The Chicago Center for Green Technology:
A Sustainable Brownfield Revitalization Best Practice

By Christopher De Sousa and Lily-Ann D'Souza

SITE HISTORY

The Chicago Center for Green Technology (CCGT) is renowned as an integrated model of energy efficiency and sustainable design. It functions as a demonstration facility for renewable energy technologies while promoting sustainable community development through a combination of educational programming, resources, and research. As one of the first municipal redevelopment projects to receive LEED Platinum certification by the U.S. Green Building Council, the CCGT also serves as an exemplary case study of brownfield redevelopment.

The CCGT is located in the Kinzie Industrial Corridor, within the East Garfield Park neighborhood, in the City of Chicago. The Kinzie Industrial Corridor is of particular significance to Chicago's economy and contains "the largest number of firms of any of the City's designated industrial areas." The Kinzie Industrial Corridor has since 1996 been the focus of a publicly led redevelopment project to preserve and revitalize the area's industrial character.

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1 Methodological note: Information for this case study was obtained from available project reports, site visits, and structured interviews with key stakeholders. For any questions, please contact Christopher De Sousa, Associate Professor and Director, School of Urban and Regional Planning, chris.desousa@ryerson.ca. Research assistance provided by Jason Tilidetzke, Laura Lynn Roedl, Elizabeth Durkin, Kevin Duffy, and Alexandra Gould from the University of Wisconsin-Milwaukee, as well as Michael Hayek and Lily-Ann D'Souza from Ryerson University.

2 U.S. Environmental Protection Agency, "From Brownfield to Brightfield in Chicago, IL," Revitalizing Southeastern Communities, A Brownfields Toolkit (EPA Region 4, n.d.).


4 Camiros, Ltd., Applied Real Estate Analysis Inc., and Sonoc/Hutter/Lee Ltd., 3.
Kinzie Industrial Conservation Area Redevelopment Project was initiated after years of negative economic growth and private disinvestment led to the deterioration and decline of the industrial corridor.\(^5\) This project introduced Tax Increment Financing as an economic policy to “stimulate industrial growth and expansion” within the corridor.\(^6\) In combination with other publicly led economic development initiatives, such as the Chicago Brownfields Initiative (described further below) and a U.S. Department of Housing and Urban Development Empowerment Zone designation, the redevelopment project aims to facilitate the transition of the corridor through new investment in industrial and manufacturing activities.

The corridor’s industrial character was influenced by the construction of the city’s first railroad, the Galena and Chicago Union Railroad, parallel to Kinzie Street, in 1851.\(^7\) The property that became the CCGT building, at 445 N. Sacramento Boulevard, was first developed in 1952, west of the industrial corridor’s rail yards. The 17-acre property was being used by the Sacramento Crushing Company to recycle construction and demolition debris.\(^8\) In 1995, however, the City of Chicago’s Department of Environment (DOE) discovered that the Sacramento Crushing Company had violated the conditions of its recycling permit.\(^9\) Staff at the DOE maintained that Sacramento Crushing had been accepting “more material than it could process, including lower-quality material” for which there is no market.\(^10\) Unable to process the oversupply of waste material, the company began to pile the debris on site, leading to the creation of an unregulated landfill.\(^11\) By the time the Illinois EPA cited Sacramento Crushing for illegally developing and operating a solid waste storage and treatment facility, the property was covered in “600,000 cubic yards of construction waste and debris”.\(^12\) The accumulated waste “was dumped into 70 foot-high piles, some of which sank 15 feet into the ground.”\(^13\) The property was commonly referred to as an ‘environmental mess’ by city officials and media reports at the time.\(^14\)
The Sacramento Crushing Company filed for bankruptcy in 1996. The DOE intervened in the court proceedings, however, and convinced the trial judge that the company had mismanaged itself as opposed to being affected by fluctuating market conditions.\textsuperscript{15} The DOE acquired the property after it had been in receivership status for one year, while the Sacramento Crushing Company’s bank tried unsuccessfully to have the site cleaned up.\textsuperscript{16}

