LEED for Communities – Collegiate Level Experience and Laboratory Pilot

Clarkson University Adirondack Semester and the New York Olympic Region LEED for Communities Certification Integrated Research Project

Erik C. Backus, P.E., LEED AP BD+C, ENV SP, FMP[1] and Stephen Bird, PhD.[2]

25 March 2019

Abstract

During the fall of 2018, Clarkson University and the US Green Building Council (USGBC) developed and executed a LEED for Communities/Cities (LFC) Collegiate Level Experience and Laboratory. In partnership with the New York Olympic Region[3], an interdisciplinary team of fourteen (14) undergraduate students was guided by two (2) primary faculty and four (4) other instructors in a first of its kind partnership. This endeavor was successful in several facets: attaining LFC certification for the New York Olympic Region, providing a fully evaluated experiential project based education in the use of sustainable holistic planning systems such as LEED for Communities/Cities, and demonstrating the value of a university partnership with a local small town, rural, tourist based community to achieve their goals. This effort provides a replicable model to be used by other communities with institutions of higher learning in the future.

[1] Director, Construction Engineering Management, Professor of Practice and Executive Officer, Department of Civil and Environmental Engineering, Clarkson University, Corresponding Author: reached at 315-268-6522 or ebackus@clarkson.edu

[2] Associate Professor, Public Policy, Humanities and Social Sciences & Institute of Sustainable Environment, Clarkson University

[3] The New York Olympic Region, or NYOR, consists of the following jurisdictions and partners: Village of Lake Placid, Town of North Elba, Olympic Regional Development Authority, and Lake Placid Central School District

Table of Contents

Background

In order to better understand the development of the LEED for Communities – Collegiate Level Experience and Laboratory Pilot, conducted as a part of the Clarkson University Adirondack Semester and the New York Olympic Region LEED for Communities Certification Integrated Research Project, some pertinent background material should be provided. This section will outline several aspects of the pilot and project including:

- LEED for Communities/Cities
- LEED Lab
- Clarkson University
- The Clarkson Adirondack Semester
- The New York Olympic Region

These preliminary subjects will enable clarity and better understanding when discussing the nature of the pilot effort.

LEED for Communities/Cities

As was announced on 1 December 2016, Leadership in Energy and Environmental Design (LEED) for Cities and LEED for Communities "is revolutionizing city planning, development and operations, while also improving life for citizens around the world. Using the Arc performance platform, LEED for Cities projects can measure and manage their city's water consumption, energy use, waste, transportation and human experience."[4] "LEED for Communities (LFC) … builds upon the same principles as LEED for Buildings, the world standard in green building certification, but significantly expands the scope of the program. LFC promotes better management of resources and smart city planning and design."[5] LFC, in its pilot, requires cities, or communities, to track fourteen (14) core metrics as well as then opt to do one of two things: a) develop a set of plans for future performance tracking or, b) commit to a minimum number of community specific metrics which can be chosen from either a set of two-hundred (200) plus available metrics to choose from or create their own tailored metrics.[6] LFC is currently being improved through a merger with STAR Communities[7] and alignment with the UN Sustainable Development Goals[8] and has been released for comment as LEED for Cities and Communities v 4.1[9].

LEED Lab

"LEED Lab is a multidisciplinary immersion course that utilizes the built environment to educate and prepare students to become green building leaders and sustainability-focused citizens."[10] Launched in 2011, with its Pilot at Catholic University of America, this program has focused on enabling collegiate

[4] https://new.usgbc.org/leed-for-cities, accessed on 20 February 2019
[5] Flory, Megan, Barber, Paul, Buck, Benjamin, Ulrich-Verderber, Louisa, Chase, Sarah, Clark, Lindsay; Danyla, Adeline, Fudo, Lucas, Gatulik, Chloe, Melgar, Daniel, Meyer, Adam, Singh, Pranav, Terleckyj, Laryssa, Vondrak, Benjamin, "USGBC LEED for Communities Certification of the New York State Olympic Region Clarkson University Adirondack Semester, Last Revised: 17 December 2018", Whitepaper, Clarkson University, December 2018
[6] https://www.usgbc.org/cityperformance, accessed on 20 February 2019
[7] https://www.usgbc.org/articles/star-community-rating-system-be-fully-integrated-usgbc%E2%80%99s-leed-cities-communities-programs, accessed on 20 February 2019
[8] https://www.un.org/sustainabledevelopment/sustainable-development-goals/, accessed on 20 February 2019
[9] https://new.usgbc.org/leed-v41#cities-and-communities, accessed on 20 February 2019
[10] https://www.usgbc.org/leed-lab, accessed on 20 February 2019

students to use their own college or university as a place to learn about green building. "Through the course, students assess the performance of existing facilities on campus and chose one building where they will facilitate the LEED for Building Operations & Maintenance (LEED O+M) process with the goal of certifying the facility. At the close of the semester, the students are prepared to sit for the LEED O+M professional credential exam. LEED Lab meets the needs of industry by equipping students with the skills, knowledge and expertise needed to be effective communicators, project managers, critical thinkers, problem solvers, engaged leaders and team players."[11] Overseen and supported by the USGBC, this program is now operating at over thirty (30) colleges or universities world-wide.

Clarkson University

"Clarkson University is an independent, nationally recognized technological university whose faculty of teacher-scholars aspires to offer superior instruction and engage in high-quality research and scholarship in engineering, business, science, health, education and liberal arts. Our primary mission is to educate talented and motivated men and women to become successful professionals through quality pre-collegiate, undergraduate, graduate, and professional continuing education programs, with particular emphasis on the undergraduate experience. Campus settings enhance the quality of student life and afford students access to and interaction with their faculty. We value the diversity of our University community, and we strive to attune ourselves and our programs to our global, pluralistic society. We share the belief that humane and environmentally sound economic and social development derive from the expansion, diffusion, and application of knowledge."[12]

Clarkson is organized into several Schools, Institutes and Centers. The Wallace H. Coulter School of Engineering (CSOE), the David D. Reh School of Business (RSOB), and the Clarkson School of Arts (CSAS) and Sciences, serve as disciplined focused degree-granting institutions. The Institute for a Sustainable Environment serves as an interdisciplinary locus of gathering offering limited degree programs and core faculty with numerous affiliate faculty in each of the undergraduate degree granting schools as well as the Graduate School, the Clarkson School (a pre-collegiate school), and the other Institutes of the Institute for STEM Education and the Beacon Institute of Rivers and Estuaries. Numerous Centers also exist to enable cross collaboration for research endeavors across the University.

The Clarkson Adirondack Semester

The Clarkson University Adirondack (ADK) Semester, run by Clarkson's Institute for a Sustainable Environment (ISE), "is a 15-credit, off-campus domestic study program for undergraduates pursuing an experience that is enriching both academically and culturally. Students from any major who are committed to learn about environmental science, policy, economics and the human history and contemporary issues of the Adirondack region"[13] take part in this immersive educational experience. The ADK semester is offered one of the two traditional academic semesters (fall or spring) but have occasioned both semesters as resources allow and needs warrant.

The 15 credit hour sequence is divided into two constituent parts: a) four (4) courses that run on compressed schedules and b) an integrated research project (IRP) which focuses on a unique problem for each ADK semester cohort. Past ADK semester IRP efforts have focused on such things as the effects of wood smoke on Adirondack Park residents to developing a hut-to-hut trail system in the area of the Saranac Lakes to developing conceptual options for better wildlife corridors between the Algonquin Provincial Park in Ontario Canada and the Adirondack Park. Student participants in the ADK semester

[11] LEED Lab Welcome Packet, Center for Green Schools, USGBC, May 2017
[12] Mission Statement, Clarkson University, https://www.clarkson.edu/about-clarkson, accessed on 20 February 2019
[13] https://www.clarkson.edu/adirondack-semester, accessed on 20 February 2019

are selected through an application process that begins early the semester before and concludes by the end of the semester in which they apply. Cohorts are limited to fourteen (14) students based on several factors, including logistics and housing, but also to retain its special small group interactive nature. Faculty are selected for the four courses and the IRP based on the IRP focus, with EV322 The Adirondack Park and a Sense of Place, being a universal core course offering (see below for more on the course offerings related to this pilot).

