

New Jersey Institute of Technology
Center for Building Knowledge

Multimedia Education Platform and Pilot Course Report

(Subtask 4.1.4)

10 February 2012

Original Purpose of Subtask

The original purpose of this subtask was to identify "...material and a delivery format suitable for a multimedia documentary on the technology, tools and processes under consideration for inclusion in the 661 retrofit."

Because the Building 661 Retrofit process focused primarily on pre-design activities during Year 1, there was relatively little "material" developed over the period, especially material that would showcase "the design strategies, technologies, construction techniques, operational systems and team management dynamics" that were originally proposed as the focus of the effort. As a consequence, NJIT turned its attention to the "delivery format" aspect of the project rather than the "material identification" aspect, simply because not much material was actually created over Year 1.

Revised Subtask Focus

As originally proposed, one goal of the project was to eventually "...create a multi-media, online teaching tool out of the planned retrofit of Building 661 into the new home for the HUB." As Year 1 progressed it became clear that such a teaching tool could be a key "delivery format" for information on Building 661 and, more expansively, for information generated by and/or for the Hub as a whole. As a consequence, NJIT CBK focused its efforts on exploring whether and how GPIC might create such an online tool as an educational platform for the Hub.

Subtask Activities

The first step in the process was to review potential sources of content for the platform. Building 661 was an obvious choice but, as noted above, material suitable for an educational offering had not been developed over the course of Year 1. A potential exception was Project Fishbowl, established under the auspices of PennDesign to observe and analyze "... the planning, design, and construction process of the "building 661+" retrofit,..." in order to "...draw conclusions from this specific retrofit case that can be applied generally to retrofit scenarios in the region." The findings from an interim report on Project Fishbowl, submitted in July 2011, contained a series of findings concerning the process (to date as of July) of implementing the 661 retrofit, but NJIT CBK considered them too preliminary for an educational offering. However, it is anticipated that Project Fishbowl will become a rich source of educational content as it - and the Building 661 retrofit - progress over time.

A second potential source was results from ongoing research in GPIC's five core tasks:

- Integrated Modeling and Design
- Integrated Technologies and Systems
- Policy, Markets and Behavior
- Education and Workforce Development
- Demonstration and Deployment

All of these tasks can and will be rich sources of educational content over time but they, like Building 661, were only establishing themselves and gathering momentum in Year 1. They were not producing the types of outputs that could be translated into educational offerings and, while they are expected to become significant educational "content engines" as GPIC matures over the next four years (and beyond), these engines were only warming up in Year 1.

Fortunately, a new GPIC activity was initiated during the second quarter of Year 1: a workshop/conference series tied to the Education and Workforce Development task, but initially implemented as part of GPIC's Public and Client Relations activities. Two workshops and one conference were developed and convened over the course of Year 1:

Workshop 1 Financing and Incentives for Energy Related Building Retrofits

Held on May 10, 2011, this workshop featured regional experts who discussed how to access loans and grants from the EnergyWorks Green Energy Loan Fund (PA) and the New Jersey SmartStart Buildings program, as well as lease financing and performance contracting models and ways to minimize first costs with proper project design.

Workshop 2 Energy Efficiency Opportunities for Commercial Office Tenants

Held on June 14, 2010, this workshop brought together national experts and key stakeholders in the commercial office building industry from the greater Philadelphia region to discuss how tenants can save energy in their leased office space.

Conference 1 Educator's Conference for Subject Matter Experts and Leaders

Held on October 20, 2011 this conference brought together more than 60 educators and industry representatives to forge connections, discuss the state of the energy efficient building industry is today, what role educational institutions can play to help drive the market, and how to bridge the transition. The meeting was intended to begin discussions among regional educators, GPIC, and business leaders around the goals of GPIC. The conference report summarizes the presentations and discussions made during the event.

NJIT CBK developed and convened Workshop 2 with the express intent of not only conducting a timely and engaging GPIC event at the Navy Yard, but also creating an educational offering based on the content conveyed during the event. The goal was to analyze and test how this workshop – and similar events in the future – could be captured and “translated” into an online learning experience that was credible, compelling and replicable.

