection Challenges within Chicago’s Network Grid**

Interconnection of distributed generation systems presents special challenges in dense urban areas with “networked” electric grids. In the past, these challenges have constrained robust development of CHP and other clean energy resources in commercial buildings in downtown Chicago. However, these problems are solvable, as demonstrated by current experience in New York City. Chicago should convene a “CHP Partnership” to bring together Commonwealth Edison, local and state government officials, project developers, technical experts and clean energy, environmental and consumer group representatives to identify and resolve specific interconnection challenges on Chicago’s downtown network grid.

**LOCAL PROGRAMS AND POLICIES: FOCUS ON DISTRIBUTED GENERATION**

*Lay the Groundwork for Mainstream Penetration*

Mayor Daley’s ambition for Chicago to be the greenest city in America has been and will continue to be a transformative proposition. It requires strong leadership by Chicago’s government, business and civic leaders. Beyond that, it will also necessitate a transformation of both market and mindset. The CCAP can help create a future in which clean and renewable energy is Chicago’s new norm by introducing improved regulatory policies and frameworks, enabling renewable energy investments through forward-thinking financial strategies, pursuing community education and streamlining the permit and approval processes.

**Recommendations**

**Adopt an Innovative Clean Energy Financing System**

The upfront costs of renewable and clean energy systems remain the major barrier to mainstream penetration. Even when an installation will pay for itself over time, the payback period is often too lengthy for many homeowners and small business owners to reap the benefits. The City should consider financing programs that allow home and business owners to amortize the costs of energy investments over an extended period of time through the property tax payment system. The City and City Council should investigate adopting a clean energy financing program that would:

- Allow Chicago residents and businesses to opt in for voluntary participation.
- Bundle energy efficiency and clean and renewable energy retrofits together.
- Capitalize the initial investment fund with tax-free, low-interest bonds or other low-cost capital.
- Eliminate upfront costs by assessing loan repayments through property tax or utility bill mechanisms.
- Transfer loan obligations to the new owners when a property changes hands, ensuring that costs are borne by all benefactors and free-rider problems are reduced.
Make Clean and Renewable Energy the New Building Standard

The City of Chicago, like most municipalities, regularly amends its building code to keep current with best practices which reflect new and improved industry standards and consumer expectations. Chicago’s energy conservation code was most recently amended in April 2009, permanently moving the market by improving energy efficiency. Some cities (e.g., Austin, New York City and Tucson) have elected to supplement their energy efficiency codes with clean energy requirements. The City should analyze options for integrating solar “readiness,” or clean and renewable energy requirements into its energy code. This approach would have the following advantages:

- The cost of a clean or renewable energy system is substantially higher when installed as a retrofit, rather than as part of an initial construction plan. Just wiring and plumbing a building to be ready to accept solar PV or solar thermal can save thousands of dollars in installation costs, whether the solar system is installed immediately or not.
- Technology-neutral building codes that require new or substantially renovated buildings to meet some or all of their energy needs with clean and/or renewable energy allow architects and builders to find the most efficient and design-friendly route to compliance. Austin, TX adopted a “net-zero energy” building code that applies to all homes built starting in 2015 and could serve as a model for Chicago.
- Requiring clean and renewable energy feasibility assessments for existing commercial and industrial developments, triggered at the point-of-sale, would greatly reduce informational barriers that prevent owners from benefitting from cost-effective projects.
- Jobs in clean and renewable energy installation and services will increase to meet new demand.

Streamline the Permitting Process

As an initial step, the City should work with installers to evaluate existing permit procedures and requirements, identify unnecessary hurdles, and adopt changes as necessary to streamline the permit process for all types of clean and renewable energy installations. Some initial ideas for review include:

- Create a checklist system identifying the requirements and regulations organized by technology-type, system size and land-use zone.
- Differentiate submittal requirements between small and large systems to strike the right balance between safety and bureaucratic efficiency.
- Partner with organizations such as the Illinois Association of Code Enforcement, the Interstate Renewable Energy Council and the Illinois Solar Energy Association to provide training on clean and renewable energy code and safety requirements for building inspectors to help ensure expert and consistent customer service.
- Reach out to other municipalities in the metropolitan area to help establish uniform permitting processes.