The New York Olympic Region

The New York Olympic Region (NYOR) is comprised of four different jurisdictions that include the Town of North Elba, the Village of Lake Placid, the Lake Placid Central School District (LPCSD), and the Olympic Regional Development Authority (ORDA). "As a public benefit corporation, ORDA maintains the region's world-class winter sports facilities (such as the Lake Placid Olympic Ski Jumping Complex and the Mount Van Hoevenberg Olympic Bobsled Run), as well as the ski resorts of Whiteface, Gore, and Belleayre."[14] For the purposes of defining this region and ORDA's involvement, "Whiteface and Gore are included in NYOR as satellite facilities, however, Belleayre is not included because it is far removed from the region …"[15] and with regards to the LFC project for NYOR this facility was not seen as part of the Olympic character that was central to the partnership. To that final note, the partners in the NYOR LFC effort, in parallel with this pilot and the ADK semester effort, were working to facilitate a formal MOU between themselves and the USGBC as well as between themselves and Clarkson University. These are at present nearing completion.

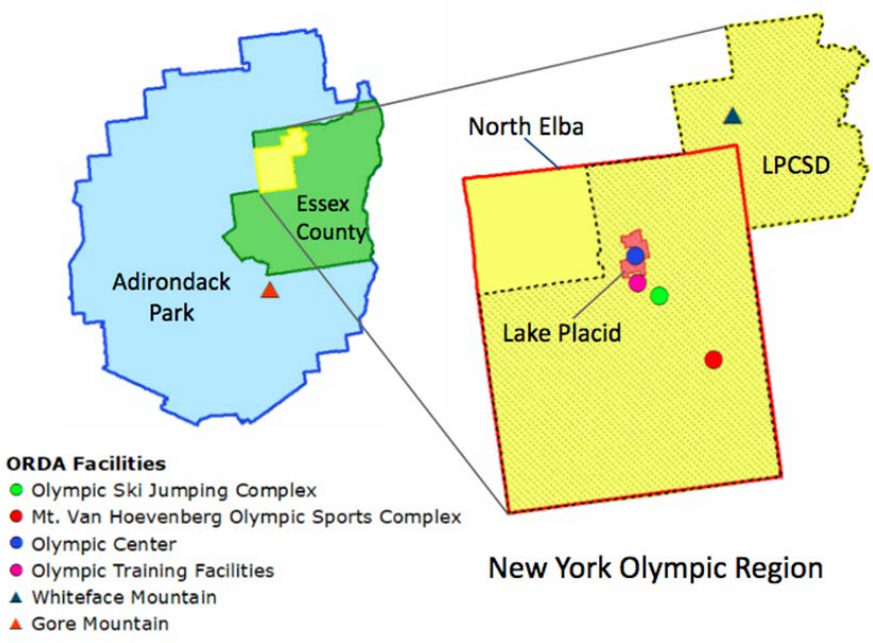


Figure 1, Map Graphic of the New York Olympic Region (NYOR)[16]

[14] Flory, Megan, Barber, Paul, Buck, Benjamin, Ulrich-Verderber, Louisa, Chase, Sarah, Clark, Lindsay; Danyla, Adeline, Fudo, Lucas, Gatulik, Chloe, Melgar, Daniel, Meyer, Adam, Singh, Pranav, Terleckyj, Laryssa, Vondrak, Benjamin, "USGBC LEED for Communities Certification of the New York State Olympic Region Clarkson University Adirondack Semester, Last Revised: 17 December 2018", Whitepaper, Clarkson University, December 2018

[15] Ibid

[16] Ibid

NYOR has a "unique tourist-based economy due to its placement in the Adirondack Park as well as its Olympic background."[17] Further the "region's Olympic legacy is critical to its character, while its placement in the Adirondack Park means it's under very strong environmental protections."[18] These protections come from the fact that the Adirondack Park is a New York State (NYS) constitutionally protected park and forest preserve[19] that is provided oversight through the Adirondack Park Agency (APA)[20] which is headquartered in the hamlet of Ray Brook, within the Town of North Elba (thus within the NYOR boundary).

Construct of the Fall 2018 Pilot

The fundamental construct of the LEED for Communities – Collegiate Level Experience and Laboratory Pilot mirrors the aforementioned Clarkson University Adirondack Semester format. The Pilot was conducted as an immersive experience enabling students to work and reside within the subject community while working on LEED for Communities certification. The semester effort began on 22 August 2018 and ended, formally, on 12 December 2018 with a formal presentation to the faculty and staff of Clarkson after a preceding presentation to the NYOR community members on 10 December 2018. Faculty from Clarkson travelled to the nearby region on a regular basis to conduct the actual classes, in a compressed format around the needs of the IRP. Engagement, with the community came through coordination between the faculty and community leaders as well as directly by the students in various ways. The following hopes to articulate the specifics of this pilot and how it may be replicated at other institutions.

Participants

Faculty Participants

The faculty participants in this pilot/the ADK semester in the Fall of 2018 included parties from within Clarkson's tenure track and non-tenure track faculty as well as faculty at Paul Smiths College. The following is a listing of the courses taught and the faculty teaching each:

- EV322 Adirondack Park and a Sense of Place; Bethany Garretson[21]
- EV312 Adirondack Ecology and Environmental Science; Stephen F. Langdon[22]
- CE301/EV316 Adirondack Science – GIS; William "Bill" B. Olsen[23]
- EV320 Social and Political Issues in the Adirondacks; Martin Heintzelman[24] and Christopher Robinson[25]
- EV314 Integrated Research Project: LEED for Communities in the New York Olympic Region; Erik C. Backus[26] and Stephen Bird[27]

Biographical Sketches are provided in Appendix A for each of these faculty. Specifics to the course content will be covered in the curriculum section of this document.

[17] Ibid
[18] Ibid
[19] https://visitadirondacks.com/about/adirondack-park, accessed on 20 February 2019
[20] https://apa.ny.gov/, accessed on 20 February 2019
[21] https://www.paulsmiths.edu/people/garretson/, accessed on 20 February 2019
[22] https://www.shingleshanty.org/organization, accessed on 20 February 2019
[23] https://www.clarkson.edu/people/william-olsen, accessed on 20 February 2019
[24] https://www.clarkson.edu/people/martin-heintzelman, accessed on 20 February 2019
[25] https://www.clarkson.edu/people/christopher-robinson-faculty, accessed on 20 February 2019
[26] https://www.clarkson.edu/people/erik-backus, accessed on 20 February 2019
[27] https://www.clarkson.edu/people/stephen-bird, accessed on 20 February 2019

Student Participants

Students selected for this semester were solicited early in the Spring 2018 semester. They were provided information about the ADK semester in general and about the particular focus IRP effort.

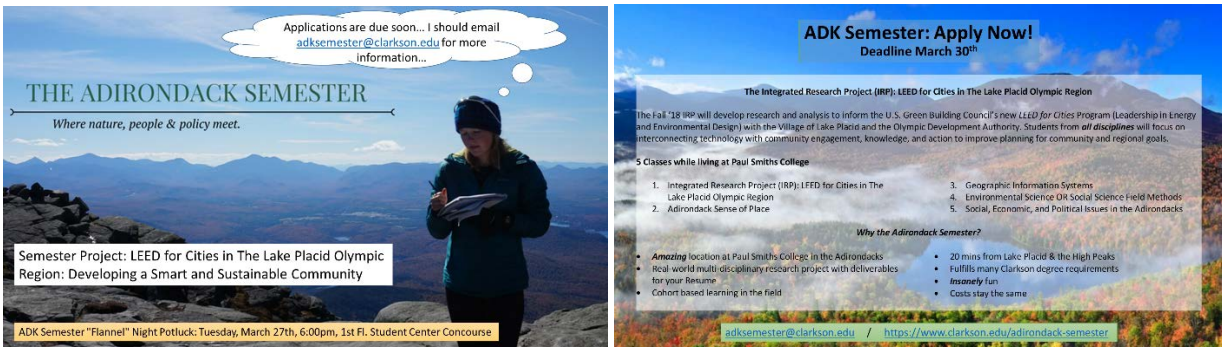


Figure 2: Images used to attract Clarkson Students to the Fall 2018 Experience

The Fall 2018 offering of the ADK semester received a record number of applicants, which was then reviewed by the ISE steering committee for the final selection of students to take part. Fourteen (14) students were selected, representing every school at the university and across numerous majors. The following table lists the student participants by name and what academic major.