The workshop took place on June 14, 2010 in Building 100 at the Navy Yard. Over 80 attendees participated, including representatives from: property development and management companies; financial institutions; utilities; product manufacturers; architecture and engineering firms; green consulting companies; and others.



The workshop included four presenters:

- Doug Baston, North Atlantic Energy Partners (program management);
- Frank Gundal, NSTAR (utility perspective);
- Amy Renbarger, New Buildings Institute (Office of the Future program); and
- Yericca Mujica, Natural Resources Defense Council (policy).

And a panel of respondents:

- Williams Agate, Philadelphia Industrial Development Corporation (developer's perspective);
- Brian Cohen, Liberty Property Trust (property management perspective); and
- Alan Hoffmann, VITETTA (tenant's perspective).

The presentations and subsequent discussion between the presenters and the respondents were both lively and informative, and sparked an energetic dialogue with the audience. The workshop was filmed and recorded, both to create a record of the event and as a means to capture content that could be re-purposed into an online educational offering.

Initially, NJIT CBK planned to use the video footage, linked to the powerpoint presentations, as the instructional format. However, upon closer review of the filmed and recorded material, it became clear that the presenter/respondent discussions did not work well from an instructional design perspective. They worked well as “color commentary” in a live setting, but they would be less effective in a more formally structured course like the one envisioned. So NJIT CBK decided to focus on the presentations themselves - which were all well organized and informative - as the core content source.

Upon further review of these presentations, it became apparent that the visual component of the videos was clear and tracked the presenters well, but that there were two glitches with the voice component: it was occasionally synced incorrectly and the volume was often too low. Fortunately, NJIT CBK had made a second, voice-only recording of the presentations where the feed was more consistent and the sound of the voices was louder. Rather than trying to sync this recording to the original video – which was doable, but might not have improved much on the original - NJIT CBK decided to use the second recording as the basis for a “voiceover powerpoint” course, as distinct from the “video plus powerpoint” originally envisioned. This format is very versatile and forgiving and, as a consequence, is a very popular form of distance education.

Subtask Results

Based on these findings, NJIT CBK proceeded to sync the voice recording it had made at the event to the slides presented by the technical experts and, using a learning management system authoring tool, to transform it into a one-hour, SCORM-compliant online course, titled “The Office of the Future: Energy Efficiency Opportunities during the Tenant Fit-Out Process.” NJIT CBK also developed a 10- question test to accompany the course (a requirement of many institutions – such as the American Institute of Architects – for the course to receive credit toward continuing membership and/or toward professional licensure).

NJIT CBK has a longstanding relationship with McGraw Hill Construction, publishers of *Architectural Record* and *Engineering News Record* magazines, and the leading provider in the US of continuing education to architects. With their cooperation, NJIT CBK uploaded the course, including the test, to their Continuing Education Center, and it was launched to the public on December 6, 2011 – GPIC’s first online course! The url for the course is:

<http://continuingeducation.construction.com/crs.php?L=273&C=843>

As of the writing of this report, the course had received 10,144 individual page views and a total of 284 individuals had taken the test and received credit for the course.

A series of representative screen shots from the course are provided below and on the following pages.

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The Office of the Future: Energy Efficiency Opportunities during the Tenant Fit-Out Process

Sponsored by The Greater Philadelphia Innovation Cluster for Energy-Efficient Buildings, a U.S. Department of Energy Innovation Hub.

Offices are the largest market segment in the commercial buildings sector, making up 17% of total floor space and 19% of primary energy consumption. 31% of this space non-owner-occupied (i.e. leased) and tenants in these facilities are typically among those least able to reap energy efficiency benefits. This course presents findings from a workshop that describes new opportunities for architects to expand into this market by helping office building tenants improve the energy efficiency of their leased space.



