



## Final Scientific/Technical Report

### 1. Award Number: DE-EE0001103

Recipient: Houston Advanced Research Center

Project: Gulf Coast Clean Energy Application Center

PI: Gavin Dillingham

### 2. THERE ARE NO AUTHORIZED DISTRIBUTION LIMITATIONS

### 3. Executive Summary:

The Gulf Coast Clean Energy Application Center was initiated to significantly improve market and regulatory conditions for the implementation of combined heat and power technologies. The GC CEAC was responsible for the development of CHP in Texas, Louisiana and Oklahoma. Through this program we employed a variety of outreach and education techniques, developed and deployed assessment tools and conducted market assessments. These efforts resulted in the growth of the combined heat and power market in the Gulf Coast region with a realization of more efficient energy generation, reduced emissions and a more resilient infrastructure. Specific to research, we did not formally investigate any techniques with any formal research design or methodology.

#### 4. Goals and objectives with actual accomplishments

Goals and Objectives	Accomplishments
<b>Market Assessments – develop non-biased, market specific information to assist potential users as they navigate through the regulatory and permitting environment of the Gulf coast</b>	
Develop permitting and regulatory process document; document/schematic that delineates specific permitting/regulatory process	<ul style="list-style-type: none"> <li>• Texas – Interconnection and Permitting drafts completed</li> <li>• Louisiana – Interconnection and Permitting drafts completed</li> <li>• Oklahoma – Interconnection and Permitting drafts completed</li> </ul>
Develop CHP financing incentive reference one-page document	Texas – draft completed Louisiana – draft completed Oklahoma – draft completed
Coordinate with CEACs through Working Groups; participate in four working groups	<p>The GC CEAC participated in conference calls to organize the Waste Heat to Power Workshop. in Chicago on Sept 29-30. GC CEAC moderated panel on State Policy.</p> <p>The GC CEAC was instrumental in the creation of a working group for technical analysts to share best practices regarding feasibility studies and for general networking and relationship building.</p> <p>GC CEAC attended waste heat working group meetings and provided a project profile (PASE) based on discussions;</p> <p>Participated in critical infrastructure working group and presented at critical infrastructure webinar (April 2013); assisted in drafting white paper "Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities (March 2013).</p> <p>Provided information to Hospitals working group regarding VA Directive 055 regarding CHP in hospitals</p> <p>Project leaders had not wrapped up all deliverables in the WHP, Hospital, Critical Infrastructure and PAWG. We just stopped meeting.</p>



**Education and Outreach – Conduct effective, non-biased education and outreach to key policy and decision makers**

Increase market knowledge and CHP uptake through targeted messaging and outreach	<p><b>Events Speaking and Exhibits</b></p> <p><b>Roadmap Workshop CHP:</b> GC CEAC organized and hosted a Roadmap Workshop in Austin, Texas on November 18-19, 2009. The purpose of the Roadmap was to better organize the CHP industry and committed stakeholders in Texas, Louisiana, and Oklahoma, and to seek their input and support for an Action Plan guiding the activities of the GC RAC over the year or two.</p> <p><b>IDEA:</b> The GC CEAC participated in the IDEA conference in Reno, February 2010. We created and displayed a poster highlighting CHP and district energy projects in our region.</p> <p><b>Texas CHP Policy Forum and Trade Show (November 1-3, 2010)</b> The meeting was held in conjunction with U.S. EPA and the Texas CHP Initiative on November 1-3, 2010 in Austin, Texas. The event drew over 300 attendees and had the involvement and support of 26 sponsors and exhibitors.<sup>1</sup> The meeting greatly increased awareness of CHP to Texas stakeholders and helped galvanize support for CHP, WHR, and district energy</p> <p>GC CEAC delivered the several presentations at the event:</p> <ul style="list-style-type: none"><li>• “Understanding the CHP Family Tree” (Plenary Session)</li><li>• “Texas HB 1831 and HB 4409 Requirements” (Breakout Session)</li><li>• “Qualification: CHP Screening Analysis” (Breakout Session)</li><li>• “CHP in Office Buildings” (Breakout Session)</li></ul> <p><b>Other presentations on CHP</b> in 2010 included ASHRAE Houston Chapter; LBJ School of Public Affairs, USGBC Louisiana Chapter Advocacy Committee Meeting; ASHRAE, Tyler Chapter; IRP Committee Meeting</p> <p><b>Building Resiliency Workshop:</b> Exhibited and disseminated collateral at the Building Resiliency Workshop in New Orleans on March 17-18, 2011.</p> <p><b>2011 Texas Emergency Management Conference</b> Exhibited at the 2011 Texas Emergency Management Conference in San Antonio, Texas, April 26-29, 2011, organized by the Texas Department of Public Safety. The event, which included presentations and workshops, drew roughly 4,000 attendees. The conference combined the previously separate Texas Hurricane Conference and the Texas Homeland Security Conference into one event. An encounter with a Williamson County Emergency Services representative resulted in GC RAC’s first project spurred by HB 1831<sup>2</sup>, a Texas law since 2009 that requires government critical infrastructure to evaluate CHP feasibility prior to construction or major renovation.</p> <p><b>IETC:</b> GC CEAC presented “Waste Heat Recovery/CHP in the Cement Industry,” which included an overview of the cement</p>
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<sup>1</sup> An event detail page that includes the conference program and archived presentations is available at <http://www.gulfcoastcleanenergy.org/NewsEvents/2010CHPConference/tabid/1808/Default.aspx>.

<sup>2</sup> More information on HB 1831 is available at [www.txsecurepower.org](http://www.txsecurepower.org), a website maintained by GC RAC.



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industry, discussion of available technologies and results of a technical and economic analysis on two different cement plants at the IETC, hosted annually by the Energy Systems Laboratory at Texas A&M University, was held in New Orleans, LA on May 17- 19, 2011. The event focused on a wide variety of topics important to industrial energy managers, utility experts, government program managers, vendors and others.

**IECA:** Presentation on GC CEAC's continual goal of coalition building at the IECA's "The Role of Combined Heat & Power and Waste Heat to Energy" workshop, held May 26, 2011 in Houston

**AIA:** Presented on CHP as it relates to green building at the American Institute of Architecture Houston chapter's annual Gulf Coast Green Symposium and Expo, held in Houston, TX, April 15-16, 2010.

**ASHRAE:** Presented on CHP at the ASHRAE Woodlands chapter's regional conference, held in The Woodlands, TX May 7, 2010.

**CADER:** Presented on CHP as it relates to community energy at CADER's (Communities for Advanced Distributed Energy Resources Conference )annual conference, held in La Jolla, CA, April 28-29, 2010

**DOE ITP:** Organized and participated in the DOE ITP's Gulf Coast Energy Efficiency Forum, whose target audience was industrials in Louisiana, Texas, Arkansas, and Mississippi. The event was held in New Orleans, LA, on May 21, 2010.

**CATEE:** Participated on a panel discussion relative to CHP at the annual Clean Air Through Energy Efficiency conference in Austin on Aug. 26, 2010. Highlighted the value proposition of cooling-only CHP in office building applications in Texas.

**EPA CHP Partnership Annual Meeting:** The GC CEAC worked with EPA to organize the annual partners meeting. The meeting was held in Austin on November 2-3, 2010.

**CHP2011:** GC CEAC and the Texas CHP Initiative (TXCHPI) hosted the CHP2011 conference and trade show on Oct. 17-19, 2011 in Houston, Texas. The event featured two workshops, 11 plenary and panel discussions, and 55 speakers. High-profile speakers included U.S. Representative Gene Green (D.-TX), Louisiana Public Service Commissioner Lambert Boissiere, and Texas Sen. Rodney Ellis (D.-Houston). CHP2011 drew roughly 285 attendees, representing about 150 organizations; 31 exhibitors, up from 19 last year; and 14 sponsors from across the country, along with a few international attendees

**CHP2011:** GC CEAC personnel organized and taught two 4-hour technical workshops that were held concurrently the day before the start of CHP2011. The introductory workshop was taught by Dan Bullock, while the advanced workshop was taught by Krishnan Umamaheswar, Ed Mardiat (Burns & McDonnell), and Peter Belmonte (ERM). Links to the workshop course content can be found at <http://www.chpcon2011.com/AGENDA/tqid/2049/Default.aspx>. Ninety people registered for the introductory workshop, while eighty people registered for the advanced one.