The DOE assumed responsibility for cleaning up the site when it acquired ownership rights to the property. Although no contaminants of concern were found on the property, clearing the site of construction and demolition debris took 18 months and cost $9 million.\textsuperscript{17} The DOE was able to offset the remediation and clean-up costs with financial assistance from several sources obtained through the Chicago Brownfields Initiative, including funds from the U.S. Department of Housing and Urban Development and the U.S. Environmental Protection Agency.\textsuperscript{18} The DOE also sold salvageable waste material to other recycling facilities and to city departments that used them as inputs in their own infrastructure projects. The foundation of the parking garage at Millennium Park, for instance, was built by the Chicago Department of Transportation using recycled material from the debris at the CCGT property.\textsuperscript{19} Meanwhile, the two-story, 34,000–square–foot building on the property had been deconstructed to its basic structure.\textsuperscript{20}

An attempt was made to sell the property after it was appraised at $800,000 in 1999.\textsuperscript{21} Any potential buyers would have had to compensate the city for the remediation and clean-up costs. In the end, the city was left with a “vacant lot and a derelict building that nobody wanted.”\textsuperscript{22} However, what was once considered to be an environmental mess eventually inspired an innovative model for energy efficiency and sustainable community development.

\section*{PROJECT VISION}

As with many redevelopment initiatives, the project vision for the brownfield property at 445 N. Sacramento Boulevard evolved to address the economic and social needs of the surrounding community. While the Chicago DOE originally thought the building would be developed for private commercial use, a confluence of factors contributed to the final project vision as a mixed-use industrial and commercial facility with public education and programming services.\textsuperscript{23}

\begin{thebibliography}{99}
\bibitem{15} Henderson.
\bibitem{16} Henderson.
\bibitem{19} No Author, \textit{Chicago Center for Green Technology, About, History} (Chicago: Chicago Center for Green Technology, n.d.).
\bibitem{20} U.S. Environmental Protection Agency, “From Brownfield to Brightfield in Chicago, IL,” \textit{Revitalizing Southeastern Communities, A Brownfields Toolkit} (EPA Region 4, n.d.).
\bibitem{22} Henderson.
\bibitem{23} Aaron Durnbaugh, Interview (Chicago, 2009).
\end{thebibliography}
To begin with, three organizations with different priorities had approached the DOE in search of office space or developable land. Greencorps Chicago, a DOE program that provides job training and assistance to community members, had outgrown its leased space.\(^{24}\) Spire Solar Chicago, a firm specializing in the manufacture and installation of photovoltaic systems, wished to relocate to a remediated brownfield.\(^{25}\) Lastly, the environment committee of the Chicago chapter of the American Institute of Architects expressed interest in designing a green building, but was frustrated in its search to find a willing client.\(^{26}\)

A formal vision for the CCGT began to develop through strategic planning exercises within the DOE and an analysis of existing multi-function environmental education centers.\(^{27}\) With funding from a settlement between the city and the Commonwealth Edison Company earmarked for “renewable energy and energy conservation projects,” Chicago’s environment commissioner at the time, Bill Abolt, resolved to combine the needs of the three organizations through the development of the vacant brownfield at 445 N. Sacramento Boulevard. Through a public-private partnership, the city would contribute $5 million toward the redevelopment of the building, with technical guidance led by a design team of environmentally conscious architects from the AIA’s Chicago chapter. The building would provide Spire Solar Chicago with manufacturing and commercial space for its operations, offer Greencorps Chicago the space it needed to continue its programming, while adding a satellite office for DOE field employees.\(^{28}\) In effect, synthesizing the needs of the three organizations gave rise to an innovative solution with benefits that would extend to the surrounding industrial corridor and the City of Chicago.

The project vision put forward by Abolt would also fulfill the objectives of a broader, city-wide urban revitalization strategy known as the Chicago Brownfields Initiative to recycle underutilized properties. The purpose of the initiative, which was one of the earliest municipal brownfields initiatives of its kind, was to promote “industrial and economic redevelopment, job creation, and tax revenues while addressing environmental problems” on underutilized properties in industrial areas.\(^{29}\) In Abolt’s vision, the CCGT redevelopment had the potential, if it proved successful, to attract private investment to the Kinzie Industrial Corridor.