Three national experts discuss results from a multi-year research program – titled the “Office of the Future” project and sponsored by utilities from across the country - that has developed and demonstrated innovative approaches to “designing in” energy savings during the tenant “fit out” process. The course reviews the programmatic and policy underpinnings of the program as a whole, discusses the role of utilities in bringing the program to fruition, and provides detailed technical information, together with case study examples, of effective energy efficient fit-out strategies.

Learn At Your Own Pace:
You can take this course and follow along at your own pace. Speed up, slow down, or stop now and finish later. Click “Take the Course Test” to go straight to the test and earn your credits. You’ll know immediately if you have earned credits and you will be able to print out your certificate of completion instantly.

Learning Objectives
At the end of this course you will be able to:

- Describe the market receptiveness to energy efficient tenant fit-outs
- Discuss leasing guidelines for energy efficient office spaces
- Explain the effectiveness of integrating energy efficient strategies and policies in office space
- Discuss how to communicate energy efficient information to commercial office tenants

Credits: 1.00 AIA/CES

Course Outline:
This course is a presentation designed to earn you 1.00 AIA/CES Learning Unit. Use the onscreen controls to pace the presentation to your liking, and then click “Take the Course Test” to take the exam for this course and earn your credit.

- The Office of the Future: Energy Efficiency Opportunities during the Tenant Fit-Out Process
 - Watch the presentation.

[Take the test](#)

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GPIC Energy Efficiency Opportunities for Commercial Building Tenants (00:22 / 51:20) ATTACHMENTS

THE CENTER FOR BUILDING KNOWLEDGE
generating new knowledge to improve the built environment and enhance quality of life


Deane Evans
The Center for Building Knowledge

Outline Thumbnails Search

1. The Office of the Future: Energy Efficiency Op
2. Program Registration
3. Copyright Notice
4. Learning Objectives
5. The Office of the Future: Energy Efficiency Op
6. Office of the Future Consortium The State of T
7. OTF Consortium
8. Office of the Future consortium Sponsors
9. Aggressive Utility goals require:
10. Market Potential: downtown office SPACE
11. Market Potential: Suburban office SPACE
12. lease SIZE
13. Market RECEPTIVENESS to An "EFFICIENT
14. Market Attitude:
15. Self-Applied Standards:
16. DOES GREEN PAY OFF?
17. WHAT IS CONSIDERED "GREEN"?
18. PROPERTY MANAGERS
19. Hines Properties
20. CB RICHARD ELLIS
21. OTF consortium Objective:

THE OFFICE OF THE FUTURE: ENERGY EFFICIENCY OPPORTUNITIES DURING THE TENANT FIT-OUT PROCESS

Moderator: Deane Evans
NJIT Center for Building Knowledge



Panelists: Doug Baston
North Atlantic Energy Advisors
Frank Gundal
NStar
Amy Cortese Renbarger
New Buildings Institute

articulate POWERED PRESENTATION

SLIDE 5 OF 64 PLAYING 00:02 / 02:45

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GPIC Energy Efficiency Opportunities for Commercial Building Tenants (09:52 / 51:20) ATTACHMENTS

THE CENTER FOR BUILDING KNOWLEDGE
generating new knowledge to improve the built environment and enhance quality of life

Doug Baston
President, North Atlantic Energy Advisors

Outline Thumbnails Search

7. OTF Consortium
8. Office of the Future consortium Sponsors
9. Aggressive Utility goals require:
10. Market Potential: downtown office SPACE
11. Market Potential: Suburban office SPACE
12. lease SIZE
13. Market RECEPTIVENESS to An "EFFICIENT
14. Market Attitude:
15. Self-Applied Standards:
16. DOES GREEN PAY OFF?
17. WHAT IS CONSIDERED "GREEN"?
18. PROPERTY MANAGERS
19. Hines Properties
20. CB RICHARD ELLIS
21. OTF consortium Objective:
22. A new approach to Utility incentives for Corp
23. Boston Charrette
24. Typical office leasing process
25. Tenant allowances
26. New "TI" utility initiative: Potential engagemer
27. Next generation innovation