Protect Investments - Solar Access Rights

Once investments are made in clean and renewable energy systems, owners must have the security of knowing that the energy production value of their system will be protected. If a new building, or even a tall, leafy tree, goes up to the south of a rooftop solar array, the unanticipated shading could drastically reduce energy output. This has proven to be a sticky issue in places where rooftop solar installations are common. Cities have had to find balanced solutions that respect both solar access and property rights. The City and stakeholders should investigate options for protecting the solar access of property owners in Chicago and adopt a solution before problems arise.
Reduce Information Gaps

The market for renewable energy products in Chicago is complex and unfamiliar – there is a long way to go before purchasing a solar array will seem as easy as replacing a furnace or air conditioner. The Environmental Law & Policy Center commissioned a survey of approximately forty solar installation companies in the Chicago metro-area to gain insight about the local market. The results provided on-the-ground intelligence about the current state of Chicago’s solar industry and barriers that must be overcome in order to achieve mainstream penetration. One of the most salient lessons was that there are many complex decisions involved in moving a solar installation from concept to reality, and additional resources are needed to help consumers access the information they need to make educated and financially smart decisions. The Chicago Retrofit Steering Committee encountered a similar array of informational barriers standing in the way of broader penetration of energy efficiency investments. The Chicago Energy Information System was designed to help address these needs while at the same time leveraging existing communication channels. This online tool is intended to provide consumer-friendly resources about energy efficiency and clean energy, including information about available programs and incentives, a database of local installers, case studies, an ROI calculator and open source applications to support community engagement and innovation. The CCAP should ensure the information provided remains current and relevant as the Chicago market develops and as programs and incentives evolve.

CHICAGO DISTRIBUTED GENERATION PENETRATION SCENARIOS

The level of emission reductions that Chicago can achieve through implementation of the CCAP Clean and Renewable Energy Policy and Program Recommendations by 2020 will depend on: (1) the design, timeline, and success rate of local implementation measures; (2) the scope and scale of outreach programs; (3) the availability of financing; and (4) the reach and applicability of new policies. External factors such as state and federal policy changes, technological breakthroughs and global macro-economic conditions that affect price trends will also impact actual emission reductions (see page 20 for a discussion of “Prospective Game Changers”). Because of the variability of these factors, “Low,” “Medium” and “High” market penetration scenarios for existing building retrofits and new construction were developed based on current market conditions and the anticipated elasticity of the market’s response to policy and program changes. Only the “High” market penetration scenario (illustrated on the next page) comes close to achieving the emission reductions goals outlined in the CCAP. If actual penetration rates are lower, the revised 2020 Emission Reduction Targets outlined on page 17 will not be met.
Existing Building Retrofits

The “High” market penetration scenario assumes that a portion of existing buildings will be retrofitted with clean and renewable energy installations by 2020. Retrofit penetration rates are higher in the “high-impact” commercial, industrial, institutional and multi-family sectors as compared to the single-family residential sector. CHP, solar PV, solar thermal and geothermal are projected to yield measurable greenhouse gas emission reductions in this timeframe. While it may turn out that other clean energy technologies such as fuel cells, small wind generators and biomass energy applications have more emission reduction potential in Chicago than projected in this analysis, it is assumed for now that options to introduce these technologies at scale within city limits will be limited prior to 2020.