In addition to being an example of brownfield remediation and redevelopment, it was also anticipated that the retrofitted CCGT building would serve as a model of sustainable design to encourage and promote the adoption of energy efficient and renewable technologies in future new and rehab projects. This vision would add to the sustainable development projects, led by Mayor Daley’s administration, being implemented in existing municipal buildings. These projects included the construction of a green roof on Chicago’s City Hall, “enacting an energy conservation code for new and renovated buildings, and heavily subsidizing the photovoltaic solar panels now appearing on public building roofs.”\(^{30}\) The envisioned multi-function center exceeded these objectives as it moved into the design and development stage.

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\(^{25}\) Henderson.
\(^{26}\) Henderson.
\(^{27}\) Aaron Durnbaugh, Interview (Chicago, 2009).
PROJECT CHARACTERISTICS AND DEVELOPMENT

By 1999, the property at 445 N. Sacramento Boulevard had been acquired by the City of Chicago, cleared of the environmental mess left by the Sacramento Crushing Company, and prepared for redevelopment. A project vision for the redevelopment, with a commitment to energy efficiency and sustainable design, had also been agreed to. A design team of environmentally conscious professionals led by the Chicago-based architectural firm Farr Associates was subsequently assembled.31

The team opted to design and build the CCGT according to the US Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED) Green Building Rating System.32 The USGBC was established in 1993 as a non-profit organization with a mandate to promote the adoption of energy- and cost-efficient design strategies to reduce the economic and environmental impact of individual buildings. When the USGBC introduced its LEED Version 1.0 Rating System in 1999, the design team agreed to target the highest rating possible, Platinum certification.33 The decision to aim for LEED certification, according to Douglas Farr, principal of Farr Associates, was that it set a comprehensive performance standard for green building.34 As a relatively new rating system for building performance with few certified projects to support its claims, LEED was viewed with some skepticism in the late 1990s.35 In 2012, however, as the CCGT celebrates its 10th anniversary, it is widely celebrated as the first redevelopment project to achieve Platinum certification of a rating system that has since developed an international presence as a leader of performance standards for buildings, homes and, most recently, neighborhoods.

The LEED rating system offers a checklist of strategies that can be employed to increase the performance and energy efficiency of a project. Each project must accumulate a designated number of points to satisfy its target rating. The CCGT, for instance, had to accrue 36 points to attain LEED Platinum certification, although it surpassed the requirement by one point.36 Some points are easier to obtain than others and depend on the strategy being employed; however, all points require an integrated approach to building design and development. Through a collaborative design charrette, the team of architects, landscape architects, engineers, and sustainability professionals chose strategies that addressed site planning, energy consumption, building materials, indoor environmental quality, and water efficiency.37 Examples from each strategy are summarized below and reflect the integrated character of the redevelopment:

31 Henderson.
35 Henderson.
Project Characteristics

| Site Planning          | High-albedo and permeable paving |
|                       | Landscaping                       |
|                       | Low-impact siting                 |

| Energy Efficiency      | Solar panels                      |
|                       | Geothermal system                 |
|                       | Smart-lighting system             |
|                       | Low-emission windows and doors    |

| Building Materials     | Reusing original building structure |
|                       | Recycled and/or locally produced building materials |
|                       | Waste diversion                    |

| Indoor Environmental Quality | Non-toxic and low-VOC building materials |
|                             | Displacement ventilation             |

| Water Efficiency         | Cisterns                             |
|                         | Green roof                           |
|                         | Bioswales                            |
|                         | Permeable paving                     |
|                         | Retention pond                       |

Site Planning – A combination of design strategies was used in the site planning of the redevelopment to offset the negative effects of land use that contribute to the urban heat island effect. The high albedo (light-colored) material used in the construction of the parking lot, for instance, reflects solar energy rather than absorbing it. When combined with the site’s extensive tree canopy and landscaping, these green design strategies keep the parking and pedestrian areas cool during the summer months. The redevelopment also scored a LEED point for reusing existing infrastructure and minimizing the ecological footprint of the project.