Last Name	First Name	Major		Last Name	First Name	Major
		Environmental Engineering/CSOE				Environmental Science & Policy/ISE
		Civil Engineering/CSOE				Environmental Engineering/CSOE
		Environmental Engineering/CSOE				Environmental Engineering/CSOE
		Environmental Engineering/CSOE				Environmental Engineering/CSOE
		Environmental Science & Policy/ISE				Environmental Engineering/CSOE
		Psychology/CSAS				Engineering & Management/RSOB
		Environmental Engineering/CSOE				Innovation & Entrepreneurship/RSOB
Key: CSOE = Coulter School of Engineering; ISE = Institute for a Sustainable Environment; CSAS = Clarkson School of Arts and Sciences; RSOB = Reh School of Business.						

Table 1: Student Participants with Indicated Majors

Either the student participants were in their Sophomore or Junior year and none were native to the NYOR itself.

Community Participants

As part of this effort, numerous community participants were key to the success of any such endeavor. In this case, given the make-up of NYOR itself (see above), it required participation from all four (4) of the partner groups.

Village of Lake Placid

The Village of Lake Placid[28] was, and remains, primarily represented by Mayor Mr. Craig Randall. Craig is a long time resident of the Village and owner/operator of a local lodging facility. Helping the effort in different ways was Ms. Anita Estling, the Village Clerk as well as Mr. Kimball Daby, the Village Electric Superintendent.

Town of North Elba

The Town of North Elba[29] was, and remains, primarily represented by Town Councilman Mr. Jay Rand. Jay is a former Olympian (Ski Jumping) and still is a member of the New York Ski Educational Foundation.

Of note, the Town and Village have a strong history of partnership on many efforts, of which the 2014 Joint Comprehensive Plan is particularly pertinent. Mr. Dean Dietrich is the Chairperson for the Lake Placid/North Elba Development Commission.[30] Dean is a volunteer in this role and make significant contributions to the effort throughout the process.

ORDA

The Olympic Regional Development Authority[31], as discussed above, is a public benefit corporation, founded under New York State law and acts as a quasi-state agency overseeing the operation of the various Olympic venues from the 1980 Olympics, which remain in active use for training and competition to this day. Mr. Mike Pratt is the CEO for ORDA, was, and remains an active participation in this effort. He assigned two of his staff, Mr. Cort Honey, Project Officer, and Mr. Nick Zachara, Events Logistics Coordinator, as point persons for this effort. Mr. Pratt, along with Mr. Robert "Bob" Hammond, ORDA Chief Engineer, participated in the early stages of the project and Mr. Honey and Mr. Zachara participated throughout.

LPCSD

The last of the core partner organizations is the Lake Placid Central School District[32]. Superintendent Dr. Roger Catania, who was active throughout this effort, leads the School District. Additionally, Ms. Tammy Morgan, a High School faculty member in the Environmental Science, was a key contributor to this effort as will be discussed elsewhere in this document.

Other Partners

In addition to the above parties several additional non-native to Clarkson University or NYOR partook in this pilot effort. These included consultants, associations and the USGBC itself.

Smith Group

Mr. Steven Baumgartner, "an engineer and urban systems and infrastructure strategist" from Smith Group[33], as well as a support team, supported the students in conceptualizing several community development goals and metrics under a consultation contract that took place through the semester. His

[28] http://villageoflakeplacid.ny.gov/, accessed on 20 February 2019
[29] http://www.northelba.org/, accessed on 20 February 2019
[30] http://www.futurelakeplacid.com/, accessed on 20 February 2019
[31] http://www.orda.org/corporate/, accessed on 20 February 2019
[32] http://www.lpcsd.org/, accessed on 20 February 2019
[33] https://www.smithgroup.com/people/steven-baumgartner, accessed on 20 February 2019

keen insights into how urban systems work as well as enabling thinking outside of the LEED for Cities/Communities construct (e.g. EcoDistricts) aided the student participants especially as they took a critical eye to LFC and its application in the NYOR.

USGBC

Dr. Vatsal Bhatt, Director of Cities and Communities at the USGBC[34], was instrumental in this pilot. He spoke remotely several times and participated in several iterative question and answer efforts related to particulars of the rating system itself as well as metric development on the part of the student participants. He was also a critical guide to Prof. Backus as he completed the certification entries for submission for review. Two other people form USGBC were of particular help. Mr. Harry Gordon, FAIA, LEED Fellow[35] partook in a joint presentation with the students at the Adirondack North Country Association sponsored Clean Energy Economy Conference on 25 October. Of note, Harry is the Vice-Chairperson for the NY Upstate Market Leadership Advisory Board (MLAB) and board member for the Green Business Certification, Inc. (GBCI, the for-profit entity that oversees LEED certification). Finally, Ms. Tracie Hall,[36] Director of the NY Upstate Community of the USGBC was in a supporting role throughout this effort.

ANCA

The Adirondack North Country Association (ANCA)[37] is an, "independent non-profit organization working to build dynamic local economies that sustain thriving communities in Northern New York. Since 1955, ANCA has leveraged the investment of hundreds of millions of dollars into key sectors that drive sustainable local economic development."[38] Jennifer Perry, the Energy Circuit Rider as well as several others were instrumental in the process, especially as this organization was the developers of the regional greenhouse gas (GHG) inventory that was the basis for evaluation for the LFC energy metric.

Preceding Activities

Well ahead of developing any kind of LEED for Communities/Cities Collegiate Level Experience and Laboratory, as a member of the USGBC New York Upstate Market Leadership Advisory Board (MLAB), Erik Backus was an early enthusiast for the LEED for Communities and Cities pilot rating system in the early part of 2017. Coincidentally, Clarkson University was in partnership with the NYOR in relation to two upcoming events, the Winter International Children's Games[39] (ICWG 2019[40]) and the Winter World College and University Games[41] (FISU Winter Universiade 2023[42]), the latter of which was in the bidding process in the summer of 2017. Working with the Clarkson department of external relations, members of

[34] https://www.usgbc.org/people/vatsal-bhatt/0011129534, accessed on 20 February 2019
[35] https://www.usgbc.org/people/harry-gordon/0000019716, accessed on 20 February 2019
[36] https://www.usgbc.org/people/tracie-hall/0011036905, accessed on 20 February 2019
[37] https://adirondack.org/, accessed on 20 February 2019
[38] https://adirondack.org/about, accessed on 20 February 2019
[39] http://international-childrens-games.org/icg/, accessed on 20 February 2019
[40] https://www.lakeplacid2019.com/, accessed on 20 February 2019
[41] https://www.fisu.net/, accessed on 20 February 2019
[42] https://www.fisu.net/sport-events/winter-universiades-events/31st-winter-universiade,

the University[43], along with USGBC[44], presented the LFC rating system to NYOR representatives[45]. The presentation demonstrated LFC aligned with the goals of the NYOR to demonstrate commitment to sustainability that is now a key marker for winning bids for international sports competitions. By that Fall, under the leadership of Mayor Randall, the NYOR partnership group was being formed and was beginning commitment to do the LEED for Communities effort. In the Spring 2018, the group was expanded to include the Lake Placid Central School District and the Village of Lake Placid had gone forward with a commitment to become a New York State Climate Smart Community[46] (an aligned statewide program with LFC). In the early summer 2018, the parties of NYOR committed in principle to execute the LEED for Communities rating process (and became registered in the ARC platform).

Additionally, prior to the formal semester educational effort, Clarkson University had formed a team of faculty that were supporting the upcoming certification effort on the part of the NYOR and looking to conduct research in parallel with that effort. Professor Erik Backus led a team including Dr. Stephen Bird, Dr. Susan Powers, and numerous other colleagues, in the development of a National Science Foundation (NSF) proposal under the Smart and Connected Communities (SCC) in February of 2018. This was not funded, but the group remains active and pursuing other possibilities for the future.