**SHSU:** Presented to 75 Sam Houston State University students and faculty on CHP Benefits and Barriers on November 2<sup>nd</sup> 2011. Afterward, met with the University's CFO regarding the feasibility of a CHP installation on campus.



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**Energy Day:** Exhibited at Energy Day, held outside of Houston City Hall on Oct. 15, 2011.

**TML:** Exhibited at the Texas Municipal League annual conference, held in Houston, Texas, on Oct. 12-14, 2011. Hundreds of attendees were at the event.

**EPA Efficiency:** GC CEAC and the Texas CHP Initiative co-hosted a conference call on October 11, 2011 with members of the EPA Efficiency listserv organized by Jennifer Kefer of David Gardiner Associates. The call was in reference to the requirements and status of HB 3268, which is pending at the Texas Commission on Environmental Quality.

**Texas Renewable Energy Industries Association (TREIA) Biomass Panel** Invited to organize a panel on biomass electric at the TREIA conference in Corpus Christi, November 5-7, 2011.

**AIA:** Presented on Combined Heat and Power and District Energy as part of the AIA 2030 Houston lecture series on Nov 30, 2011.

**POHA:** Presented at Port of Houston Authority (POHA) meeting on Dec. 13, 2011 to discuss the Port's Clean Air Strategy Plan. GC CEAC participated in the POHA's Innovative Technologies task force to consider cleaner forms of power generation.

**TAMC:** Exhibited at the Texas Association of Manufacturers Conference on February 14-15, 2012.

**TAPPA:** Presented at the Texas Association of Power Plant Administrators (TAPPA) conference on April 17, 2012 in San Antonio.

**IETC:** Attended the Industrial Energy Technology Conference in New Orleans on May 30-31, 2012. As part of that activity, CEAC personnel hosted a booth to distribute CEAC and DOE materials, attended meetings with Sewerage and Water Board officials, Public Service Commissioners, and other city leaders. A trip was made to Shreveport to address the City of Shreveport Energy Task Force to discuss opportunities for CHP in the City.

**CHP 2012:** Presented at CHP 2012 about the value of CHP to high-tech industry; Set-up booth and engaged industrial stakeholders at CHP 2012. (

GC CEAC was asked not to assist in organization or support of event by DOE HQ. Our role was to be only presenter and exhibiter.)

**CATEE:** Exhibited at CATEE (Clean Air Through Energy Efficiency) in Galveston, TX, November 2012

**TCELAH:** Presented to TCELAH – The Clean Energy Leadership Association of Houston, January 2013

**Siemens:** Presented to Siemens Industries about CHP in the Pulp and Paper and Chemical Manufacturing January 24<sup>th</sup>

**ASHRAE:** Presented to ASHRAE Shreveport chapter on February 20<sup>th</sup>, 2013



	<p><b>IEEE:</b> Presented at IEEE (Institute of Electrical and Electronics Engineers) on April 23<sup>rd</sup>, 2013</p> <p><b>McCord:</b> Presentation to McCord Development about district energy options in Texas on July 3, 2013</p> <p><b>GenSolutions:</b> Presented to GenSolutions, LLC about CHP market opportunities in Texas, May 2013</p> <p><b>Conference Support</b> – Identified and organized speakers for DOE SE Industrial EE &amp; CHP Industrial at IEEE on Jan. 24, 2013 and identified speakers (with IM CEAC) and market SMU Geothermal and Waste Heat to Power Conference on March 13-14, 2013 ; GC CEAC acknowledged as sponsor.</p>
Cost effectively conduct outreach to large audience with the expectation of improving market knowledge and increasing uptake of CHP	<p><b>Webinars</b></p> <p><b>33 Total Webinars with 1,457 attendees<sup>3</sup></b></p> <p>Contributed and presented in national webinar Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities<sup>4</sup></p> <p><b>Regulatory:</b> TX Permit by Rule - Texas CHP Permitting Reform; TX 83<sup>rd</sup> Legislative session wrap-up documenting 4 CHP related bills; and Texas CHP Permitting, Interconnection, and Siting; Louisiana Legislature Recap; CHP in Texas: Increase to 35%...; Texas 82<sup>nd</sup> Legislative Session (Update); Louisiana Regulatory Overview and Legislative Update; Texas 82<sup>nd</sup> Legislative Session Recap; HB 1831: Promoting CHP in Texas' Critical Infrastructure; CHP feasibility studies for critical government buildings.</p> <p><b>Technical:</b> Renewable CHP Using Biomass Feedstocks; Trigeneration Using Adsorption Chillers; CHP: Core Principles and Technologies; CHP: Basics &amp; Benefits; WHR in Cement/Kiln Applications; Absorption Chillers and Technologies; Energy Security in Critical Infrastructure; Cooling-only CHP; Green Building with CHP; Prime Mover Technologies for CHP; Organic Rankine Cycle: Clean Electricity from Waste Heat;</p> <p><b>Project Development:</b> CHP: Basics and Benefits; CHP Feasibility Studies: Process and Software Tools; Streamlining Project Development; CHP Permitting Requirements; Using and Measuring the CHP Advantage; CHP in Colleges and Universities; Financing CHP Projects.</p>
Increase market knowledge and increase CHP uptake through well designed web	<p><a href="http://www.gulfcoastcleanenergy.org">www.gulfcoastcleanenergy.org</a> - GC CEAC led the development and design of the CEAC web sites. Upon being selected by the CEAC web team to serve as the prototype for the seven other RACs, the GC CEAC website underwent refinement and incorporated comments by DOE, the RAC directors, and ICF. GC CEAC completed its website design and disseminated the prototype to the other RACs.</p> <p><b>Web Stats for GC CEAC site</b></p>

<sup>3</sup> <https://www.dropbox.com/sh/jtnghezn635wcd0/Pt7lacuGD3/Webinars>

<sup>4</sup> [http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp\\_enabling\\_resilient\\_energy\\_infrastructure.pdf](http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_enabling_resilient_energy_infrastructure.pdf)



sites and newsletters with dynamic content	<p>Web (May 2010 - present) 29,922 visits 22,134 unique visitors 61,678 page views</p> <p><a href="http://www.txsecurepower.org">www.txsecurepower.org</a> :The GC CEAC created a new website to highlight the requirements under Texas law HB 1831 and HB 4409 for Texas-based organizations and service providers to obtain CHP feasibility studies.</p> <p>GC CEAC was also responsible for the development and maintenance of CHP 2010 and CHP 2011 as stated above.</p> <p><b>Newsletters:</b> The GC RAC's periodic e-mail blasts, or electronic newsletters provided a useful tool in our array of education and outreach tools and generate favorable reviews from stakeholders. Content varies, but generally includes regional case studies, state-specific policy developments, a calendar of hosted and third-party events, spotlights on clean energy champions, references to relevant clean energy activities and publications, and funding opportunities.</p> <p>As planned sent approximately one newsletter per month; Sent 42 newsletters with 23,783 views of newsletter</p>
Increase market knowledge and increase uptake of CHP through in-depth analysis of Gulf Coast CHP markets and opportunities.	<p><b>Publications – all reports/publications attached</b></p> <p><b>“Companies of the Future: Clean, Energy Efficient, Productive and Profitable,”</b> - Director was interviewed by journalist Vicki Wolf on December 13, 2010<sup>5</sup></p> <p><b>“Impacts Resulting from Increasing Natural Gas Fueled Combined Heat and Power from 20 to 35 Percent of Total Electricity Consumption in Texas”</b> at the request of the Texas Lieutenant Governor’s office. The report was intended to support the policy efforts of the Texas CHP Initiative during the legislative session<sup>6</sup>.</p> <p><b>“CHP Policy Action Plan for Texas”</b> - The GC CEAC worked with DOE to draft a CHP Policy Action Plan for Texas. Participated in a DOE organized (RAC Face-to-face) meeting in Reno, NV on February 8, 2010 to update DOE and other RACs about activities in the Gulf Coast region. With the selection of the State of Texas as one of the five leading states for additional policy development activities, the PI supported development of a state policy development action plan. Led by John Cuttica of the Mid-west RAC, the output of this effort was a policy paper and presentation to Kathleen Hogan on April 26, 2010.</p> <p><b>“No Regrets”: Greenhouse Gas Reduction Strategy”</b> -The GC CEAC was a key contributor to a state-run effort (required by Texas SB 184) to develop policy recommendations for “no cost” CO2 mitigation technologies<sup>7</sup></p>