Energy Efficiency – The CCGT building was designed to maximize energy efficiency, and uses 40% less energy than a minimally code-compliant building of the same size. The combination of renewable energy technologies with energy conservation strategies addresses the supply and demand of energy to achieve energy performance goals in the building design. On the supply side, solar panels located on the roof, the south side of the building, and adjacent to the parking lot supply nearly 25% of the CCGT’s electricity. A geothermal system uses the relatively consistent ground temperature to heat and cool the building. On the demand side, low-emission windows and doors designed to reflect solar radiation during the summer and absorb it in the winter decrease heating and cooling costs throughout the year. A “smart lighting system” regulates indoor lighting based on the amount of natural sunlight in a room.

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39 City of Chicago, Chicago Center for Green Technology, Self-Guided Tour (Chicago: Brochure prepared by the Department of the Environment and the Chicago Center for Green Technology, n.d.).
contributing to energy conservation. Fluorescent light bulbs throughout the building also minimize energy consumption when electric light is needed. These energy efficiency strategies contribute to annual energy savings of $29,000.\footnote{City of Chicago.}

**Building Materials** – Building materials were carefully considered in the development of the CCGT for two primary reasons, 1) to limit the amount of waste incurred through construction, and 2) to minimize indoor air pollution. The design team was able to limit the environmental cost of construction by utilizing 100% of the original building’s structural shell, sourcing materials with recycled content wherever possible, and purchasing from local suppliers. For instance, 36% of all building materials have recycled content, and “over 50% of the building materials (excluding mechanical and plumbing systems) were manufactured or assembled within 300 miles of the construction site.”\footnote{U.S. Green Building Council.} Moreover, 84% of the waste produced through construction was diverted from the landfill.\footnote{U.S. Green Building Council.}

**Indoor Environmental Quality** – In addition to the considerations noted above, non-toxic building materials were used to minimize indoor air pollution, effectively limiting the emission of volatile organic compounds (VOCs).\footnote{U.S. Green Building Council.} The building is also equipped with a displacement ventilation system that feeds fresh air near floor level and removes stale air at ceiling level, providing occupants with high-quality clean air.\footnote{City of Chicago, \textit{Chicago Center for Green Technology, Self-Guided Tour} (Chicago: Brochure prepared by the Department of the Environment and the Chicago Center for Green Technology, n.d.).}

**Water Efficiency** – A variety of green strategies were employed in the development of the CCGT building to address water conservation and stormwater management concerns on the 17-acre property. The water efficiency strategies act as an integrated system, first by absorbing rainwater, and then by filtering runoff, to reduce the land use impact of the building on broader ecological functions. To begin with, a 3,000-square-foot layer of vegetation on the roof, known as a green roof, absorbs rainfall, and has a cooling effect on the building during the summer months.\footnote{City of Chicago, \textit{Chicago Center for Green Technology, Self-Guided Tour} (Chicago: Brochure prepared by the Department of the Environment and the Chicago Center for Green Technology, n.d.).} Four cisterns subsequently collect and store up to 12,000 gallons of excess rainwater that drain from the building’s roof. The recovered water is used to irrigate plants, reducing the need to use fresh water sources as well as building operation costs associated with water consumption.\footnote{City of Chicago.} Bioswales, or heavily planted ditches, funnel rainwater from the parking lot to a reconstructed wetland.\footnote{City of Chicago.} The bioswales also act as a water filtration system and remove pollutants from rainwater. Three different examples of permeable paving on the site illustrate how rainwater can percolate into the ground rather than being forced into the municipal sewer system. A retention pond functions as a reservoir for rainwater not collected or absorbed by the other on-site water conservation strategies. The retention pond also serves as habitat for wildlife. These water efficiency strategies effectively address stormwater management on-site by reducing the amount of rainwater runoff entering the sewer system by 50%.\footnote{City of Chicago.}
In addition to these green design interventions, the CCGT was awarded a LEED point for its proximity to public transit as the Center is situated near the Sacramento and Kedzie bus routes as well as the Union Pacific West Line rail station.