Key to the LEED for Communities/Cities Collegiate Level Experience and Laboratory was that as a manner to kick off for the certification process and to help generate ideas to drive future support proposals, the collaborating research team executed a one-day workshop in Lake Placid on 22 August 2018. This workshop took on the form of a planning charrette with the following agenda:

Time	Topic/Agenda Item	Duration/Notes
8:00 to 8:45 am	Introduction/Introductions • Overview of LEED for Communities • Preview of Synergy with Community Goals/Trajectories • Layout Potential Broad Research Plan • Personal Introductions	45 min
8:45 to 9:00 am	BREAK	
9:00 to 10:00 am	Community and Stakeholder Kick-off and Engagement • Contextual notes • Roles/responsibilities of various partners • Overall expectations/goals • Proposed/potential project timeline	1 hour
10:00 to 10:15 am	BREAK	Community Stakeholders are invited to remain
10:15 to 12:15 pm	Research/Support Planning • Research/Support Gaps • Past Research Ideas/Effort • Research Opportunities • New/Revised Research Ideas and Plans	2 hours (30 min background, 1 hour breakouts and planning, 30 min plenary & wrap-up)
12:15 to 12:30 pm	Departure	all but the Clarkson Adirondack Semester Team
12:30 to 1:00 pm	Adirondack Semester Planning	30 min

Table 2: Olympic Region of New York State

[43] Represented by Clarkson VP of External Relations Dr. Kelly Chezum and Dean of the Graduate School Dr. Kerop Janoyan

[44] Represented by Dr. Vatsal Bhatt, Director of Cities and Communities and Ms. Tracie Hall, Director of the NY Upstate Community

[45] Represented by Mr. Michael Pratt, CEO ORDA, Mr. Jay Rand, Councilman, Town of North Elba, Mr. Craig Randall, Mayor, Village of Lake Placid, and Mr. Jim McKenna, CEO, Regional Office of Sustainable Tourism (ROOST)

[46] https://climatesmart.ny.gov/, accessed on 20 February 2019

LEED for Communities Kick-off Event and Research Proposal Workshop Agenda[47]

Participants in this workshop included all of the individuals and organizations above (including outside consultants), as well as many more. Prof. Backus and Dr. Bhatt initiated the conversation with an overview of the LEED for Communities rating system and then Prof. Backus facilitated the discussion throughout the day. Notes were taken and saved for use in the upcoming efforts. As noted in the agenda, the end of the day was set to aid faculty in the ADK semester in doing final planning for the semester effort that was to begin the following Monday, 27 August 2018.

This particular workshop had a few critical aspects that should be considered in future LEED for Communities/Cities Collegiate Level Experience and Laboratory efforts:

- It opened lines of communication across all of the constituent groups that would participate with the students in the LFC Certification process
- It set expectations for the student effort
- It prepared faculty for their roles as facilitators of the student project based IRP effort.
- It set the stage and built energy for the community around the process

Overarching Curriculum

The overarching curriculum for the LEED for Communities/Cities Collegiate Level Experience and Laboratory pilot was driven largely from two sources. The first, and primary source, was previous iterations of the ADK semester at Clarkson University. As described above, this immersive experience has a strong record of accomplishment to draw from and the form of the curriculum remained essentially unchanged from that perspective. The second was a white paper derived from a previous set of discussions on what such a LEED for Communities/Cities Collegiate Level Experience and Laboratory might look like. Provided in Appendix B, is a white paper that was developed around the conversations that were had around this concept. As cited therein, it was thought that this kind of effort would require three fundamental things:

- "Fundamental Skills Courses that equip students with core knowledge in the various technical and specific discipline domains that would be required at the community/city scale
- A hands on test bed using the college campus itself as a laboratory in order to understand the challenge of scoring and managing sustainability at the community/city scale.
- A capstone hands-on application, working with a local community as it seeks to obtain certification or recertification as a LEED community."[48]

As such, the overall curriculum incorporated much of these three elements, although instead of an on-campus test-bed, given the early application, the students were able to jump right into the process with the community in this pilot effort.

The following figure depicts the layout of the courses and curriculum for the 15-week session of the Fall 2018 ADK semester and pilot of this program:

[47] Backus, Erik, Olympic Region of New York State LEED for Communities Kick-off Event and Research Proposal Workshop, Workshop Agenda, 22 August 2018

[48] Backus, Erik, LEED for Communities Lab – Initial Meeting Notes and White Paper, Memo to Clarkson Faculty and Dr. Vatsal Bhatt, 20 November 2017

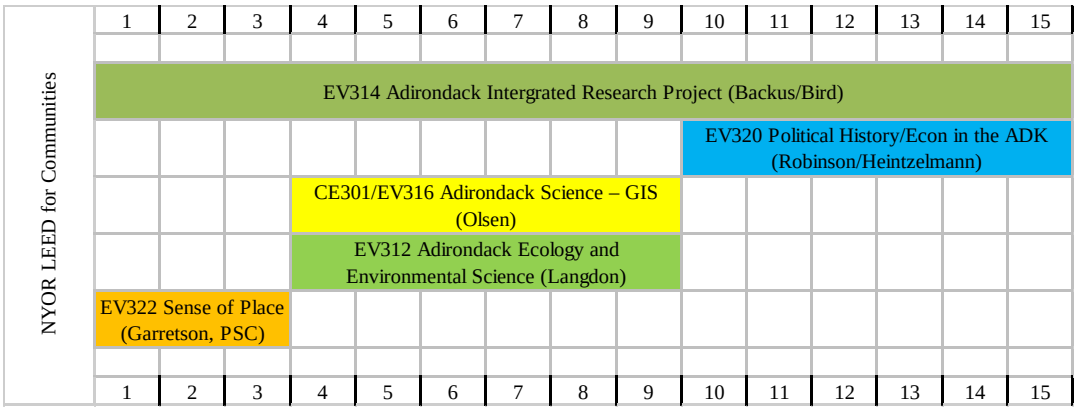


Figure 3: 15 Week Layout of the Fall 2018 ADK Semester[49]

The following sections will discuss the supporting courses as well as the IRP, which centered on the LFC certification effort itself.

Supporting Courses

The following details the description and specific key notes about each supporting course that was taught during the ADK semester in the Fall of 2018. More detail can be found through a reading of the syllabi for the courses, which is provided in Appendix C to this document. Users of this document are highly encouraged to review each of these syllabi and contact the related instructors should questions arise.

EV322 Adirondack Park and a Sense of Place

Ms. Bethany Garretson an instructor at Paul Smith's College, who is an avid writer, hiker, and outdoors person, taught this course. The following is the course description for this course:

"To understand a place, one must often understand the views of nature and the environment as seen by writers and essayists. Students will explore the Adirondacks through literature while experiencing the lakes, rivers, streams, and mountains. The readings, discussions, and written assignments will explore the aesthetics, the social and political climate, and the prevailing attitudes toward the environment that helped create the Adirondack Park. In addition, the course will provide students will an opportunity to participate in seasonal outdoor activities to learn how recreational activities have impacted the social, cultural, economic, and physical aspects of the Park."[50]

This course begins with a backcountry expedition in the Adirondack forest preserve, with students literally learning while on the trail. The course then returns to the semester living-learning site at Paul Smiths College, where they continue discussions and round out their background understanding of the people and culture of the Adirondack region. As noted above, this course preceded all other supporting courses during the semester.

EV312 Adirondack Ecology and Environmental Science

[49] Bird, Stephen and Backus, Erik, Semester Planning Spreadsheet, Revised, October 2018
[50] Clarkson University, Online Course Catalog, accessed through the following link: https://www.clarkson.edu/student-administrative-services-sas/course-descriptions-and-class-schedules

Taught by Mr. Stephen F. Langdon, this course included a trip to the Shingle Shanty Preserve and Research Station[51], of which he is the director:

"This course introduces ecological and environmental science concepts relevant for understanding the structure and function of terrestrial, aquatic, and human systems in the Adirondack Park. Students will learn to identify important plant and animal species representative of the Adirondack Mountains, and learn major features of ecological systems in the Park. The course will also provide the students an assessment of human impacts on the ecology of the Adirondack Park."[52]

The Fall 2018 session of this course included an overnight stay at the aforementioned research station and included extensive field study off the campus of Paul Smiths and into the preserve itself. This course and the following were executed simultaneously during the semester.

CE301/EV316 Adirondack Science – GIS

This is a variation on the traditional course taught on the Clarkson campus by Mr. William "Bill" B. Olsen. Mr. Olsen is a well-known geographer and geospatial science resource in the greater North Country region. Here is the course description for this supporting course:

"An introductory course in the concepts and uses of Geographic Information Systems (GIS) including analysis of GIS-based local and global geographic datasets. Provides basic knowledge of GIS theory and applications using existing state-of-the-art GIS software and current spatial data resources. Applications include: overlay analysis, spatial data query, map generation and terrain surface analysis. Students will also learn the basics of GPS data collection, remote sensing, 3D visualization, probability, statistics, and error analysis."[53]

The Fall 2018 offering of this course was placed sequentially after Sense of Place and in parallel with Ecology. The focus of this course was in developing a map that was used to depict NYOR effectively as well as providing a tool to do data analysis across many of the LFC metrics. The results of this course work was included in the end of the semester white paper, which is cited throughout this document.