OTF CONSORTIUM OBJECTIVE:

- Achieve deeper energy savings in existing office buildings by
- Scaling up corporate real estate involvement in utility energy efficiency programs by
- Offering a efficiency incentive program and brand that (1) is consistent throughout North America (2) meets real corporate and tenant objectives

articulate POWERED PRESENTATION

SLIDE 21 OF 64 PLAYING 00:02 / 09:58

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GPIC Energy Efficiency Opportunities for Commercial Building Tenants (16:13 / 51:20) ATTACHMENTS

Frank Gundal
Manager, Ancillary Energy Services, NSTAR Electric

Outline Thumbnails Search

- 22. A new approach to Utility incentives for Corporations
- 23. Boston Charrette
- 24. **Typical office leasing process**
- 25. Tenant allowances
- 26. New "TI" utility initiative: Potential engagement
- 27. Next generation incentive
- 28. Office of the Future Consortium
- 29. Office of the Future Sponsors
- 30. Technical best practices
- 31. Technical best practices
- 32. High Performance Lighting system Design Considerations
- 33. Lighting Best Practices
- 34. Lighting best practices Option #4
- 35. Lighting controls by use type
- 36. Daylighting Guide for Office interiors
- 37. Space planning relative to daylight patterns and building form
- 38. Space Planning
- 39. Workstation panel design & Orientation
- 40. Interior surface finishes
- 41. Zoning for daylighting
- 42. Commercial Office plug Load Savings Assessment

'TYPICAL' OFFICE LEASING PROCESS

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GPIC Energy Efficiency Opportunities for Commercial Building Tenants (03:12 / 51:20) ATTACHMENTS

Doug Baston
President, North Atlantic Energy Advisors

Outline Thumbnails Search

- 1. The Office of the Future: Energy Efficiency Opportunity
- 2. Program Registration
- 3. Copyright Notice
- 4. Learning Objectives
- 5. The Office of the Future: Energy Efficiency Opportunity
- 6. **Office of the Future Consortium: The State of the Market**
- 7. OTF Consortium
- 8. Office of the Future consortium Sponsors
- 9. Aggressive Utility goals require:
- 10. Market Potential: downtown office SPACE
- 11. Market Potential: Suburban office SPACE
- 12. lease SIZE
- 13. Market RECEPTIVENESS to An "EFFICIENT"
- 14. Market Attitude:
- 15. Self-Applied Standards
- 16. DOES GREEN PAY OFF?
- 17. WHAT IS CONSIDERED "GREEN"?
- 18. PROPERTY MANAGERS
- 19. Hines Properties
- 20. CB RICHARD ELLIS
- 21. OTF consortium Objective:

OFFICE OF THE FUTURE CONSORTIUM: THE STATE OF THE MARKET

Doug Baston,
North Atlantic Energy Advisors

Philadelphia, June 14, 2011

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GPIC Energy Efficiency Opportunities for Commercial Building Tenants (24:38 / 51:20) ATTACHMENTS

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Amy Cortese Renbarger
Senior Project Manager,
New Buildings Institute

Outline Thumbnails Search

- 22. A new approach to Utility incentives for Corpora
- 23. Boston Charrette
- 24. typical office leasing process
- 25. Tenant allowances
- 26. New "TI" utility initiative: Potential engagemer
- 27. Next generation incentive
- 28. Office of the Future Consortium
- 29. Office of the Future Sponsors
- 30. Technical best practices
- 31. Technical best practices
- 32. High Performance Lighting systemDesign C
- 33. Lighting Best Practices
- 34. Lighting best practicesOption #4
- 35. Lighting controls by use type
- 36. Daylighting Guide for Office interiors
- 37. Space planning relative to daylight patterns a
- 38. Space Planning
- 39. Workstation panel design & Orientation
- 40. Interior surface finishes
- 41. Zoning for daylighting
- 42. Commercial Office plug Load Savings Asses