Community and Social Development

In addition to being a model of energy efficiency and sustainable design, the CCGT contributes to Chicago's economic and social development through its collaborative relationship with Greencorps Chicago, a career development and community gardening program that was created by the DOE in 1994. The program links environmental stewardship and restoration activities with job training and public engagement to create natural spaces that are “safe, healthy and sustainable.”

On the career development side, Greencorps Chicago offers 40 Chicago-area residents a nine month paid position in the DOE’s Green Industry job training program. Recruits benefit from field and classroom instruction in four technical areas: landscaping and horticulture, environmental health and safety, etc.

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Greencorps Chicago, Program Information (Chicago, n.d.).
electronics recycling and weatherization. Historically, the program has partnered with social service agencies to provide work experience and employment opportunities to underemployed and unemployed individuals, including ex-offenders. In fact, 90% of the program recruits are ex-offenders searching for opportunities to upgrade their skills and employment prospects in order to achieve self-sufficiency. The job training and work experience provided through the program is invaluable and addresses the systemic barriers to employment experienced by ex-offenders that may lead them to relapse into criminal behavior.

On the community gardening side, the program provides free plants and technical assistance to facilitate the creation of community gardens throughout the city. Community groups must complete a certification process to participate in the program, as well as workshops covering topics such as garden design, installation and maintenance, and community group organization. Technical assistance is provided by DOE staff as well as trainees in the career development program. This approach engages residents in the city’s delivery of environmental services while simultaneously educating them about the benefits of ecological restoration and sustainability.

The native gardens and landscaping on the CCGT property offer on-site demonstration and learning opportunities for both components of the Greencorps Chicago program. In turn, recruits of the job training program maintain CCGT’s gardens, reducing the operating costs of the center. The collaborative relationship between the CCGT and Greencorps Chicago contributes to community development through job training, capacity building, and community greening initiatives. The program also attracts visitors to the CCGT who have the potential to return to the center to access other educational programming and to share what they have learned with other residents.

Approximately 30,000 visitors access the CCGT each year for educational programming, job training, tours, and green building resources. The Chicago Department of Environment offers guided and self-guided tours of the building and grounds, as well as a variety of free educational programs for both professionals and the public. These programs relate to architecture, building and construction management, do-it-yourself greening, engineering, green business, interior design, and landscape design. CCGT monitors attendance and participation on an ongoing basis in order to assess its performance.

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51 Greencorps Chicago[b], Greencorps Chicago Green Industry Job Training (Chicago, n.d.).
52 Greencorps Chicago[b].
54 City of Chicago[c].
55 Greencorps Chicago, Program Information (Chicago, n.d.).
Project Development

The proactive approach to brownfield remediation pursued by the City of Chicago in the case of the CCGT benefitted from federal and state incentives to encourage brownfield redevelopment. The regulatory framework at the federal and state levels served to facilitate brownfield remediation and redevelopment primarily through incentives and favorable conditions. The effort to return brownfield properties to productive use is largely voluntary and depends on a property owner's willingness to assume risk. Liability concerns, as well as the potential to incur extremely high cleanup costs, often deter property owners from proceeding with remediation and redevelopment. Accordingly, the federal and state regulatory framework is structured to encourage remedial action through grants and loans, and by streamlining the process. It is still up to municipalities or developers, however, to take advantage of the incentives offered for brownfield redevelopment.