EV320 Social and Political Issues in the Adirondacks

This course was co-taught by Dr. Martin Heintzelman and Dr. Chris Robinson. Dr. Heintzelman is an ecological economist and Dr. Robinson is a public policy and political science researcher looking at ecological trauma and sustainable development.

"The historical, social, political, and environmental factors contributing to the fabric of the Adirondack Park is an evolving social experiment. The course readings will focus upon the New York State constitutional provisions that engendered the park, the policies that shaped the park, along with the political actions that influence the park today. The Adirondack State Park is extraordinary for its history and because it is a place where human residents live and recreate in sustainable ways that conserve resources and 'forever wild' regions of the park."

[51] https://www.shingleshanty.org/
[52] Clarkson University, Online Course Catalog, accessed through the following link: https://www.clarkson.edu/student-administrative-services-sas/course-descriptions-and-class-schedules
[53] Ibid

The Fall 2018 offering looked into the economic and political landscape of the region, specific to the Olympics in 1980 as well as today. Part of this course included trips to the APA and other governmental elements effecting NYOR. This course was taken at the end of the semester and its timing, as discussed below was somewhat ideal in relation to the IRP.

The Integrated Research Project (LEED for Communities in NYOR)

As indicated earlier, the Clarkson Adirondack Semester Integrated Research Project (IRP) for the Fall 2018 was the evaluation and certification of the New York Olympic Region. This effort was facilitated by Prof. Erik Backus and Dr. Stephen Bird as the primary instructors for the course, and was the centering point of the entire semester effort. The formal course description for EV314 Integrated Research Project: LEED for Communities in the New York Olympic Region is as follows:

"This problem-based learning course will task students to analyze and suggest solutions to complex problems relevant to the economic, social, and environmental welfare of the Adirondack Park. The course is intended to reinforce what students have learned in other Adirondack courses."[54]

Consequently, this three (3) credit hour course represents the core "LEED for Communities/Cities Collegiate Level Experience and Laboratory" course model. This said, the supporting courses were critical in enabling and augmenting the IRP effort throughout and, thus, should be seen as critical to the overall IRP process. This section will discuss the conduct of the IRP in detail, more so than the previous courses discussion as it pertains to how others might envision running a specific LEED for Communities/Cities Collegiate Level Experience and Laboratory in the future.

Kick-Off and Introduction

The IRP itself began promptly on 27 August 2018, with an informal meet and greet with the students prior to their other ADK semester orientation activities. Prof. Backus and Dr. Bird began with a mutual sharing and outlining of the IRP in general terms, prepping the teams for what was to be a weekly engagement on the part of the faculty and more on the part of the students. Throughout the semester, students were to look for articles and scholarly works related to the LEED for Communities effort and provide a weekly report of their activities. This served as a manner for faculty to observe activities and to ensure students were conducting necessary independent investigations.

Bird and Backus alternated between Friday and Monday morning drop-in sessions throughout the semester to facilitate conversations as well as conduct interactions with community groups. The first of these occurred on 3 September (following the backcountry expedition as part of Sense of Place), where Dr. Bird and Prof. Backus conducted the first formal class session. Backus covered the basics of the LEED for Communities Rating System, which prompted a discussion of how to start thinking about collecting the requisite data for the certification process. On 7 September, Prof. Backus coordinated for a meeting between the students and ORDA officials as well as hosted a remote discussion session with Dr. Vatsal Bhatt and the students to further explore metric data gathering. On 10 September, Dr. Bird facilitated a discussion on research generally as well as how to use available reference materials and library resources for the study. Friday 14 September was an opportunity for the ADK semester students to meet the Lake Placid Central School Environmental Science Students during a field trip to nearby Lake Flower[55] and meet Mr. Stephen Langdon (instructor for the ADK Semester Ecology course). This was followed by the first meeting between the students and Mr. Dean Dietrich of the Lake Placid/North Elba Development Commission to start exploring community priorities. Monday 17 September featured a

[54] Ibid

[55] Where an ongoing lake remediation project was taking place

lecture on Smart Growth and related topics for reference on the part of the students and closing the introductory materials for the IRP.

Investigations and Data Collection

By the fourth week, the ADK semester changes from a focus on the Sense of Place course and the IRP to the students taking two compressed courses (EV312 ADK Ecology and CE301/EV316 GIS) as well as continuing work on the IRP. For this reason, interactions between the facilitators are a bit more scattered and more work that is independent is expected of the students. This phase kicked off in earnest on 21 September, where Backus and Bird facilitated a brainstorming session for how the students would execute the needed data collection for LEED for Communities, specifically around the core metrics (the fourteen (14) required metrics in the LFC rating system). This was informed by the earlier conversation with Dr. Bhatt (who also partook in this session remotely), but delved also into where to seek this data beyond those suggestions. On Monday 24 September, there was a follow-up session, in the morning, to see how the students were structuring their search. In parallel with this, Prof. Backus met telephonically with Dean Dietrich in order to set up a steering committee on the part of the four LEED for Communities jurisdictions. This latter effort was one that took considerable effort on the part of Backus in order to finally bring together a group that would be identified as the core representatives for each party as part of the overall LFC effort.

On 28 September, Dr. Bird conducted a drop in assist session and attempted to address several questions relating to data. Notably, household income data and GHG emissions data quickly emerged as troubling data sets to determine. Additionally, during the last week of September, Stephen Langdon took the students on a tour of the Mount VanHoovenburg ORDA site in conjunction with the ecology class. This informed the data collection around water use as well as how to understand the data for ORDA in conjunction with the LFC effort. The first week of October then focused on continued data collection, work on developing a map for the NYOR region (in the GIS class), and an overnight stay at the Shingle Shanty Preserve and Research Station (as part of the ecology class). The next week was a continuation with a check-in by Bird with the students on Friday 12 October, wherein it was discussed that the students would make their first, preliminary presentation on their work at the Clean Energy Economy Conference in Glens Falls on October 25. After a check-in with Backus on 15 October, the students kept working on data collection and beginning on developing their presentation. While this was ongoing, Mr. Harry Gordon of USGBC and GBCI had agreed to co-present on LEED for Cities/Communities with the students at said conference. On Friday, 19 October, the students gave their first presentation of their progress to Mr. Gordon, Dr. Bird, and Prof. Backus followed by further coordination of preparations for the upcoming presentation. The evening of 18 October was very important, however, as Prof. Backus and Mayor Randal held a prolonged conversation about the Village of Lake Placid goals (which the Mayor laid out as Erik took copious notes) as well as worked to pull together the necessary steering group in the near term. The following week, Mr. Gordon did another prep session with the students who then presented at the Clean Energy Economy Conference (CEEC) on 25 October to a small yet very interested audience. From this experience, the students learned much about where they stood in the process as well as what more needed to be done for eventual certification. The conference was also a key turning point in the semester as the GIS and ecology courses concluded and the final full course taught by Dr. Heintzelman (who also attended the CEEC) and Dr. Robinson began.

Certification Effort and Challenges

Whilst data collection continued, the certification effort began in earnest on 26 October when Prof. Backus gave a lecture and demonstration of the ARC[56] platform. Up until this point, the students worked

[56] http://arcskoru.com

primarily through a provided Google drive folder structure established at the outset of the semester. This is a critical note, as there is considerable work that is needed prior to uploading data and inputs into ARC, necessitating a file sharing capability. Google drive was ideal in this case because: 1) it was the university file sharing service, 2) it enabled use of Google docs, Google sheets, and other collaborative documents for shared development of the various documents and calculations, and 3) it was interoperable with ARC thorough its file sharing options imbedded in the platform. In order to let everyone catch-up, 29 October was a scheduled "work day" with Dr. Bird offering these specific comments on the status of the effort:

"[For] our work, our strategy should be to resolve our water, waste, and GHG metrics for certification.

Second, we have a beginning set of concerns to work with from Mayor Randall on the secondary goals and metrics for LFC, below. Please start thinking about these issues from the perspective of:

- addressing a literature review in these topics,
- thinking about data sources now and in the future,
- coordinating these goals across our 4 jurisdictions,
- adding more high-priority items to this list,
- and anything else that is relevant.