### High Market Penetration Scenario (2020)
Clean and Renewable Energy Retrofits for Existing Buildings

<table>
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<tr>
<th>Retrofit Sector</th>
<th>Technology</th>
<th>Penetration Assumptions</th>
<th>Estimated Reduction MMTCO₂</th>
<th>Installed Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential (1,2,3 family)</td>
<td>Solar Thermal</td>
<td>36,290 units (5% of total)</td>
<td>0.025</td>
<td>1.81 million sq-ft</td>
</tr>
<tr>
<td>Commercial, Industrial, Institutional, Multi-family</td>
<td>Solar PV</td>
<td>36,290 units (5% of total)</td>
<td>0.125</td>
<td>174.2 MW</td>
</tr>
<tr>
<td>Commercial, Industrial, Institutional, Multi-family</td>
<td>Solar Thermal</td>
<td>3857 units (7% of total)</td>
<td>0.026</td>
<td>1.93 million sq-ft</td>
</tr>
<tr>
<td>Commercial, Industrial, Institutional, Multi-family</td>
<td>Solar PV</td>
<td>3857 units (7% of total)</td>
<td>0.333</td>
<td>462.8 MW</td>
</tr>
<tr>
<td>Geothermal</td>
<td>1333 units</td>
<td>0.271</td>
<td></td>
<td>100 million sq-ft</td>
</tr>
<tr>
<td>CHP</td>
<td>43 units</td>
<td>0.41</td>
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<td>200 MW</td>
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High Penetration Scenario Total GHG Reductions (MMTCO₂) 1.19

New Construction

The pollution reduction potential of codes and standards that trigger clean and renewable energy integration into newly constructed homes and buildings hinges on two variables: (1) the level of baseline energy efficiency of new structures; and (2) the proportion of total energy needs met through clean and renewable energy. For this analysis, it is assumed that clean energy will be integrated with advanced efficiency measures into new construction codes and that consistent results will be enforced through Chicago’s code inspection process. Because at least 80% of the buildings that exist today will still be standing in 2020, it will take time before the pollution reduction benefits of new construction code requirements are realized, relative to existing building retrofits. On the other hand, if nothing is done to integrate energy efficiency and clean and renewable energy into new construction, future pollution from this sector will eventually offset any progress made in retrofitting existing buildings.

PROJECTED EMISSION REDUCTIONS
Chicago Distributed Generation Market Penetration Scenarios

The 2020 emission reduction results range widely between scenarios: from 0.36 MMTCO₂ e on the low-end to 1.43 MMTCO₂ e on the high-end. Only the “High” market penetration scenario will allow Chicago to hit the revised 2020 emission reduction targets outlined in the next section. This emphasizes the importance of bold action to move forward with an aggressive local agenda, complemented by a strong platform for policy advocacy at the state level.

Cumulative Emissions Reductions:
High, Medium, Low Market Penetration Rate Scenarios - Chicago Distributed Generation

Source: ELPC
A fully-implemented Illinois Renewable Energy Standard (RES), combined with high penetration of distributed generation in Chicago, can potentially reduce emissions by about 4.0 MMTCO$_2$e, or about 75% of the initial target of 5.3 MMTCO$_2$e for the Clean and Renewable Energy Sources Strategy as outlined in the 2008 CCAP. To put this number in context, it is important to remember that more than half of the initial emission reductions for this strategy were projected to come from upgrading and improving coal plants, that these actions have limited feasibility for the reasons described on page 3 of this report, and that the balance of the initial emission reductions projected from this sector will be made up in other areas. More than two-thirds of the reductions from this sector come from reducing the carbon intensity of the Illinois electricity grid through full implementation of the Illinois RES. However, achieving reductions of 4.0 MMTCO$_2$e will also require an enormous increase in the number of clean and renewable energy installations retrofitted on Chicago’s existing building stock, as summarized on page 15 -- more than 600MW of solar PV, 3.7 million square feet of solar thermal, 100 million square feet of geothermal, and 200 MW of CHP, in addition to the installations driven by clean energy standards for new construction. Implementing the recommendations outlined in this report on the timeline detailed on the next page will get Chicago headed in the right direction to meet these ambitious targets.