The City of Chicago introduced the Chicago Brownfields Initiative in 1993 to provide leadership in brownfield remediation and development. The CBI outlined a process to return brownfield sites to productive use by "acquiring, cleaning, and coordinating" brownfield redevelopment.56 The transformation of the environmental problem at 445 N. Sacramento Boulevard into the CCGT evolved based on the approach established through the Chicago Brownfields Initiative:

<table>
<thead>
<tr>
<th>Step</th>
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<tbody>
<tr>
<td><strong>Site is evaluated</strong></td>
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<tr>
<td>Accessibility and control</td>
</tr>
<tr>
<td>Estimated clean-up costs and development value</td>
</tr>
<tr>
<td><strong>Property is acquired by city</strong></td>
</tr>
<tr>
<td>City negotiates purchase, lien foreclosure or tax reactivation on property if necessary</td>
</tr>
<tr>
<td><strong>Property is added to city’s “investment portfolio”</strong></td>
</tr>
<tr>
<td><strong>Risk assessments are performed</strong></td>
</tr>
<tr>
<td><strong>Hazardous waste material is removed immediately</strong></td>
</tr>
<tr>
<td><strong>Clean-up strategies and cost estimates are determined</strong></td>
</tr>
<tr>
<td><strong>City’s brownfield properties are enrolled in Illinois EPA’s Site Remediation Program (SRP)</strong></td>
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<tr>
<td><strong>A “No Further Remediation” (NFR) Letter is issued upon successful completion of the Site Remediation Program</strong></td>
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State-level requirements pertaining to the remediation of a property are addressed through the Chicago Brownfields Initiative process. For instance, the Illinois EPA regulates the environmental condition of the site and reviews site remediation plans prepared by the project proponent through its Site Remediation Program. The project proponent, in this case the City of Chicago, is eligible for financial assistance from the state to offset the assessment and cleanup costs when the remediation plan has been approved, if this assistance is available.

Once site contamination has been addressed through the Tiered Approach to Corrective Action (TACO), a No Further Remediation letter (NFR) is issued by the Illinois EPA. The NFR letter releases the program participant from future liability and contains the terms and conditions for the future use of the property.

The CCGT property was enrolled in the Illinois Site Remediation Program in December of 1999. The site was divided into two for regulatory approval: one 3.5 acre parcel consisting of the CCGT building and its immediate surroundings; and the other 13 acres to the east of the building site. The site also required the removal of an underground storage tank. Environmental Site Assessments at two sites uncovered contaminants typical of former industrial properties at levels slightly above those considered safe for future industrial use (e.g., arsenic, benzo(a)pyrene, Dibenzo(a,h)anthracene). To inhibit any ingestion of the contaminated media, various engineered barriers (asphalt/clean soil/concrete/building/geotextile) were employed in different parts of the site to essentially cover the problem areas. The Illinois EPA issued a so-called “comprehensive” NFR Letter for the smaller property site in January 2003, noting that the measures taken effectively minimized the risk of exposure for an industrial/commercial land use. To qualify for a “comprehensive” NFR Letter, the proponent must examine the site for a wide range of environmental conditions (e.g., volatiles, semi-volatiles, metals, and others, depending on historical risk profile) and implement a remedial action that demonstrates that all environmental conditions do not present a significant risk to human health and the environment (a “focused” NFR letter limits remedial actions to a specific chemical or set of chemicals). The other part of the site also utilized engineered barriers (geomembrane/clean soil barrier/concrete barrier/building foundation) to inhibit ingestion of contaminated media. In addition, institutional controls require a worker safety plan for any future excavation and construction at the site, and also prohibit the installation and the use of potable water supply wells. The larger site received its comprehensive NFR letter from the Illinois EPA in November 2007.