<sup>5</sup> [http://www.cleanhouston.org/business/features/future\\_companies.htm](http://www.cleanhouston.org/business/features/future_companies.htm)

<sup>6</sup> [http://files.harc.edu/sites/gulfcoastchp/reports/GCRAC\\_NG\\_CHP\\_WhitePaper\\_2011.pdf](http://files.harc.edu/sites/gulfcoastchp/reports/GCRAC_NG_CHP_WhitePaper_2011.pdf)

<sup>7</sup> GC CHP et al, [Texas SB 184 “No Regrets” Greenhouse Gas Emissions Reduction Strategies](#), State Energy Conservation Office, Texas Comptroller of Public Accounts (2010)

**“Texas Power Crunch to Create CHP Boom?”**- Article about GC RAC’s mission and activities in the 3Q edition of IDEA’s District Energy magazine.<sup>8</sup>

**“Recommendations for a Balanced Energy Policy: A Briefing Book Presented to the 112th Congress”** -The Consumer Energy Alliance published a report entitled “Recommendations for a Balanced Energy Policy: A Briefing Book Presented to the 112th Congress” on Jan. 24. The report includes a chapter about the merits of CHP, which would have been excluded if not for GC CEAC’s intervention in December.<sup>9</sup>

**“Hurricane helper: Using CHP or 'cogen' to power hospitals can help save lives when storm winds blow.”** An opinion editorial on CHP’s energy security benefits was submitted to the Houston Chronicle in late June and published on July 7.<sup>10</sup> The newspaper’s editorial staff published their own editorial in response, again highlighting the value of CHP.<sup>11</sup> A similar op-ed tailored to Louisiana for the New Orleans Times-Picayune was drafted in late September. In addition, we published a CHP article in September 2010 issue of the Louisiana Green Scene<sup>12</sup> magazine.

**“Proposal: State could make its own electricity for Capitol complex.”** Our work with the Texas Facilities Commission to consider CHP at the Texas Capitol Complex was highlighted on the front page of the Austin American-Statesman on August 22, 2010.<sup>13</sup>

**“Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities”**<sup>14</sup> Collaborated on drafting with ICF and other CEACs – “Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities”

**Marketing Collateral**– This material includes handouts and posters that were used to educate stakeholders at conferences and meetings.<sup>15</sup>

<sup>8</sup> <http://online.qmags.com/COG0112?sessionID=3FA66971BEE36CD994B48557E&cid=662262&eid=17034>

<sup>9</sup> The report is available at [http://gulfcoastcleanenergy.org/Portals/24/Reports\\_studies/CEA%20112th%20Congress%20Report\\_Forum%20Electronic%20Use.pdf](http://gulfcoastcleanenergy.org/Portals/24/Reports_studies/CEA%20112th%20Congress%20Report_Forum%20Electronic%20Use.pdf)  
<sup>10</sup> “Cogeneration can provide relief when power fails.” *Houston Chronicle*. June 7, 2010. Available at <http://www.chron.com/disp/story.mpl/editorial/outlook/7096727.html>. Last accessed June 7, 2010.

<sup>11</sup> “Hurricane helper: Using CHP or 'cogen' to power hospitals can help save lives when storm winds blow.” *Houston Chronicle*. June 9, 2010. Available at (<http://www.chron.com/disp/story.mpl/editorial/7101709.html>). Last accessed on July 29, 2010.

<sup>12</sup> <http://www.louisianagreenscene.com/>

<sup>13</sup> “Proposal: State could make its own electricity for Capitol complex.” Austin American-Statesman. August 22, 2010. Available at <http://www.statesman.com/news/texas-politics/proposal-state-could-make-its-own-electricity-for-873312.html>.

<sup>14</sup> [http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp\\_critical\\_facilities.pdf](http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_critical_facilities.pdf)

<sup>15</sup> [https://www.dropbox.com/sh/jtnghezn635wcd0/4G\\_PkgR\\_zs/Collateral](https://www.dropbox.com/sh/jtnghezn635wcd0/4G_PkgR_zs/Collateral)



Educate public officials and policy makers	<p><b>Texas</b></p> <p><b>BP1 to BP3 EILS-</b> GC CEAC participated in ERCOT's rulemaking to enhance the state's Emergency Interruptible Load Service program for the prevention of blackouts. Worked with ERCOT to change rules supportive of CHP. <b>Outcome:</b> ERCOT's demand response program (formerly known as EILS) was changed to allow distributed generators to be paid for available generating capacity. The new program (now known as ERS), will pay small-scale CHP owners for providing capacity during emergency situations. In addition, the GC CEAC has supported a number of small commercial and residential CHP developers.</p> <p><b>BP2 - TXCHPI</b> - The GC RAC was instrumental in obtaining funding allowing the organization to hire Paul Cauduro as a full-time Executive Director. This is a very significant accomplishment that greatly increases the credibility and appeal of the organization. A larger and stronger TXCHPI is vital to our continued success in Texas.</p> <p><b>BP2 to BP4 – Critical Infrastructure:</b> Developed educational material and worked with legislators and state offices to have CHP assessments considered in all state critical facilities. <b>Outcome: HB 1831 and HB 4409</b> –Requirement for all government entities to formally consider the feasibility of implementing combined heat and power (CHP) technology prior to new construction or major renovation of critical buildings and facilities.</p> <p><b>BP3 to BP4 – Critical Infrastructure:</b> After passage of critical infrastructure legislation, began proposing including similar language in regional resolutions with council's of government. The expectation was to have greater adoption of this requirement in local and regional government organizations. GC CEAC proposed critical infrastructure resolution for consideration by the Dallas County Judge with the intent of proposing it to either the Emergency Preparedness Planning Council and/or Regional Emergency Preparedness Advisory Committee. GC CEAC plans to use the resolution as a template to propose to other CoGs.</p> <p><b>BP4 – Critical Infrastructure – HB 1864</b>- Provided educational support for TXCHPI, including joint meeting with State Energy Conservation Office on strengthening CHP critical facility law. The passage of this law requires SECO to develop guidelines on how states should proceed and develop assessments for state critical infrastructure. <b>Outcome:</b> GC CEAC drafted and submitted guidelines to SECO to be used by state agencies when considering CHP.</p> <p><b>BP4 - CHP-supportive bills passed in Texas legislative session.</b> GC CEAC provided comments and data to TXCHPI</p> <ul style="list-style-type: none"><li>• HB 2049 - Allows CHP operators to sell electricity to multiple neighbors on private wires without being regulated as a retail electric provider, power generation company, or electric retail utility</li><li>• SB 385 - Strengthens/replaces existing state Property Assessed Clean Energy (PACE) to provide special low-cost, financing of energy efficiency, renewable energy, water conservation applications (including CHP)</li><li>• HB 788 - Transfers GHG permitting authority from EPA to TCEQ--should accelerate CHP permitting process</li></ul>
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	<p><b>Louisiana:</b></p> <p><b>BP1 to BP2 – RPS</b> - Actively participated in Public Service Commission Docket 28271, which is evaluating option to establish a Renewable Portfolio Standard in Louisiana. On November 5, 2009, GC CEAC had a conference call with LAPSC Commissioner Jimmy Fields to highlight the opportunities for waste heat recovery in Louisiana and the potential benefits to the state. At this time, the consultant's report filed with the PSC includes waste heat recovery as an allowable technology/measure within the program. On January 15, 2010, the GC RAC filed comments with the PSC regarding the consultant's report and we remained engaged. <b>Outcome:</b> WHR and biomass-CHP allowed as eligible measures within the pilot program, which gained approval from the commission and is now moving forward. Natural gas fired CHP was not allowed within the RPS,</p> <p><b>BP1 to BP4:</b> An ongoing effort to develop a state of CHP and opportunities report for Louisiana similar to the one published by Summit Blue 2008 report. <b>Outcome:</b> The outcome was in <b>BP4</b> DNR commissioned LSU's Center for Energy Studies to develop a report on CHP's current status and potential in the state.</p> <p><b>BP1 to BP4:</b> LA team reached out to the Department of Environmental Quality about pursuing rulemaking to switch the state's permitting process to one based on output-based emissions. <b>Outcome:</b> No decision made.</p> <p><b>BP1 to BP4:</b> GC CEAC Continued to foster an alliance with the Mechanical Contractor's Association and the Association of General Contractors with the goal of assembling a network of organizations and individuals best suited to serve as advocates on a statewide or regional basis. <b>Outcome:</b> With this effort saw the passage of the state resolution on CHP assessments in critical facilities and MCA head Henry Heier was awarded as the 2012 "CHP Policy Champion" and tabbed to speak at DOE's Industrial Energy Efficiency Dialogue on Jan. 24 in Little Rock, AR.</p> <p><b>BP4:</b> GC CEAC initiated a collaboration with Safe Cities, Strong Communities SC2 in New Orleans – intent is to help NOLA identify grant/finance options related to backup power. <b>Outcome:</b> No action taken by City.</p> <p><b>Oklahoma</b></p> <p><b>BP4-</b> Joint meeting (with Oklahoma Sustainability Network) with state Secretary of Energy Mike Ming on March 4, 2013. Outcome: GC CEAC to develop and present educational materials on CHP barriers to state's two major vertical utilities in second quarter</p>
Develop energy/water nexus document specific to CHP adoption	The GC CEAC engaged Texas water policy experts in a study of water savings from existing and potential CHP adoption. Several meetings were held with Dr. Michael Webber (UT Austin), Kate Robertson (EDF), Marilu Hastings (Energy Foundation) on this topic. To promote greater understanding of CHP and water usage we wrote CHP energy-water nexus literature assessment (see attached)