Goals list from Mayor Randall

- Create improved trails connectivity and conditions for biking, skiing, etc. to and from the Village and within the Village
- Enable continued savings in energy use and improve the local electrical security/resiliency/storage
- Provide full water metering for all connected users (current status: not fully metered in the village)
- Develop a comprehensive approach to manage stormwater within the village in order to address water body stresses especially for Lake Placid and Mirror Lake while accounting for multi-seasonal effects (e..g road salt, etc.)
- Address and improve traffic within the village and to the surrounding sites to enable vibrancy for the core for all citizens and visitors
- Address and enable solutions in order to improve housing equity within the region"

On 2 November, Dr. Bird and Prof. Backus met with the students to check in on status with Prof. Backus collaboratively developing with the students a comprehensive outline for the final end-of-semester whitepaper. This was helpful as it aided the students in building a structure for how to collect the disparate data and information that is needed to execute the LFC certification in ARC. What was still missing was further clarity on the community approach to ongoing certification, namely through a planning process or dedication to ongoing measurement of a number of community based metrics. This was resolved when, thanks to leadership on the part of both Prof. Backus and Mayor Randall, the steering committee met with the students on 5 November 2018 at the Beach-house in Lake Placid. In this initial meeting, the following persons represented the various groups:

Name, Position	Group/Partner
Jay Rand, Councilman	Town of North Elba (TNE)
Craig Randall, Mayor	Village of Lake Placid (VOLP)
Dean Dietrich, Chair	Lake Placid/North Elba Community Development Commission
Roger Catania, Superintendent	Lake Placid Central School District (LPCSD)

Cort Honey and Nick Zachara, Project Coordinators	ORDA

Table 3: LFC Steering Committee Members[57]

In this meeting, the Mayor's goals were reviewed and discussed, leading to a larger conversation about the goals, and corresponding metrics needed to track those goals, for each of the parties in NYOR. Dr. Catania indicated that the LPCSD goals should, in part, be derived from the School District students themselves. To that end, some of the Clarkson students took part in the Youth Climate Summit with some LPCSD students at the Wild Center in Tupper Lake on 8 November, and then followed by a meeting with Ms. Tammy Morgan's LPCSD Environmental Science class, on 14 November. From this and ongoing work the Clarkson students were able to create a draft document for the community metrics, which was reviewed on 16 November by the steering committee (done remotely by the students, given weather conditions).

By this point, the Clarkson students had been able to largely resolve the challenges with the core metrics and were able to present those statuses to the stakeholders. On 12 November, the students with Dr. Bird met with Steven Baumgartner of SmithGroup to discuss the status of the project and further thinking about how to develop the community goals/objectives and corresponding metrics. The week of 19 November was the week of American Thanksgiving, which the students had off as a break. Following the Thanksgiving break, on 26 November was the final meeting between the students and the steering committee. At this meeting, not only were the community metrics identified, the various parties agreed who would commit to their input, the primary or lead group who would be in charge of managing that particular metric, likely sources of the needed data, and the difficulty of retrieving it for use in future LFC annual updates. At this point, all of the elements were in place for the students to execute the final steps for certification and entering the data into ARC.

Closure, White Paper and Presentations

Following the 26 November meeting, the Clarkson students worked in earnest to complete two end of semester deliverables: 1) a detailed whitepaper supporting LEED for Communities certification for the New York Olympic Region, and 2) a final presentation of those results. Over the week of 26 November, Bird and Backus fielded numerous questions related to the pre-certification elements and the various narrative justifications that were to be included with the core metrics upon entering the data into ARC. Further, these were used to detail elements of the closure whitepaper. Friday 30 November was set aside as a workday, with Monday 3 November set aside as a data entry day for entering data into ARC. A press release[58] was sent out on 30 November from Clarkson announcing the effort and that public presentations would occur in the community on 10 December and on campus on 12 December. Because of continued work, ARC entry was slowed and a work session was held on 5 December in order to clear up several details in support of the presentation as well as the whitepaper (a partial draft of which was delivered to Bird and Backus on 1 December). On Friday, 7 December, a rehearsal of the presentation was conducted in front of Bird and Backus, both gave comments for updates for the coming Monday. In parallel, the whitepaper was being revised to reflect comments from Backus and Bird as well as meet the needs for ARC data entry. Over the weekend of 8-9 December, the ADK semester students worked diligently to

[57] Flory, Megan, Barber, Paul, Buck, Benjamin, Ulrich-Verderber, Louisa, Chase, Sarah, Clark, Lindsay; Danyla, Adeline, Fudo, Lucas, Gatulik, Chloe, Melgar, Daniel, Meyer, Adam, Singh, Pranav, Terleckyj, Laryssa, Vondrak, Benjamin, "USGBC LEED for Communities Certification of the New York State Olympic Region Clarkson University Adirondack Semester, Last Revised: 17 December 2018", Whitepaper, Clarkson University, December 2018

[58] https://www.clarkson.edu/news/clarkson-students-assist-new-york-olympic-region-it-pursues-leed-community-sustainability

polish and rehearse the presentation as well as fill in gaps in the whitepaper, simultaneous with ARC data and supporting document upload.

This fury of activity came to a crescendo on 10 December when the students held the first public presentation at the Lake Placid Convention Center at 4:30 pm. ORDA was kind enough to set up a presentation space and provide refreshments. Attendance was lighter than expected, but all of the participating parties were represented and several community members joined as well. As will be discussed, the presentation revealed several surprising results and confirmed others in relation to community expectations. This presentation with minor modifications was presented on 12 December on the Potsdam Hill Campus of Clarkson University (in Moore House at 10 am) to a campus wide audience. Aside from some technical issues with the projection of some slides, the presentation was very well received by all. The whitepaper[59] and ARC data/justification upload (on the part of the students) was completed on 17 December. The oft-discussed whitepaper, from which much of this document cites, is located in Appendix D. The final presentation given by the students is also provided in Appendix E.

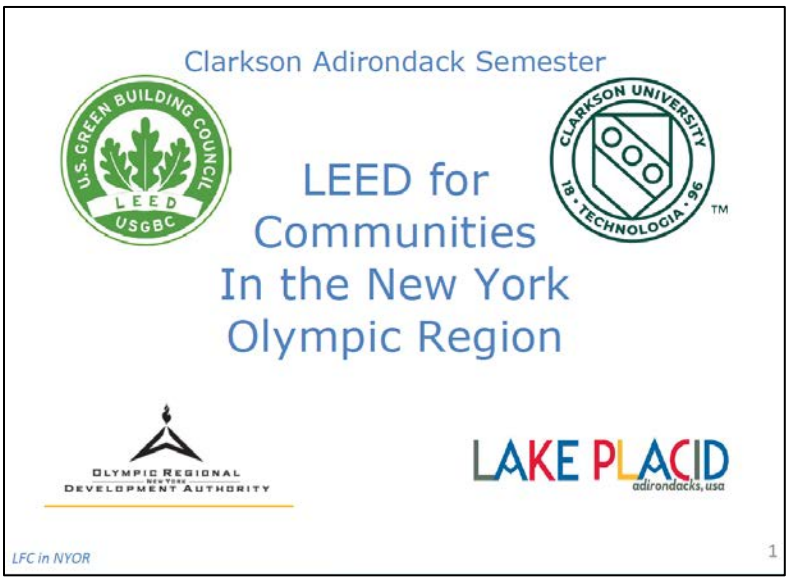


Figure 4: Opening Slide, Final Fall 2018 IRP Presentation

At the conclusion of the ADK semester, all that remained was for Prof. Backus to work with USGBC and GBCI to enable certification review to move forward.[60] As was discussed, the final MOUs are still in progress to finalize this effort in this regard, but all parties are agreed in principle and as of this writing, the project is in the review cue with GBCI.