TECHNICAL BEST PRACTICES

LIGHTING DESIGN

- Workstation Specific
- Pendant Mounted Direct/Indirect
- High Efficiency Recessed Non-Planar
- Non-Planar Recessed Recessed Kit
- Pendant Mounted Direct/Indirect for Low Ceilings
- Task Lighting

LIGHTING CONTROLS

- Vacancy Sensors
- Occupancy Sensors
- Daylight Harvesting
- Scheduling
- Multi Level Switching
- Workstation Specific Dimming

PLUG LOADS

- Plug Load Control Devices
- IT Technologies
- Purchasing Guidelines (Energy Star)

METERING & FEEDBACK

- Acceptance Testing
- Tenant Feedback
- Tenant Sub-metering

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SLIDE 31 OF 64 PLAYING 00:01 / 00:55

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GPIC Energy Efficiency Opportunities for Commercial Building Tenants (47:10 / 51:20) ATTACHMENTS

THE CENTER FOR BUILDING KNOWLEDGE
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Amy Cortese Renbarger
Senior Project Manager,
New Buildings Institute

Outline Thumbnails Search

- 45. Plug load control
- 46. Metering and feedback
- 47. Metering and feedback
- 48. Metering and feedback
- 49. Building the business case
- 50. Landmark Square
- 51. glumac
- 52. GO 4 SCE Executive offices
- 53. BC Hydro Dunsmir Office
- 54. NEEP Office
- 55. NEEA - commonwealth building
- 56. Lighting Results
- 57. Lighting Results
- 58. Lighting Results
- 59. Lighting Results
- 60. Lighting Results
- 61. Lighting Results
- 62. daily lighting profile
- 63. Lessons learned
- 64. For more information

LIGHTING RESULTS

Pilot	Location	Size SF	Code Lighting	Installed Lighting	Average Measured Lighting During Day	Peak Measured Lighting	Lighting Costs
			W/SF	W/SF	W/SF	W/SF	\$/SF
Glumac	Irvine, CA	8,328	1.18	0.83			
Landmark	Long Beach, CA	1,500	1.37	1.32			
GO 4	Rosemead, CA	16,500	1.16	0.64			
NEEP	Lexington, MA	6,762	1.00	0.54			
BC Hydro Dunsmir	Vancouver, BC	9,000	1.10				
Commonwealth	Portland, OR	18,962	1.00	0.50			
Veterans Admin	San Diego, CA	3,040	1.30	1.30			

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SLIDE 58 OF 64 PLAYING 00:04 / 00:08

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GPIC Energy Efficiency Opportunities for Commercial Building Tenants (36:14 / 51:20) ATTACHMENTS

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generating new knowledge to improve the built environment and enhance quality of life

Amy Cortese Renbarger
Senior Project Manager,
New Buildings Institute

Outline Thumbnails Search

- 36. Daylighting Guide for Office Interiors
- 37. Space planning relative to daylight patterns a
- 38. Space Planning
- 39. Workstation panel design & Orientation
- 40. Interior surface finishes
- 41. Zoning for daylighting
- 42. Commercial Office plug Load Savings Asses
- 43. Plug load Study objectives
- 44. Slide 44
- 45. Plug load control
- 46. Metering and feedback
- 47. Metering and feedback
- 48. Metering and feedback
- 49. Building the business case
- 50. Landmark Square
- 51. glumac
- 52. GO 4 SCE Executive offices
- 53. BC Hydro Dunsmuir Office
- 54. NEEP Office
- 55. NEEA – commonwealth building
- 56. Lighting Results

ZONING FOR DAYLIGHTING

Legend

- Lighting Control Zone - Continuous dimming on photocell
- Lighting Control Zone and enclosed program - Manual switch "On" with vacancy sensor "Off"

articulate POWERED PRESENTATION

SLIDE 41 OF 64 PLAYING 00:02 / 01:04

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McGraw Hill CONSTRUCTION Continuing Education Center FINISH LATER

Test

The Office of the Future: Energy Efficiency Opportunities during the Tenant Fit-Out Process

Sponsored by The Greater Philadelphia Innovation Cluster for Energy-Efficient Buildings, a U.S. Department of Energy Innovation Hub.