Develop and Refine NOx permit-by-rule from TCEQ as outcome from HB3268 docket	<p><b>BP1</b> GC CEAC worked with the Texas Commission on Environmental Quality about harmonizing CHP permitting issues. The Air Permits Division scheduled rulemaking for necessary revisions and updates in the summer of 2011. GC CEAC participated and filed comments.</p> <p><b>BP2 - House Bill 3268</b><sup>16</sup>, which calls for a permit-by-rule for CHP projects, was signed into law on June 17, 2011 by Governor Rick Perry. The bill requires that the Texas Commission on Environmental Quality open rulemaking to develop air permitting standards specifically for CHP systems. The bill requires that TCEQ implement the new rule by September 1, 2012. The new rule would streamline the permitting process for CHP by making permit levels consistent with technology capabilities.</p> <p><b>BP3-</b> The Texas Commission on Environmental Quality approved the PBR on July 25, 2012. The ruling streamlines permitting for CHP systems up to 8 MW and, if certain controls are applied, up to 15 MW. Due to GC CEAC's and TXCHPI's persistent efforts, the final approved version improved upon the original proposal, which only allowed eligibility up to 5 MW.</p> <p><b>BP4</b> - Worked to get additional refinements to the permit to address concerns relating to oxidation catalyst and supplemental firing for larger, over 8 MW systems and increasing the PBR permit applicability from 15 MW to 18 MW</p> <ul style="list-style-type: none"><li>• No meeting with TCEQ – efforts to reach Commissioner Toby Baker and other officials were in vain<ul style="list-style-type: none"><li>○ 14 MW Project permitted under PBR – Gas Processing Facility – T2 EF Cogeneration LLC; 2.9 MW facility for Fort Bend County jail was permitted.</li></ul></li></ul>
Secure incentives/financial opportunities for CHP in Texas, Oklahoma and Louisiana	<p><b>Texas</b></p> <p><b>BP1 - Energy Efficiency Incentive Program (EEIP)</b>, After successfully petitioning the PUCT to change the program rules regarding CHP, the EEIP has allowed incentive payments for CHP since 2007. The Methodist Hospital (Houston, TX) was the first CHP project to request the incentive from Centerpoint Energy. In 2008, they were turned down for inclusion in the program. In 2009 the GC CEAC was instrumental in linking the Methodist Hospital (Houston, TX) with Good Company Associates (Austin, TX) to request consideration from the PUCT during an open docket commenting period on the energy efficiency program. As a result, the Methodist Hospital successfully negotiated a \$500K incentive payment based upon the electricity consumption avoided through implementation of a thermally-driven chiller powered by the CHP system.</p> <p><b>BP2 – EEIP</b> - GC CEAC remained actively involved in seeking clarification of CHP's eligibility for incentives under the state's (EEIP), which is overseen by the PUC. Members of GC CEAC and TXCHPI met with representatives of PUCT, CenterPoint Energy, and EUMMOT on Feb. 2 and 15 and March 7 and 8 (and several conference calls) regarding incentive methodology for CHP under the EEIP. GC CEAC attended and gave public testimony at a day-long workshop hosted by the PUC on June 30, 2010. Based on staff's recommendation and feedback gathered at the workshop, GC CEAC is likely to succeed in achieving two of its requests for clarification: confirmation of CHP's eligibility under the EEIP and determination of a methodology for utilities to calculate incentive amounts for qualifying CHP projects.</p> <p><b>BP4</b> - Wrote financial opportunities one-pagers for each of three Gulf Coast states (attached)</p>

<sup>16</sup> HB 3268 bill language is available at <http://www.capitol.state.tx.us/BillLookup/History.aspx?LegSess=82R&Bill=HB3268>.



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(281) 364-4060

	<p><b>BP3 to BP4</b> - Providing stakeholder support for Texas PACE in engaging community/local governments and developing guidelines (see SB 385 below). Participating on SECO's PACE Technical committee and Program Design committees for PACE in a BOX development.</p> <p><b>Louisiana</b></p> <p><b>BP2 - BP4 – Louisiana Energy Efficiency Program</b></p> <p>GC RAC filed comments<sup>17</sup> on March 11, 2011 in response to the Louisiana Public Service Commission's solicitation for its proposed statewide Energy Efficiency program (Docket #33106). CHP was singled out in the questionnaire, indicating PSC's increased awareness of CHP. <b>Outcome:</b> Louisiana Public Service Commission has approved energy efficiency rules for the state. Currently, the state is taking comments in regards to the rules. GC CEAC completed draft of material for Louisiana utility education-related new state wide energy efficiency program to help the PSC better understand what has been happening in other states. (see attached)</p>
Reduce costs to potential adopters by providing low cost/no cost technical assistance with the expectation of increased CHP implementation	<p><b>Technical Assistance:</b></p> <p>Completed NASA JSC Space Center (third party review complete)</p> <p>Worked with LAN Engineers on identifying technology for 2.6 MW Fort Bend County Administrative Complex. Project is installed.</p> <p>Acted as prime contractor to DOE/NETL on this project to implement a waste heat recovery boiler at the Clean Harbors facility in Pasadena, Texas. In support of the project, the GC CEAC participated in weekly calls with subcontractor and project developer, Integral Power, and with NETL program administrator Alan Blosser. The Principal Investigator participated in a meeting at NETL on January 19, 2010 to provide an update on the project to NETL staff.</p> <p><b>Feasibility Assessments</b></p> <p><b>BP1</b> - Lockheed (3); Copano Energy; Texas Instruments; First City Tower; VA Hospital Dallas</p> <p><b>BP2</b></p> <p>Houston Hyatt Regency; Shriners Hospital, Galveston, TX</p> <p><b>BP3</b>- Morehouse General Hospital, Orange County and Natchitoches Regional Medical; Richardson Hospital (2<sup>nd</sup> study), Weir SPM, Bayou Club, University of Houston, Cooper Tire (Texarkana). Entergy Thermal, UT Medical Branch, New Orleans Sewage and Water Board, and FreeScale Semiconductor.</p>

<sup>17</sup> GC RAC's comments are available at [http://files.harc.edu/sites/gulfcoastchp/policy/louisiana/psc\\_31106\\_e/GC-RAC-comments\\_31106\\_20110311.pdf](http://files.harc.edu/sites/gulfcoastchp/policy/louisiana/psc_31106_e/GC-RAC-comments_31106_20110311.pdf).