Results to Date

The core results of this LEED for Communities/Cities Collegiate Level Experience and Laboratory, was that collegiate level students at Clarkson University more than successfully completed the core tasks to

[59] Flory, Megan, Barber, Paul, Buck, Benjamin, Ulrich-Verderber, Louisa, Chase, Sarah, Clark, Lindsay; Danyla, Adeline, Fudo, Lucas, Gatulik, Chloe, Melgar, Daniel, Meyer, Adam, Singh, Pranav, Terleckyj, Laryssa, Vondrak, Benjamin, "USGBC LEED for Communities Certification of the New York State Olympic Region Clarkson University Adirondack Semester, Last Revised: 17 December 2018", Whitepaper, Clarkson University, December 2018

[60] This was also contingent on the NYOR partners paying the requisite registration and certification review fees.

execute certification for the New York Olympic Region. As stated in the concluding whitepaper by the ADK semester students:

"We believe that the strategy of linking local universities with rural communities is an effective one, and is especially useful for communities with fewer human and financial resources available for projects such as this. The positive effects of these relationships between academic institutions and communities are felt in both directions. From community projects, students gain real world research and problem solving experience, while providing outside ideas and perspectives which may inspire fresh approaches that advance the community's goals. With this in mind, the relationship between Clarkson and NYOR will continue"[61]

Through this process the students uncovered several things that were of interest to the community:

- Violent crime rates are by proportion higher than expected, even as the total numbers appear small. Further, trends seem to need to be watched to determine how best to address any concerns that may be derived from this discovery.[62]
- LFC struggles to deal with visitors and high levels of tourism. Transportation, Energy, Water and Waste metrics all relate to per-capita rates, which are largely skewed on account of this context. As stated in the whitepaper, "Perhaps the most significant question they raise is whether or not the transient visitor populations should be included in a region's total population count. In areas with high tourist traffic, such as NYOR, including the visitor population in per capita measurements provides a more accurate assessment of the impact of an individual on use of resources."[63]
- "Rural communities do not have access to the same levels of information for tracking that urban communities do."[64]
- The problem of having sufficient level of precision for some metrics based on data sources is very clear, as census track and other data pools may not account for those variations, while yet still be very accurate in the aggregate.
- Most (almost all) of the chosen community metrics were not available from the two-hundred plus available additional metrics in ARC. This has delayed the ability to begin work to start entering data for tracking on these metrics on the part of the NYOR partners on that platform.[65]
- Several metrics required some base assumption (e.g. water, for well water usage) in order to arrive at a metric for the region. Care must be taken to use the same methodology going forward, and to eventually develop better means such that said assumptions can be replaced with factual data.[66]
- Working with a multi-jurisdictional construct, such as NYOR, requires clear delineation of roles, responsibilities and boundaries. It also requires extensive communication and linkages to be maintained through the LFC certification process, and more importantly for the community, and its constituent parts, to meet its mutually reinforcing goals.

Beyond these discoveries, the effort proved highly rewarding academically. The participating students in the ADK semester took away great appreciation for the challenges involved in executing the task required

[61] Flory, Megan, Barber, Paul, Buck, Benjamin, Ulrich-Verderber, Louisa, Chase, Sarah, Clark, Lindsay; Danyla, Adeline, Fudo, Lucas, Gatulik, Chloe, Melgar, Daniel, Meyer, Adam, Singh, Pranav, Terleckyj, Laryssa, Vondrak, Benjamin, "USGBC LEED for Communities Certification of the New York State Olympic Region Clarkson University Adirondack Semester, Last Revised: 17 December 2018", Whitepaper, Clarkson University, December 2018
[62] Ibid
[63] Ibid
[64] Ibid
[65] Ibid
[66] Ibid

to achieve certification within a sustainable holistic planning system like LFC. The faculty were also able to glean invaluable data from this pilot for future iterations of this experience. For instance, Clarkson will be using its Honor's sophomore level project course next year to continue the NYOR LFC certification effort (focused on performance in the core and community metrics compared against this first iteration).

Finally, the NYOR LEED for Communities Project was submitted for review in early February and is awaiting its certification score. Once completed, it is anticipated that a significant media effort will be made to announce how the place where the "Miracle on Ice" is now a certified LEED Community, thanks to the efforts of these students, their faculty, and the community that has hosted them.

Recommendations and Future Actions

After executing the first ever LEED for Communities/Cities Collegiate Level Experience and Laboratory, there are some key recommendations that come to light:

- The nature of having an immersive living-learning experience within the community for the LFC effort is very beneficial. Future LEED for Communities/Cities Collegiate Level Experience and Laboratory efforts should look to repeat this model.
- The supporting coursework used in this pilot effort would seem essential for future efforts. While done within the same semester as the LEED for Communities/Cities Collegiate Level Experience and Laboratory (the IRP), there is merit to thinking these could be done preceding the semester lab experience. That said, the need for said courses to focus on the community that is the subject of certification might make that more challenging logistically or from a focus perspective.
- As is shown here, having a dedicated faculty that can work closely with local community leaders to facilitate the needed coordination and meeting facilitation is critical. This effort of course benefited from a faculty who was very active in the local USGBC community as well as had significant local government planning experience to fulfill this role, but this needs to be considered in future efforts. There is a real need to have this coordination and facilitation role whether through an office of external relations, specific community service coursework/service work activity, or otherwise.
- Further, it is also critical to have a faculty that is working on this project that has extensive public policy experience and hold academic credentials that can guide the participating students in a rigorous scholarly approach to this work. Local community leaders see academic institutions, rightly, as places to seek knowledge that they do not possess within the greater populace. To that end, in addition to filling in a human resources gap to accomplish the effort to complete a program like LFC, communities are looking for College or University partners to bring in expertise and knowledge through the student effort such as this. Again, this pilot was able to provide that through one of the IRP faculty as well as some of the supporting course faculty.
- Future iterations take into account that students are learning as they conduct the certification efforts/researching the best ways forward with a community. To this end, the effort will take some time, but ultimately result in a much better product.

In regards to future actions, it would be Clarkson's desire to continue to develop this LEED for Communities/Cities Collegiate Level Experience and Laboratory and find other beta sites for this concept, regionally, nationally, or internationally. Further, efforts to take this particular case study and provide generalizable guidance and curricula for other contexts would certainly be considered. It is hoped that the USGBC would aid this development, through either its Center for Green Schools, or other mechanisms. Please contact the corresponding author for ways to further collaborate in this manner.

Appendix A: Faculty Biographical Sketches

Bethany Garretson

Year Started at Paul Smith's: 2014
Department: Environment & Society
Program: Environmental Studies

Academic Background

MA, Applied Community Change, Future Generations University
BA, Paul Smith's College
AS, SUNY Cobleskill

Courses Taught

360 PRK Diversity and Inclusion by Design
310 EST Environmental History and Social Justice
350 PSY Introduction to Therapeutic Recreation
315 SOC Community Organization and Outreach
210 COM Interpersonal Communication
215 HST The Adirondacks
201 POL Politics of the Environment

Two Women Tackle The Adirondack 46 High Peaks

How Young Is Too Young for High Altitude?

BethanyClimbs.com

Fastest Known Time

Osgood Pond Semester

Bethany Garretson

Contact »

Instructor
bgarretson@paulsmiths.edu

Paul Smith's College
P.O. Box 265
7777 NY-30
Paul Smiths, NY 12970

Christopher Robinson (Faculty)

Associate Provost for Faculty Achievement
Provost's Office

Email: crobinso@clarkson.edu
Phone: 315/268-3986
Office: 313 Science Center
Mailbox: CU Box 5750

Department(s): Humanities and Social Sciences, Honors Program
School(s): School of Arts and Sciences, Institute for a Sustainable Environment

Zoom Link

https://clarkson.zoom.us/j/93305037775?pwd=U3VqbFN3M3hPZysxUzhtMVVhalB1UT09

Office Hours

Monday: 4:30 -6:30
Wednesday: 4:30 - 6:30
Friday: 4:30 - 6:30

On This Page

Research Interests

Publications

Education

Ph.D. -
State University of New York at Albany
M.A. -
SUNY at Albany & University of Massachusetts at Amherst
B.A. -
Siena College

Courses Taught

- Environmental Law and Policy
- American Politics
- Constitutional Law
- Human Rights Law and Politics
- Law and Bioethics
- Political Theory

Research Interests

Scholarly Interests
My research interests cleave in two distinct directions. I am completing a book on Wittgenstein and Political Theory; part of a larger study of contemporary political theory as a series of responses to political trauma (genocide, war, the Holocaust) and ecological catastrophe. My second area of scholarly interest is the politics of sustainable development, where I am formulating a position I call "Political Ecology" that considers the larger political effects of acknowledging the illogic of limitless economic growth on a planet of limited natural resources.

Publications

Publications
"The Iron Triangle: Why the Wildlife Society Needs to Take a Position on Economic Growth," co-authored with Brian Czech and nineteen signatories, Wildlife Society Bulletin 31.2 (Fall 2003), pp. 574-77.

Presentations
"Seeing As It Happens: Theorizing Through the Eyes of Wittgenstein," a paper presented at the 2004 Annual Meeting of the Northeastern Political Association, Boston, MA, November 11-13, 2004.