The revised 2020 Clean and Renewable Energy emissions reduction target represents approximately 26% of the total emissions reductions sought from implementing the Chicago Climate Action Plan. More than two-thirds of these reductions come from full implementation of the Illinois RES.
## Chicago’s Clean & Renewable Energy Work Plan - Timeline

*Priority recommendations are those judged to be most essential for attaining the CCAP’s GHG reduction targets.*

<table>
<thead>
<tr>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014-2020</th>
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### Policy Advocacy Recommendations

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<tr>
<td>Green the Grid by ensuring that the IL Renewable Energy Standard is fully implemented</td>
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<tr>
<td>* Advocate for a long-term strategy for REC procurement.</td>
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<tr>
<td>* Advocate for interim targets for the solar carve-out.</td>
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<td>Identify new in-state transmission capacity if needed to implement the Illinois RES.</td>
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<tr>
<td>Advocate for policy changes at the state level that will drive markets for clean and renewable energy in Chicago</td>
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<tr>
<td>* Advocate for DG-friendly rules for Illinois' solar renewable energy credit market.</td>
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<tr>
<td>* Advocate for amendments to Illinois' net metering provisions.</td>
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<tr>
<td>* Advocate for clean energy-friendly tariff design at the Illinois Commerce Commission.</td>
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<td>Support efforts to integrate solar hot water into Illinois’ natural gas efficiency programs.</td>
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<td>Continue to participate in efforts to develop smart grid infrastructure.</td>
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<tr>
<td>Local Program and Policy Recommendations</td>
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<tr>
<td>Catalyze path-breaking, high-profile “Marquee” Projects</td>
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<tr>
<td>* Assemble stakeholder group to design a Marquee Projects workplan that addresses technical, financial, policy, logistical, workforce and educational barriers.</td>
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<tr>
<td>* Implement Marquee Projects.</td>
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<tr>
<td>* Develop, package and disseminate project blueprints high impact sectors.</td>
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<tr>
<td>Target high-impact sectors (commercial, industrial, institutional, multi-family residential)</td>
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<tr>
<td>* Apply project blueprints and assistance packages developed through the Marquee Project Initiative to high-impact sectors.</td>
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<tr>
<td>* Integrate clean and renewable energy requirements into existing City programs, including the Sustainable Development Policy, Green Matrix Program and other green business initiatives.</td>
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<tr>
<td>* Maximize the amount of Chicago-sourced renewable energy procured by the City to meet 20% target. Bundle clean and renewable DG installations with energy-efficiency upgrades of municipal facilities.</td>
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<tr>
<td>* Build awareness among high-impact sector decision-makers by sponsoring road-shows for important sector forums.</td>
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<tr>
<td>* Work to identify and correct specific interconnection problems within Chicago's network grid.</td>
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<tr>
<td>Lay the groundwork for mass market penetration</td>
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<tr>
<td>* Evaluate and consider adopting innovative clean energy financing systems to alleviate up-front cost barriers. Support state legislation that facilitate local program design.</td>
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<tr>
<td>* Assess the viability of adopting local code changes to make clean and renewable energy Chicago's new standard. Evaluate and consider adopting the following:</td>
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<tr>
<td>* - Building energy code amendments that would require new or substantially renovated buildings to be “solar ready” and/or supply some of their energy needs through DG.</td>
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<tr>
<td>* - Requirements for energy efficiency and CHP/renewable energy feasibility assessments, triggered at the point-of-sale.</td>
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<tr>
<td>* Explore options for protecting solar access rights.</td>
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<tr>
<td>Streamline Chicago’s permit process for clean and renewable energy installations.</td>
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<tr>
<td>Reduce informational barriers by developing and maintaining the online Chicago Energy Information System to provide clean energy information and resources to consumers.</td>
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<tr>
<td>Administration, tracking and reporting requirements</td>
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<tr>
<td>* Hire a Clean and Renewable Energy Manager.</td>
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<tr>
<td>Create a standardized tracking and monitoring process to ensure accurate accounting of clean and renewable energy installations.</td>
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<tr>
<td>Submit progress reports. Metrics: clean and renewable energy installed capacity by sector and technology, MMCO2e reduced.</td>
<td>⭐️ ⭐️</td>
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ADMINISTRATIVE RECOMMENDATIONS