	<p><b>BP4</b> - Richardson Hospital (2<sup>nd</sup> study), Kik Custom Products (2), Port of Houston Authority (Part 1), City of Houston 69<sup>th</sup> St. WWTP (Part 1), Ahreberg Milling Company, Corpus Christi Military Base, Lone Star College University Park and Lone Star College Cy-Fair</p> <p><b>Detailed Assessments</b></p> <p>Texas Facilities Commission – Phase 1</p> <p>Part 1 and 2 of City of Houston 69<sup>th</sup> feasibility study</p> <p>VA Hospital Dallas</p> <p>Houston Hyatt Regency</p>
Increase uptake of CHP through the development and deployment of CHP opportunity assessment tools and case studies	<p><b>GIS Tool:</b> The GC CEAC mapped existing CHP plants &amp; installations in Texas and Louisiana using GIS Software. A macroscopic view of the installations can now be easily discerned on a topographic map. Additionally, one can zoom in and out to review specific installations and locations. Subsequent to zooming in, clicking on any of the installation enables a pop-up window, which provides further information such as plant capacity, fuel type, address, SIC code and market segment. The map, developed using free third party software ARCGIS, can be viewed by clicking on the link below <a href="http://www.arcgis.com/home/webmap/viewer.html?webmap=c4d376b3a91d40b0b0332b40190cd1d3">http://www.arcgis.com/home/webmap/viewer.html?webmap=c4d376b3a91d40b0b0332b40190cd1d3</a> And <a href="http://www.arcgis.com/home/webmap/viewer.html?webmap=7e678696e5a24f128bbb6e0685abc90d">http://www.arcgis.com/home/webmap/viewer.html?webmap=7e678696e5a24f128bbb6e0685abc90d</a></p> <p><b>Feasibility Assessment Tool:</b> The GC CEAC developed a user-friendly, open source, downloadable CHP analysis tool to examine potential of combined heat and power systems. 12 months of utility consumption and costs (electricity and gas) along with operational hours are enough to generate results. For a user more familiar with CHP systems, optional inputs can be changed to tailor site-specific conditions. Economic and technical outputs for four different scenarios are presented as outputs. Refined existing GC CEAC tool – completed and now includes life cycle assessment component.</p> <p><b>Project Profiles</b></p> <ul style="list-style-type: none"><li>• WHR plant Port Arthur Steam Energy (Port Arthur, TX)</li><li>• Targa Resources</li><li>• The City of Dallas Wastewater Treatment Facility</li><li>• The Methodist Hospital</li><li>• Thermal Energy Corp (TECO)</li><li>• BP Helios</li></ul>

## GULF COAST CLEAN ENERGY APPLICATION CENTER MANAGEMENT REPORTING

### 5. Summary of Project Activities

#### BP1

##### Technical Assistance

- The GC CEAC completed seven Screening Analyses which included Texas Instruments; First City Tower, VA Hospital Dallas and Lockheed Martin (4 sites);
- Conducted one Detailed Analysis for Texas Facilities Commission (Phase 1)
- Creation of PAWG: The GC CEAC was instrumental in seeking creation of a working group for technical analysts to share best practices regarding feasibility studies and for general networking and relationship building.

##### Education and Outreach

###### Webinars

- The GC CEAC delivered seven webinars. Topics included CHP in Universities and Colleges; HB 1831: Promoting CHP in Texas' Critical Infrastructure; CHP: Basics and Benefits; and CHP feasibility studies for critical government buildings.

###### Regulatory Activity

- The Oklahoma Legislature passed HB 3028, which created a voluntary RPS that includes WHR and CHP as eligible measures.
- Texas: GC CEAC and TXCHPI members submitted revisions to pro-CHP strategy proposals under the SB 184 "No Regrets" project.
- GC CEAC was instrumental in successfully negotiating a financial incentive for the Methodist Hospital CHP project. The project received approximately \$850,000 from the Energy Efficiency Incentive program administered by the Public Utility Commission of Texas.

###### Publications

- The GC CEAC published an opinion-editorial on CHP's energy security benefits in the *Houston Chronicle*<sup>18</sup>.
- The GC CEAC worked with DOE to draft a CHP Policy Action Plan for Texas. The GC CEAC was a key contributor to a state-run effort (required by Texas SB 184) to develop policy recommendations for "no cost" CO<sub>2</sub> mitigation technologies like CHP<sup>19</sup>.

###### Events

- HARC organized and hosted a Roadmap Workshop in Austin, Texas on November 18-19, 2009. The purpose of the Roadmap was to better organize the CHP industry and committed stakeholders in Texas, Louisiana, and Oklahoma, and to seek their input and support for an Action Plan guiding the activities of the GC CEAC during the first budget period. Stakeholders from Texas and Louisiana attended the Workshop.
- GC CEAC participated on a panel discussion relative to CHP at the annual Clean Air Through Energy Efficiency conference in Austin on Aug. 26. GC CEAC highlighted the value proposition of

<sup>18</sup> <http://www.chron.com/default/article/Hurricane-helper-Using-CHP-or-cogen-to-power-1704570.php> and <http://www.chron.com/opinion/outlook/article/Cogeneration-can-provide-relief-when-power-fails-1699645.php>

<sup>19</sup> GC CHP et al, [Texas SB 184 "No Regrets" Greenhouse Gas Emissions Reduction Strategies](#), State Energy Conservation Office, Texas Comptroller of Public Accounts (2010)

cooling-only CHP in office building applications in Texas.

- Texas CHP Policy Forum: The GC CEAC worked with EPA CHP Partnership and TXCHPI to organize a policy forum in Austin, a key part of our policy strategy in Texas.
- AIA Certified CHP Presentation: Rich Herweck of TXCHPI has successfully certified a CHP presentation with AIA, opening the door for much greater outreach to architects.

#### Market Assessments

- The GC CEAC completed a case study for the Targa Resources CHP plant<sup>20</sup> and the University of Texas, Austin CHP Plant<sup>21</sup>

## BP2

#### Technical Assistance

- Screening Analysis - completed one from the Shriners' Hospital in Galveston, TX and the Houston Hyatt Regency.
- Detailed Analysis - completed one Level 2 feasibility study (Dallas VA Hospital). Following delivery of the Level 2 analysis last quarter, we continued to support the Texas Facilities Commission efforts to implement CHP at the Texas State Capitol Complex. Also, conducted a detailed CHP study for the VA Dallas hospital

#### Education and Outreach

- *Webinars*
  - 24 webinars were conducted during BP2, drawing approximately 800 attendees. Webinar registrations were used to expand our network, especially in regard to marketing CHP2011. Topics included:
    - **Regulatory:** Louisiana Legislature Recap; CHP in Texas: Increase to 35%...; Texas 82<sup>nd</sup> Legislative Session (Update); Louisiana Regulatory Overview and Legislative Update; Texas 82<sup>nd</sup> Legislative Session Recap;
    - **Technical:** Renewable CHP Using Biomass Feedstocks; Trigeneration Using Adsorption Chillers; CHP: Core Principles and Technologies; CHP: Basics & Benefits; WHR in Cement/Kiln Applications; Absorption Chillers and Technologies; Energy Security in Critical Infrastructure; Cooling-only CHP; Green Building with CHP; Prime Mover Technologies for CHP; Organic Rankine Cycle: Clean Electricity from Waste Heat;
    - **Project Development** CHP Feasibility Studies: Process and Software Tools; Streamlining Project Development; CHP Permitting Requirements; Using and Measuring the CHP Advantage; CHP in Colleges and Universities; Financing CHP Projects.
- *Events*
  - Exhibited at the Texas Municipal League annual conference, held in Houston, Texas, on Oct. 12-14; and exhibited at Energy Day, in Houston on October 15
  - Delivered presentations on CHP at the annual Industrial Energy Technology Conference on May 17-19 and presented at the Industrial Energy Consumers of America's CHP workshop in Houston on May 26 .