Question 1 of 10

The Office of the Future Consortium is a North American multi-utility initiative to develop and promote deep energy savings into the commercial office market. Its main goal is to develop a program platform that is:

- a. State-specific
- b. Regional
- c. National
- d. Locally administered but nationally consistent

Next

Test Progress:

1 2 3 4 5 6 7 8 9 10

Note: Do not use your "back" button while taking the test. Once your answers are entered, you will not be able to change your answers until after you click "Score Test Now" to view your results.

Conclusions and Recommendations

This project tested the feasibility of creating professional online training derived from GPIC work products – in this case, a technical workshop focused on a cutting-edge topic related to energy efficient commercial buildings. The test worked, and GPIC launched its first online course for building professionals in December 2011.

Going forward, the potential for replicating and expanding this process appears promising and could occur at any of the following three levels:

- **Level One – Present Results of GPIC Symposia and Workshops**
GPIC could institute a practice of recording all its future workshops and symposia with the specific intent of turning them into online courses. GPIC staff already videotape these events, so the process of capturing the content is already well-understood. The key variation to current practice would be to manage the events with a clear focus on their eventual use for educational purposes – including clear, consistent guidance to presenters on how to organize and present their information so that it can be effectively used for training. Clearly, not every event at the Navy Yard will be suitable for these purposes, but many will be and could, over time, constitute a rich body of online training coming from the Hub.
- **Level Two – Present Results of GPIC Research and Demonstration Products**
GPIC could encourage its members and partners to develop educational presentations on the results of their research and demonstration efforts. GPIC could then develop these presentations into online courses following the procedures used for the symposia and workshops. Deploying research results as education would be relatively novel but would also be entirely appropriate for an “innovation hub.” This approach would require some standardization of presentation formats across teams and tasks, but this would not be especially onerous for the teams or GPIC staff.

Special Focus: Building 661

A core focus of Level Two activities would be the tools and procedures used to create – and the technologies and systems incorporated into – the Building 661 retrofit. It is anticipated that the design and construction process itself could be transformed into several online courses, drawing from the information captured through Project Fishbowl. In addition, an entire “Building 661 Curriculum” could be created around the innovative products and technologies used in the facility. A systems integration “theme” could be woven through all these courses, providing a unique learning experience not currently available in professional continuing education.

- **Level Three – Present Educational Offerings from Outside GPIC**
In this scenario, GPIC could serve as the national platform for relevant educational offerings from sources outside the Hub. GPIC would need to develop clear guidelines for those wishing to use the platform – both in terms of content and format – and would need to provide consistent review and oversight. In addition, GPIC would need to launch and administer these external courses for a period of time. While none of these activities are particularly difficult or costly, they do require ongoing attention and engagement by GPIC staff. It is therefore suggested that Level Three only be considered if and when GPIC determines that serving as the national platform for online professional education on energy efficient commercial building retrofits is core to its mission.

If GPIC chooses to move forward at any of these levels, it will need to establish its own online education platform – perhaps something like the GPIC Energy Efficient Commercial Building Retrofit Online Academy. While McGraw Hill Construction was pleased to support GPIC's first offering, based on its longstanding relations with NJIT CBK staff, it will not be willing to do so on an ongoing basis. Creating such an online academy, with an embedded learning management system, should be a relatively straightforward proposition for one or more of GPIC's university partners, who are well-acquainted with distance education systems and technologies. GPIC will also need to register as an authorized provider of professional education with one or more professional accrediting bodies (for example, the American Institute of Architects), but this is also a straightforward and inexpensive process.

The resulting academy could establish GPIC as a – if not the - trusted source of professional training on a topic that will be new to many architects and engineers: energy efficient commercial building retrofits. Such a position seems entirely in keeping with GPIC's mission and objectives and would directly complement the GPIC's ongoing workforce education activities.