Project Financing

The total cost to clean and redevelop the brownfield property and vacant building at 445 N. Sacramento Boulevard was $14.4 million. Clearing the construction and demolition waste that was illegally stored on-site by the Sacramento Crushing Company cost $9 million. The DOE paid $6 million to dispose of unrecyclable debris, and $3 million to crush and process salvageable waste material so that it could be sold to other city departments as inputs.

for infrastructure projects. Clean-up and remediation costs were financed through loans and incentives from the U.S. Department of Housing and Urban Development, the U.S. Environmental Protection Agency, and General Obligation Bonds that were consolidated through the Chicago Brownfields Initiative. The remaining $5.4 million was used in the construction and renovation of the CCGT building and property with funds from a settlement between the City of Chicago and the Commonwealth Edison Company.\textsuperscript{60}

Construction of the Chicago Center for Green Technology was completed in 2002. It was subsequently certified LEED Platinum in 2003. As planned, the building is a mixed-used commercial and manufacturing facility that also serves as a model of energy efficiency and sustainable design. The CCGT’s tenants originally included Spire Solar and Greencorps Chicago, as well as a satellite office for DOE field employees. WRD Environmental, a landscape architecture firm, established its headquarters at the CCGT when Spire Solar relocated its operations elsewhere in Chicago.\textsuperscript{61} WRD Environmental has since partnered with the DOE to further develop the Greencorps program.\textsuperscript{62} NeighborSpace, a non-profit organization committed to the acquisition and protection of community public space, also recently began operating from the CCGT.\textsuperscript{63}

**BENEFITS, BARRIERS, AND LESSONS LEARNED**

While the CCGT is renowned as a model of energy efficiency and technology, the success attributed to its design and development benefitted from a broader vision for economic, environmental and social sustainability. Through this integrated approach, the CCGT became an incubator for urban revitalization in one of Chicago’s most economically distressed industrial corridors.

In the early 1990s, Chicago’s economy was affected by de-industrialization synonymous with rust belt decline. The City recognized that public intervention was necessary to remediate and redevelop brownfield sites. This was particularly true of Mayor Richard Daley, who commented that “if the city doesn’t take responsibility for brownfield sites like this, no one else will.”\textsuperscript{64} The City of Chicago adopted an integrated approach to employment-oriented development and introduced strategies that considered the environmental and economic conditions of the affected industrial areas – the Chicago Brownfields Initiative and the Kinzie Industrial Conservation Area Redevelopment Project, the latter an economic policy to stimulate development through Tax Increment Financing. Thus, the transformation of the brownfield at 445 N. Sacramento Boulevard to the CCGT was possible because of Chicago’s “strategy of linking environmental restoration with industrial real estate development to create jobs and generate tax revenue.”\textsuperscript{65} Accordingly, several factors contributed to development of the CCGT as a model of energy efficiency and sustainable design, including public leadership, funding and support from senior levels of government, changing attitudes, and perhaps most importantly, timing. Each factor was a necessary condition, but would have been insufficient on its own.

\textsuperscript{60} U.S. Green Building Council.

\textsuperscript{61} Chicago Center for Green Technology, *About – Tenants* (Chicago, n.d.).

\textsuperscript{62} U.S. Environmental Protection Agency, “From Brownfield to Brightfield in Chicago, IL,” *Revitalizing Southeastern Communities, A Brownfields Toolkit* (EPA Region 4, n.d.).

\textsuperscript{63} Chicago Center for Green Technology, *About – Tenants* (Chicago, n.d.).


Through this strategic approach, the CCGT has contributed to the revitalization of the distressed Kinzie corridor by demonstrating the benefits of constructing energy–efficient and sustainably designed buildings. The CCGT also contributed to employment retention in the Kinzie corridor by retaining 450 jobs from a neighboring company that was planning to leave the city, and by employment growth through the creation of 38 new jobs. Moreover, by providing opportunities for job training through the Greencorps Chicago program, the CCGT has the potential to create additional employment opportunities.

CCGT has also sparked the creation of a small “green” cluster, or eco–industrial park, with the addition of landscape–oriented businesses next to the site. These include Christy Webber Landscapes, a full-service landscape company that works throughout Chicago. Its LEED Platinum headquarters building, known as Rancho Verde, has won numerous awards for its innovative, environmentally sensitive approach to the redevelopment of a brownfield site. Charles J. Fiore Nursery and Landscape Supply sells premium grade plant materials, stone, and landscape products to the building industry and home gardeners. Through its lead by example approach, CCGT is also playing an important role as a living laboratory and educational facility aimed at influencing green building and development throughout the city.