<sup>20</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/Targa.pdf>

<sup>21</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/UT-Austin.pdf>



- Texas CHP Forum and Tradeshow (aka CHP 2011, CHP 2012, CHP 2013) The first year it was called the CHP Forum and Tradeshow. The event drew over 300 attendees and 26 sponsors and exhibitors.
- *Regulatory Activity*
  - GC CEAC helped Methodist Hospital in Houston to become the first CHP project in Texas to receive an incentive through the PUCT's EEIP program.
  - TX CHPI - As a direct result of GC CEAC efforts, the TXCHPI was able to hire a full-time, professional Executive Director in the quarter. This is a very significant accomplishment that greatly increases the credibility and appeal of the organization.
  - GC CEAC filed comments in response to the Louisiana Public Service Commission's solicitation to participants about developing a statewide energy efficiency program. CHP was singled out in the questionnaire, indicating PSC's increased awareness and consideration of CHP.
  - The Louisiana Public Service Commission approved a pilot RPS program that includes WHR and biomass-CHP as eligible resources! The GC CEAC filed numerous comments and testimony supporting the inclusion and our work was instrumental in this outcome.
- *Publications*
  - Published white paper titled "Impacts Resulting from Increasing Natural Gas Fueled Combined Heat and Power from 20 to 35 Percent of Total Electricity Consumption in Texas" at the request of the Texas Lieutenant Governor's office. The report supported policy efforts of the Texas CHP Initiative during the legislative session<sup>22</sup>.

### Market Assessments

- *Case Studies:* The GC CEAC completed four project profiles: Thermal Energy Corporation (TECO)<sup>23</sup> and BP Helios Plaza<sup>24</sup>; City of Dallas Wastewater Treatment Plant<sup>25</sup> and The Methodist Hospital<sup>26</sup>.

### BP3

### Technical Assessments

- Screening Analysis completed seven in BP3: Morehouse General Hospital, Orange County, Port of Houston, the University of Houston-Main, Natchitoches Regional Medical Center Entergy Thermal, and FreeScale Semiconductor
- Detailed Analysis -
  - New Orleans Sewerage and Water Board (New Orleans, LA) – Four options presented included a 2.8 MW reciprocating engine, 4.6 MW gas turbine, 9.5 MW gas turbine, and four 4.6 MW gas turbines—each configured with HRSGs.
  - Richardson Medical Center (Rayville, Louisiana) – Evaluated feasibility of 200kW microturbine, HRSG, and 45-ton double effect absorption chiller
  - University of Texas Medical Branch (Galveston, Texas) – Five options presented included 9.2-11.4 MW gas turbines or a 16 MW reciprocating engine with various configurations involving duct burners, steam turbines, HRSGs, steam-driven chillers, and/or boilers.
- The Williamson County Emergency Services Operations Center in Georgetown, Texas procured

<sup>22</sup> [http://files.harc.edu/sites/gulfcoastchp/reports/GCRAC\\_NG\\_CHP\\_WhitePaper\\_2011.pdf](http://files.harc.edu/sites/gulfcoastchp/reports/GCRAC_NG_CHP_WhitePaper_2011.pdf)

<sup>23</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/TECO.pdf>

<sup>24</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/BP-Helios.pdf>

<sup>25</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/CityofDallasWWT.pdf>

<sup>26</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/MethodistHospital.pdf>

a Level 1 Feasibility Study from Parsons Corporation, the first known study resulting directly from HB 1831 pertaining to critical government facilities in Texas.

## **Education and Outreach**

- *Webinars*
  - The GC CEAC delivered seven webinars. Topics included CHP in Universities and Colleges; HB 1831: Promoting CHP in Texas' Critical Infrastructure; CHP: Basics and Benefits; and CHP feasibility studies for critical government buildings.
- 
- *Events*
  - GC CEAC organized two 4-hour technical workshops that were held concurrently on October 17, the day before the start of CHP2011.
  - *CHP2011 Event:* GC CEAC and the Texas CHP Initiative (TXCHPI) hosted the CHP2011 conference and trade show on Oct. 17-19 in Houston, Texas. The event featured two workshops, 11 plenary and panel discussions, and 55 speakers. High-profile speakers included U.S. Representative Gene Green (D.-TX), Louisiana Public Service Commissioner Lambert Boissiere, and Texas Sen. Rodney Ellis (D.-Houston). The event drew roughly 285 attendees, representing about 150 organizations; 31 exhibitors, up from 19 last year; and 14 sponsors from across the country.
- *Publications*
  - Authored an article about GC RAC's mission and activities in the 3Q edition of IDEA's *District Energy* magazine<sup>27</sup>.
- *Regulatory Activity*
  - The Texas Commission on Environmental Quality conducted rulemaking on a CHP Permit-by-Rule following the passage of HB 3268 in 2011. Technical information was provided to TCEQ staff during the public comment process following publication of the draft rule. The Texas Commission on Environmental Quality approved a permit by rule (PBR) on July 25 for CHP systems up to 15 MW. The PBR is expected to reduce regulatory delays and eliminate some equipment costs associated with CHP systems.
  - *Texas EILS rulemaking* – GC CEAC and Texas CHP Initiative members participated in ERCOT's rulemaking to enhance the state's Emergency Interruptible Load Service program for the prevention of blackouts. The new Emergency Response System, which will replace EILS, is designed to encourage demand response participation by distributed generators.

## **Market Assessments**

- Collaborated with other RAC directors on a market sector work plan about critical infrastructure, which was completed in April.
- The GC CEAC has plotted existing CHP plants & installations in Louisiana and Texas using GIS Software. Clicking on any of the installations enables a pop-up window, which provides further information such as plant capacity, fuel type, address, SIC code and market segment.

## **BP4**

### **Technical Assessments**

- Completed screening analyses: Richardson Hospital (2<sup>nd</sup> study), Bayou Club, Weir SPM, Kik Custom Products (2), University of Houston, Port of Houston Authority, Ahreberg Milling

<sup>27</sup> <http://online.qmags.com/COG0112?sessionID=3FA66971BEE36CD994B48557E&cid=662262&eid=17034>

Company, Corpus Christi Military Base, Lone Star College University Park, and Cooper Tire (Texarkana) in partnership with SE CEAC.

- Detailed analysis – City of Houston 69<sup>th</sup> Street Waste Water Treatment Plant – round two
- Upgraded CHP feasibility tool to include life cycle cost analysis; Excel tool is attached.

## Education and Outreach

### Webinars

- Conducted webinars on TX Permit by Rule - Texas CHP Permitting Reform; TX 83<sup>rd</sup> Legislative session wrap-up documenting 4 CHP related bills; and Texas CHP Permitting, Interconnection, and Siting
- Participated in national webinar Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities<sup>28</sup>

### Publications

- Collaborated on drafting with ICF and other CEACs - Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities<sup>29</sup>
- Drafted white paper on energy water nexus looking at water saving benefits of CHP
- Drafted and finalized state energy efficiency policy one page education document for Louisiana legislator
- Drafted How To guide on interconnection in Texas,<sup>30</sup> Louisiana,<sup>31</sup> and Oklahoma<sup>32</sup>
- Drafted How To guide on air permitting in Texas<sup>33</sup>, Louisiana<sup>34</sup> and Oklahoma
- Drafted three one-page documents on financing options in Louisiana<sup>35</sup>, Oklahoma<sup>36</sup>, and Texas<sup>37</sup>.