The Clean and Renewable Energy Policy and Program Recommendations outline an ambitious multi-year plan that will require a strong administrative commitment and rigorous tracking and monitoring to ensure that momentum is maintained and goals are met. The REWG recommends the following:

Create a Clean and Renewable Energy Manager position
Effectively implementing the recommendations will require a considerable investment of staff time. The REWG recommends that the CCAP create a dedicated “Renewable Energy Manager” position responsible for implementing the work plan and delivering results.

Establish a Communication, Decision-Making and Accountability Structure
Regular communications between the Chicago Department of Environment, the Mayor’s Office, the CCAP Green Ribbon Committee and the REWG will be essential for assuring that implementation of this strategy maintains momentum, and that the Renewable Energy Manager is sufficiently empowered to work most effectively. The City and the Renewable Energy Manager should continue to deliver progress reports to the REWG every six months, meetings should be made open to the public and meeting materials should be publicly accessible so that interested Chicago stakeholders can engage in the process.

Tracking Progress
Tracking clean and renewable energy installations can be challenging in a large city like Chicago if specific protocols are not in place. Building permit requirements and utility interconnection procedures and existing databases can be used to create a standardized tracking and monitoring process for clean and renewable energy installations. The City and the REWG should devise specific procedures to track installations over time and keep an accurate account of associated greenhouse gas reductions.

Making Adjustments
The REWG’s ongoing charge will be to maximize Chicago’s greenhouse gas reductions from clean and renewable energy sources with a specific target of meeting or exceeding reductions associated with the “high market penetration” scenario outlined on pages 15-16. The program and policy recommendations explained in this report provide a roadmap for the early years of implementation. However, as part of a plan that charts a course through 2020 and on to 2050, it is clear that activities, tactics and priorities will need to adapt to changing external circumstances and, then, pivot when new opportunities arise. As described on the next page, there are a number of potential “game changers” that could have a dramatic effect on Chicago’s ability to meet or exceed 2020 goals. The REWG can provide ongoing input on local implications of external developments that result in market shifts.
The global renewable energy market is changing rapidly. The direction and rate of these changes, in addition to the success of local implementation efforts, will play a major role in determining whether deployment of clean and renewable energy in Chicago will most closely track a High, Medium or Low market penetration scenario. The most significant external factors are described below.

Emerging Policy and Regulation:
- **Federal**: Carbon caps and pricing and important renewable energy legislative initiatives are currently under consideration at the federal level. Pricing carbon will tend to increase the price of coal-generated electricity, and, thereby, increase the value and competitiveness of renewable energy and high efficiency CHP.
- **State**: Changes in state policy affecting implementation of the Illinois Renewable Energy Standard, the solar carve-out and net metering rules can potentially dramatically accelerate market penetration of renewable energy in Chicago and throughout the state.

Emerging Technologies: Clean energy technologies are rapidly changing as wind turbine components and architecture become more efficient, thin-film and other solar power technologies emerge alongside improvements in traditional silicon-based photovoltaics, hybrid system technologies and vertical drilling approaches improve geothermal profitability, and advances are made in batteries, fuel cells, biomass, clean CHP and waste heat recovery technologies that open doors to a greater variety of potential applications.

Shifting Economics: Installed costs of wind, solar and other clean and renewable energy technologies have been steadily declining for the last ten years, due to technological improvements and strong growth rates in production capacity and industry experience. Future price trends are expected to continue on a steady downward slope, although short-term market conditions may create both price troughs and spikes. Increasing costs of renewable energy’s conventional competition -- coal, nuclear and natural gas -- will also have market impacts. Increasing volatility of fossil fuel commodity prices will improve the economics of waste heat recovery and renewable energy generation from the wind, sun and earth where “fuel” is free.