The successful implementation of green design principles in the development of the CCGT provided the city with the momentum to expand their application in future projects. This was accomplished through changes to building codes, site planning, and zoning requirements to address stormwater management and the urban heat island effect on a site by site basis.

According to interviewees, limited financial resources were the most cited barrier in the development of the CCGT. While there was no shortage of ideas to increase energy efficiency or restore ecological functions, it was impossible to implement them all. Trade-offs were necessary to prevent the project from going over budget and to adhere to other principles of sustainability so that “one kind of environmental virtue had to be weighed against another, and any virtue had to be weighed against the cost of obtaining it.” For instance, extensive landscaping was added to the project at a premium cost, but was considered vital because it contributed to the creation of a stormwater best management practice. Acquiring the right technical expertise to build, monitor, and maintain the facility was also cited as a challenge given that many of the renewable energy technologies were new at the time.

The CCGT evolved to offer public education programming due to overwhelming interest from the community. Doug Farr of the design team commented that the addition of classrooms, or the flexibility to add classrooms through an adaptable design, would have been beneficial. It was later acknowledged, however, that increased community consultation during the design and development phase of the project could have avoided this oversight. However, despite the fact that public participation was limited in the visioning and development of the CCGT, linkages to the community are well established through the center’s collaborative relationship with Greencorps Chicago. Approximately 30,000 visitors access the CCGT each year for educational programming, job training, and tours. While the benefits of providing public tours, workshops and green building resources outweigh the costs, an ongoing barrier to offering these services is to sustain funding for staffing and service delivery. Some of these barriers have been addressed through partnerships with the building’s tenants, while others depend on the creative thinking and resourcefulness of city staff.

The individual elements that contributed to the successful development of the CCGT are summarized in the table below.

| Economic | Chicago Brownfields Initiative  
|  |
| - Kinzie Industrial Conservation Area Redevelopment Project  
| - Infrastructure, access and connectivity  
| - Financial assistance for cleanup and redevelopment  
| - Recycling and selling waste material  
| - Employment retention and development  
| |  
|  | 450 jobs retained, 38 jobs created with the potential of creating 200 more  
| - Job training  
|  
| Environmental | Brownfields remediation and land reutilization  
| - Recycling and selling waste material  
| - Sustainable design strategies  
| | Water efficiency  
| | Energy efficiency  
| | Recycled building materials  
| | Indoor air quality  
| - LEED Platinum certification  
|  
| Community/Society | Tours  
| | 30,000 visitors/year  
| - Workshops and educational programming  
| - Green building resources  
|  
| TIMELINE |  
| YEAR | DESCRIPTION  
| 1952 | The original building is constructed at 445 N. Sacramento Blvd, Chicago.  
| 1995 | The Chicago Department of Environment (DOE) discovers ‘environmental mess’ at 445 N. Sacramento Blvd.  
| 1995-1996 | DOE takes legal action against the Sacramento Crushing Company for violating the conditions of its permit to recycle construction debris.  
| 1996 | Sacramento Crushing Company files for bankruptcy.  
| 1997 | DOE acquires ownership of the property.  
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<td>The site is cleared of 600,000 tons of waste and debris at a cost of $9 million.</td>
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<td>1999-</td>
<td>The Chicago DOE collaborates with the U.S. Department of Energy's Brightfields program and a design team led by Farr Associates to experiment with the design of an energy efficient building.</td>
</tr>
<tr>
<td>2002</td>
<td>The Chicago Center for Green Technology opens to the public.</td>
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<tr>
<td>2003</td>
<td>The Chicago Center for Green Technology is certified LEED Platinum by the U.S. Green Building Council.</td>
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<tr>
<td>2003</td>
<td>IEPA issues No Further Remediation letter after state requirements for brownfield remediation are fulfilled.</td>
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REFERENCES


City of Chicago[b]. *Chicago Center for Green Technology, Self-Guided Tour*. Chicago: Brochure prepared by the Department of the Environment and the Chicago Center for Green Technology, n.d.


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