### Meetings and Conferences

- Initiated first true contact with Oklahoma and began dialogue with Montelle Clark at Oklahoma Sustainability Network. The outcome of the initial meeting was a meeting with state Energy Secretary Michael Ming on March 4 regarding utility barriers to CHP implementation. Mr. Ming was sympathetic and invited GC CEAC and OSN to provide outreach materials to the state's two major integrated utilities in June.
- GC CEAC team participated in CHP2012 (exhibited, presented, and networked). Presented on CHP applications to reduce downtime costs in hi-tech industry.
- GC CEAC met with Texas's State Energy Conservation Office Director Dub Taylor in February about tightening enforcement of a state law requiring CHP evaluations by certain critical government facilities.
- Identified speakers and helped with the coordination of the DOE SE Industrial Energy Efficiency & CHP Regional Dialogue Meeting in January.
- Exhibited at Industrial Energy Technology Conference (IETC) meeting in May; While there held several meetings with New Orleans policymakers, developers, and prospective adopters while in town attending the annual Industrial Energy Technology Conference in May including the City of Louisiana and the School Recovery Board.

### Regulatory Activity

<sup>28</sup> [http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp\\_enabling\\_resilient\\_energy\\_infrastructure.pdf](http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_enabling_resilient_energy_infrastructure.pdf)

<sup>29</sup> [http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp\\_critical\\_facilities.pdf](http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_critical_facilities.pdf)

<sup>30</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_TX/TX\\_interconnection.pdf](http://gulfcoastchp.org/Portals/24/Policy_TX/TX_interconnection.pdf)

<sup>31</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_LA/LA\\_interconnection.pdf](http://gulfcoastchp.org/Portals/24/Policy_LA/LA_interconnection.pdf)

<sup>32</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_OK/OK\\_interconnection.pdf](http://gulfcoastchp.org/Portals/24/Policy_OK/OK_interconnection.pdf)

<sup>33</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_TX/TX\\_permitting.pdf](http://gulfcoastchp.org/Portals/24/Policy_TX/TX_permitting.pdf)

<sup>34</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_LA/LA\\_permitting.pdf](http://gulfcoastchp.org/Portals/24/Policy_LA/LA_permitting.pdf)

<sup>35</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_LA/LA\\_financing.pdf](http://gulfcoastchp.org/Portals/24/Policy_LA/LA_financing.pdf)

<sup>36</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_OK/OK\\_financing.pdf](http://gulfcoastchp.org/Portals/24/Policy_OK/OK_financing.pdf)

<sup>37</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_TX/TX\\_financing.pdf](http://gulfcoastchp.org/Portals/24/Policy_TX/TX_financing.pdf)

- Through analysis and education supported the passage of several CHP-supportive bills in the Texas Legislature:
  - HB 1864 - Directs SECO to issue “guidelines” on existing critical infrastructure CHP laws
  - HB 2049 - Allows CHP operators to sell electricity to multiple neighbors on private wires without being regulated as a retail electric provider, power generation company, or electric retail utility
  - SB 385 - Strengthens/replaces existing state Property Assessed Clean Energy (PACE) to provide special low-cost, financing of energy efficiency, renewable energy, water conservation applications (including CHP)
  - HB 788 - Transfers GHG permitting authority from EPA to TCEQ--should accelerate CHP permitting process

#### Market Assessments

- Through the efforts of the GC CEAC the Louisiana Department of Natural Resources commissioned LSU's Center for Energy Studies to develop a report on CHP's current status and potential in the state. The study is similar to the 2008 Summit Blue study called Power in Texas.
- Completed Project Profile for WHR plant Port Arthur Steam Energy (Port Arthur, TX), approved by DOE<sup>38</sup>

#### 6. Products developed under this award:

- **“Companies of the Future: Clean, Energy Efficient, Productive and Profitable,”** - Director was interviewed by journalist Vicki Wolf on December 13, 2010<sup>39</sup>
- **“Impacts Resulting from Increasing Natural Gas Fueled Combined Heat and Power from 20 to 35 Percent of Total Electricity Consumption in Texas”** at the request of the Texas Lieutenant Governor's office. The report was intended to support the policy efforts of the Texas CHP Initiative during the legislative session<sup>40</sup>.
- **“CHP Policy Action Plan for Texas”** - The GC CEAC worked with DOE to draft a CHP Policy Action Plan for Texas. Participated in a DOE organized (RAC Face-to-face) meeting in Reno, NV on February 8, 2010 to update DOE and other RACs about activities in the Gulf Coast region. With the selection of the State of Texas as one of the five leading states for additional policy development activities, the PI supported development of a state policy development action plan. Led by John Cuttica of the Mid-west RAC, the output of this effort was a policy paper and presentation to Kathleen Hogan on April 26, 2010.
- **“No Regrets”: Greenhouse Gas Reduction Strategy”** -The GC CEAC was a key contributor to a state-run effort (required by Texas SB 184) to develop policy recommendations for “no cost” CO2 mitigation technologies<sup>41</sup>
- **“Texas Power Crunch to Create CHP Boom?”**- Article about GC RAC's mission and activities in the 3Q edition of IDEA's District Energy magazine<sup>42</sup>.
- **“Recommendations for a Balanced Energy Policy: A Briefing Book Presented to the 112th Congress”** -The Consumer Energy Alliance published a report entitled “Recommendations for a Balanced Energy Policy: A Briefing Book Presented to the 112th Congress” on Jan. 24. The

<sup>38</sup> [http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/PASE\\_project-profile.pdf](http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/PASE_project-profile.pdf)

<sup>39</sup> [http://www.cleanhouston.org/business/features/future\\_companies.htm](http://www.cleanhouston.org/business/features/future_companies.htm)

<sup>40</sup> [http://files.harc.edu/sites/gulfcoastchp/reports/GCRAC\\_NG\\_CHP\\_WhitePaper\\_2011.pdf](http://files.harc.edu/sites/gulfcoastchp/reports/GCRAC_NG_CHP_WhitePaper_2011.pdf)

<sup>41</sup> GC CHP et al, Texas SB 184 “No Regrets” Greenhouse Gas Emissions Reduction Strategies, State Energy Conservation Office, Texas Comptroller of Public Accounts (2010)

<sup>42</sup> <http://online.qmags.com/COG0112?sessionID=3FA66971BEE36CD994B48557E&cid=662262&eid=17034>

report includes a chapter about the merits of CHP, which would have been excluded if not for GC CEAC's intervention in December.<sup>43</sup>

- **"Hurricane helper: Using CHP or 'cogen' to power hospitals can help save lives when storm winds blow."** An opinion editorial on CHP's energy security benefits was submitted to the Houston Chronicle in late June and published on July 7.<sup>44</sup> The newspaper's editorial staff published their own editorial in response, again highlighting the value of CHP.<sup>45</sup> A similar op-ed tailored to Louisiana for the New Orleans Times-Picayune was drafted in late September. In addition, we published a CHP article in September 2010 issue of the Louisiana Green Scene<sup>46</sup> magazine.
- **"Proposal: State could make its own electricity for Capitol complex."** Our work with the Texas Facilities Commission to consider CHP at the Texas Capitol Complex was highlighted on the front page of the Austin American-Statesman on August 22, 2010.<sup>47</sup>
- **"Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities"** Collaborated on drafting with ICF and other CEACs; April 2013.<sup>48</sup>
- **"Energy –Water Nexus and CHP: State of the Literature"** - Drafted white paper on energy water nexus looking at water saving benefits of CHP<sup>49</sup>
- **"Combined Heat and Power Best Practices, Best Fits to Meet Louisiana's Energy Efficiency Goals"** - Drafted and finalized state energy efficiency policy one page education document for Louisiana legislator<sup>50</sup>
- **"How-To-Guide on interconnection"** developed for Texas,<sup>51</sup> Louisiana,<sup>52</sup> and Oklahoma<sup>53</sup>
- **"How-To-Guide on air permitting"** developed for Texas<sup>54</sup>, Louisiana<sup>55</sup> and Oklahoma<sup>56</sup>
- **"Financing CHP Options"** developed for Louisiana<sup>57</sup>, Oklahoma<sup>58</sup>, and Texas<sup>59</sup>.