Growing Public Awareness: Even when economically rational behavior should tend to accelerate technology adoption, public awareness (or lack thereof) remains a major factor limiting market penetration rates. Energy efficiency retrofits provide a good example of untapped opportunities. Regardless of whether economic, environmental or social considerations are most likely to drive consumer behavior in this area, as the Chicago public becomes more aware of clean and renewable energy technologies, demand will tend to increase.
CREATING SYNERGIES WITH OTHER CCAP STRATEGIES

This report, combined with the implementation reports for the other CCAP mitigation strategies, sets a course to make steady progress toward Chicago’s ambitious climate action goals. There will be many opportunities to both facilitate and expand CCAP implementation activities by creating synergies between strategies. For example:

Economic Development and Job Growth Opportunities Abound. In addition to a roadmap for reducing greenhouse gas pollution, the Chicago Climate Action Plan can also be regarded as a bold economic development strategy, designed to attract green jobs and investment in new and growing industries. Demand resulting from the market penetration targets outlined for Clean and Renewable Energy and Energy Efficient Buildings would drive associated clean energy/energy efficiency installation and O&M jobs to become one of the fastest growing sectors of the Chicago labor market. Manufacturing jobs could also increase if local industries can ramp up capacity to meet growing demand for their products. Efforts aimed at attracting research and development, recruiting, incentivizing and incubating businesses and commercializing new technologies would generate new growth in high-tech jobs. Chicago and partners should develop and refine plans to take full advantage of the cross-cutting economic development opportunities associated with this plan.

Energy Efficiency and Renewable Energy Can Be Two Sides of the Same Coin. Job training and inspection protocols should be designed so that energy efficiency technicians performing an in-home energy audit also assess solar access and installation feasibility. When energy services companies provide bids to potential commercial or industrial clients, they can add value by including a solar, geothermal or CHP feasibility assessment. Shorter paybacks for energy efficiency can help offset longer paybacks for renewable energy installations. Technicians skilled in both areas are of greater value to Chicago’s workforce and have more opportunities for career advancement.

Plug-In Electric Vehicles (EVs), Including Plug-In Hybrids, Can Offer Synergies Between the Electric and Transportation Sectors. EVs have the potential to provide storage for intermittent energy sources like wind and solar, allowing efficient integration of these resources into the grid without threatening stability. Wind tends to blow more at night. To the extent that EV charging will take place at night (possibly encouraged by discounted off-peak rates), that can help create a stronger market and better prices for new wind power developments. Battery storage capacity provided by grid-connected EVs offers the potential to store nighttime wind power until it is needed during peak hours. Solar generation is better aligned with peak power demand hours, but solar, too, would benefit from services that grid-tied EVs could provide. Solar could also become a valuable source of power for on-peak EV charging, competing with high-polluting coal plants that often operate at the margin in the Northern Illinois power market.

Waste Products Can Be Recycled as Sources of Energy. Biogas from wastewater treatment plants or food and yard-waste processing facilities can be used to fuel CHP installations, offsetting the need for natural gas and making use of resources that would otherwise be wasted. The volatility of natural gas prices can increase the economic risk associated with investments in CHP, but access to a stable supply of biogas can help. The Chicago Waste-to-Profit Network, a partnership between the Chicago Manufacturing Center, the City of Chicago, the State of Illinois and EPA Region V, was set up in 2006 to identify reuse opportunities for the byproducts of Chicago’s manufacturing industries. This partnership is well-positioned to identify and divert useable feedstock that can be used for clean energy generation.
ACKNOWLEDGEMENTS

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CLEAN AND RENEWABLE ENERGY POLICY AND PROGRAM RECOMMENDATIONS

REPORT OF THE CLEAN AND RENEWABLE ENERGY WORKING GROUP