#### Web Sites:

<sup>43</sup> The report is available at

[http://gulfcoastcleanenergy.org/Portals/24/Reports\\_studies/CEA%20112th%20Congress%20Report\\_Forum%20Electronic%20Use.pdf](http://gulfcoastcleanenergy.org/Portals/24/Reports_studies/CEA%20112th%20Congress%20Report_Forum%20Electronic%20Use.pdf).

<sup>44</sup> "Cogeneration can provide relief when power fails." *Houston Chronicle*. June 7, 2010. Available at

<http://www.chron.com/disp/story.mpl/editorial/outlook/7096727.html>. Last accessed June 7, 2010.

<sup>45</sup> "Hurricane helper: Using CHP or 'cogen' to power hospitals can help save lives when storm winds blow." *Houston Chronicle*. June 9, 2010. Available at (<http://www.chron.com/disp/story.mpl/editorial/7101709.html>). Last accessed on July 29, 2010.

<sup>46</sup> <http://www.louisianagreenscene.com/>

<sup>47</sup> "Proposal: State could make its own electricity for Capitol complex." Austin American-Statesman. August 22, 2010. Available at <http://www.statesman.com/news/texas-politics/proposal-state-could-make-its-own-electricity-for-873312.html>.

<sup>48</sup> [http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp\\_critical\\_facilities.pdf](http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_critical_facilities.pdf)

<sup>49</sup> [http://www.gulfcoastchp.org/Portals/24/Policy\\_TX/CHP-energy-water-lit-review\\_2013.pdf](http://www.gulfcoastchp.org/Portals/24/Policy_TX/CHP-energy-water-lit-review_2013.pdf)

<sup>50</sup> [http://www.gulfcoastchp.org/Portals/24/Policy\\_LA/LA-EE\\_program\\_one-pager\\_HARC.pdf](http://www.gulfcoastchp.org/Portals/24/Policy_LA/LA-EE_program_one-pager_HARC.pdf)

<sup>51</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_TX/TX\\_interconnection.pdf](http://gulfcoastchp.org/Portals/24/Policy_TX/TX_interconnection.pdf)

<sup>52</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_LA/LA\\_interconnection.pdf](http://gulfcoastchp.org/Portals/24/Policy_LA/LA_interconnection.pdf)

<sup>53</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_OK/OK\\_interconnection.pdf](http://gulfcoastchp.org/Portals/24/Policy_OK/OK_interconnection.pdf)

<sup>54</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_TX/TX\\_permitting.pdf](http://gulfcoastchp.org/Portals/24/Policy_TX/TX_permitting.pdf)

<sup>55</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_LA/LA\\_permitting.pdf](http://gulfcoastchp.org/Portals/24/Policy_LA/LA_permitting.pdf)

<sup>56</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_OK/ok\\_permitting.pdf](http://gulfcoastchp.org/Portals/24/Policy_OK/ok_permitting.pdf)

<sup>57</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_LA/LA\\_financing.pdf](http://gulfcoastchp.org/Portals/24/Policy_LA/LA_financing.pdf)

<sup>58</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_OK/OK\\_financing.pdf](http://gulfcoastchp.org/Portals/24/Policy_OK/OK_financing.pdf)

<sup>59</sup> [http://gulfcoastchp.org/Portals/24/Policy\\_TX/TX\\_financing.pdf](http://gulfcoastchp.org/Portals/24/Policy_TX/TX_financing.pdf)

<a href="http://www.gulfcoastcleanenergy.org">www.gulfcoastcleanenergy.org</a>	The homepage of the Gulf Coast Clean Energy Center
<a href="http://www.gulfcoastchp.org">www.gulfcoastchp.org</a>	A portal serving the CHP community in the Gulf Coast prior to and at initial start of award; transferred information to gulfcoastcleanenergy.org during project; site has been revived with ending of funding.
<a href="http://www.txsecurepower.org">www.txsecurepower.org</a>	An informational page to educate stakeholders about critical government building requirements under HB1831 and HB4409.
<a href="http://www.texaschpi.org">www.texaschpi.org</a>	GC CEAC maintained this web site when the initiative was getting started. This maintenance role ended in BP3.

### Project Profiles:

- WHR plant Port Arthur Steam Energy (Port Arthur, TX)<sup>60</sup>
- Targa Resources<sup>61</sup>
- The City of Dallas Wastewater Treatment Facility<sup>62</sup>
- The Methodist Hospital<sup>63</sup>
- Thermal Energy Corp (TECO)<sup>64</sup>
- BP Helios<sup>65</sup>
- Baytown Industrial Park<sup>66</sup>

### Other Tools:

*GIS Maps* The GC CEAC has plotted existing CHP plants & installations in Louisiana using GIS Software. Clicking on any of the installations enables a pop-up window, which provides further information such as plant capacity, fuel type, address, SIC code and market segment.<sup>67</sup>

<http://www.arcgis.com/home/webmap/viewer.html?webmap=c4d376b3a91d40b0b0332b40190cd1d3>

And

<http://www.arcgis.com/home/webmap/viewer.html?webmap=7e678696e5a24f128bbb6e0685abc90d>

*Feasibility Assessment Tool:* The GC CEAC developed a user-friendly, open source, downloadable CHP analysis tool to examine potential of combined heat and power systems. 12 months of utility consumption and costs (electricity and gas) along with operational hours are enough to generate results. For a user more familiar with CHP systems, optional inputs can be changed to tailor site-specific conditions. Economic and technical outputs for four different scenarios are presented as outputs. Refined existing GC CEAC tool – completed and now includes life cycle assessment component<sup>68</sup>.

<sup>60</sup> [http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/PASE\\_project-profile.pdf](http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/PASE_project-profile.pdf)

<sup>61</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/Targa.pdf>

<sup>62</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/CityofDallasWWT.pdf>

<sup>63</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/MethodistHospital.pdf>

<sup>64</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/TECO.pdf>

<sup>65</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/BP-Helios.pdf>

<sup>66</sup> <http://files.harc.edu/sites/gulfcoastchp/ProjectProfiles/BaytownPark.pdf>

<sup>67</sup> <http://www.arcgis.com/home/webmap/viewer.html?webmap=7e678696e5a24f128bbb6e0685abc90d>

<sup>68</sup> <https://drive.google.com/file/d/0B-guijkPPFpCazVBbXBUQXo2N2M/edit?usp=sharing>

**Collaborations and Networks:**

- Participated in Texas CHP Initiative Board conference calls
- Participated in Waste Heat to Power conference calls
- Continued to develop relationships with major project developers including GenSolutions LLC, NRG Thermal, LAN Engineers and Robust Energy; these relationships help to better understand market dynamics and opportunities.
- Began to develop partnership with developers of Generation Park's McCord Development; this is a 1,200 acre development that is interested in developing district energy project; included IDEA in the discussion and proposal development.
- Continued to work with Keeping PACE (Property Assessed Clean Energy) in Texas on strategies to help municipalities and counties develop regulations and ordinances to facilitate financing of energy- and water-saving applications, including CHP; actively participated in Program Design and Technical Standards group.
- Attended Energy Roundtables at Alliance for Affordable Energy offices (LA)
- Attended Board of Southeast Louisiana Coalition of the AC Industry (LA)

**7. Computer Modeling**

Not applicable to this project. No computer modeling was conducted.