Chair and discussant for "Social Criticism and Political Argument Panel," at 2004 Annual Meeting of the Northeastern Political Science Association, Boston, MA, November 11-13, 2004.

"Theorizing Sustainability: An Exercise in Political Ecology," at the Association for Political Theory Conference, October 29-31, 2004, Colorado College Roundtable: Environmental Political Theory: The Art of Politics in a Natural World.

Participant at Oxford Round Table on Regulating Sustainable Development: Adapting Globalization in the Twenty-First Century, University of Oxford, England, August 8-13, 2004, in the keynote presentation: "Theorizing Sustainability: An Exercise in Political Ecology."

"Political Ecology and Sustainability: A Political Defense of Ecological Economics," at the Annual Meeting of the Midwest

Political Science Association, Chicago, IL, April 15-18, 2004.

"Sustainability Science in Policymaking: Santa Rosa National Park (Costa Rica) and Adirondack State Park," co-authored with Tom Langen, presented at the Wildlife Society 2003 Annual Conference, Sept. 8, 2003, Burlington, VT, sponsored by the Gund Institute for Ecological Economics.

"Theorizing Politics Lost: Hannah Arendt and Herbert Marcuse," presented at the Annual Meeting of the Midwest Political Science Assoc., Chicago, IL, April 3-6, 2003.

Respondent, Panel on "Jacques Derrida and Political Theory" at the Annual Meeting of Midwest Political Science Association, Chicago, IL, April 3-6, 2003.

Respondent, "Did Socrates Believe in Democracy?" at the SUNY Potsdam's Legacy of Greece and Rome Conference, March 13, 2003.

Chair, "Continental Political Philosophy Panel" at the Association for Political Theory Inaugural Conference, Calvin College, Grand Rapids Michigan, Oct. 17-19, 2003.

Erik Backus

Professor of Practice / Director of the Construction Engineering Management Program / Executive Officer
Civil & Environmental Eng

Email: ebackus@clarkson.edu
Phone: 315/268-6522
Office: 140a Rowley Lab
Mailbox: CU Box 5710 -8 Clarkson Avenue

Department(s): Department of Civil and Environmental Engineering
School(s): Coulter School of Engineering, Institute for a Sustainable Environment

Zoom Link

https://clarkson.zoom.us/my/ebackus

On This Page

CU COVID ALERT: Gold, Low-Moderate-Risk - Maintaining the Bubble – Spring 2021 Info

Awards

Publications

Education

Civil Engineering (Concentration: Construction Engineering and Management) M.S. - 2004
University of Missouri – Rolla (now Missouri University of Science and Technology)
Civil Engineering (Concentration: Infrastructure Technologies) B.S. - 1997
Clarkson University

Courses Taught

- CE 212 Introduction to Engineering Design (Fall Semesters)
- CE 406 – Construction Engineering (Fall Semesters)
- CE 409 – Fundamentals of Building Systems (Spring Semesters)
- CE 410/CE 510 – Sustainable Infrastructure and Building (Fall Semesters)
- CE 490 – Senior Design (Structures/Transportation/Geotech) /(Building, Arch) (Spring Semesters)
- CE 591/ES 581 – Special Topics in Construction Engineering Management (Spring Semesters)

Experience

Lieutenant Colonel *US Army Reserve, 2012*
Professional Engineer *2005*

Biography

I am the Howard E. Lechler Endowed Director of the Construction Engineering Management program at Clarkson University in Potsdam, NY. I teach courses and execute research/work in an array of topics related to the built environment including: sustainability, resilience, and life-cycle thinking of infrastructure and buildings. I serve on the Univ. Sustainability Committee and am an affiliate faculty in the Institute for a Sustainable Environment (and play hockey now and again). In my faith life, I am a member of the Lutheran Church of the Holy Trinity in Potsdam, NY, a member of Lutherans Restoring Creation (LRC) and am also a Synod Trainer for LRC. Beyond these efforts, I recently retired as a Lieutenant Colonel in the Army Reserve, serving in various capacities including as the Battalion commander of the 479th Engineer Battalion at Fort Drum. I also continue to serve as the Co-Chair for the Market Leadership Advisory Board for the Upstate NY Community of US Green Building Council (USGBC). Not too far from campus, in Russell, NY, I proudly manage my family property (5th generation) near Backus Hill and Backus Road where you might catch me when I'm not doing all of the above or at home with my amazing wife Jackie and a couple cats watching a (2018 Stanley Cup winning Washington Capitals) hockey game.

Research Interests

- Sustainable Construction
- Force Protection Engineering/Infrastructure Resiliency
- Integrated Project Delivery/Project Leadership
- Energy/Alternative Energy Metrics/Management & Informatics
- Alternate Transportation Impacts/Planning

Awards

Best Paper Award, ICEIS 2013, Area: Artificial Intelligence and Decision Support Systems
CU COVID ALERT: Gold, Low-Moderate Risk - Maintaining the Bubble – Spring 2021 Info
George Mason University: Facilities Employee of the Month, August 2013; Sustainability Hero Award, 2012
Military: Bronze Star Medal; Combat Action Badge, Bronze Order de Fluery Medal
Leadership: Clarkson Phalanx Commendable Leadership/Inductee; Eagle Scout, BSA

Publications

Recent Presentations

• Backus, Erik C. (2016), Teaching Green - Prepping Students for LEED v4 and Envision (April 14, 2016): http://www.esf.edu/greenbuilding/2016/documents/2016NYSGBC_Erik_Backus.pdf
• Hogue, Markus, Webb, Mark, Backus, Erik C., Schay, Alan, (2016), The Brave New World of Facilities Informatics, APPA Annual Conference (July 13, 2016)
• Backus, Erik C. (2015), A Decision-Guided Energy Framework for Optimal Power, Heating, and Cooling Capacity, 2015 Clean Energy Economy Conference, Utica, NY (June 11, 2015) http://www.ncenergyconference.org/wp-content/uploads/2015-CEEC-Detailed-Agenda-ASL1.pdf
• Backus, Erik (2015), Improving Infrastructure Resilience through Partnership and Planning (March 12, 2015): http://www.esf.edu/greenbuilding/2015/documents/Backus.Abstract.WEB.pdf
• Backus, Erik and Farris, David (2014), Improving Infrastructure Resilience through Partnership and Planning (November 13, 2014): http://www.samejets.com/?page_id=318
• Backus, Erik (2014),"What's Your Bootprint?" Together in Mission (TIM) Talk (like a TED Talk) on Sustainability: https://www.youtube.com/watch?v=aTk-XqqIWbA&feature=share&list=FLGOXjlqnKLc52vtsx5zYUwA&index=1

Selected/Recent Publications

• Backus, Erik C. (2017), "Technology, Trends, and How to Not be Swept Away", CONEXPO/CONAGG News, September 26, 2017, http://www.conexpoconagg.com/news/september-2017/technology-trends-and-how-to-not-be-swept-away/
• Backus, Erik. C. and Weidner, Ted, (2017) "Getting the Most out of APPA's FPI Survey and Report Tool—And a Preview of What's to Come", Facilities Manager, APPA (Sep/Oct 2017), pp 49-51
• Hogue, Markus, Backus, Erik C., Smeds, Christopher, and Webb, Mark (2016), Code Talkers: Informatics Moving Forward (Nov/Dec 2016)
• Backus, Erik C.; Schay, Alan; Theimier, Ana (2016), APPA Facilities Informatics Maturity Matrix Technical Report, July 2016, APPA http://www.appa.org/bookstore/product_browse.cfm?itemnumber=1306
• Backus, Erik (2014), "Lighting Your Worship Space Primer: Bringing in the Light, Sustainably", http://docs.google.com/viewer?a=v&pid=sites&srcid=bHV0aGVyYW5zcmVzdG9yaW5nY3JlYXRpb24ub3JnfHd3d3xneDo0N2UxMTAyYTIwYTBhOGMy
• Backus, Erik and Lo Margaret (2013), "George Mason University Environmental Design Standards", http://facilities.gmu.edu/ProjMgmtConst/DesignStandardsManual/upload/3-4-ENVIRONMENTAL-STANDARDS.pdf, June 28, 2013
• Ngan, Chun-Kit, Brodsky, Alexander, Egge, Nathan, and Backus, Erik (2013), "A Decision-Guided Energy Framework for Optimal Power, Heating, and Cooling Capacity Investment", ICEIS 1, page 357-369. SciTePress, http://adweb.clarkson.edu/~ebackus/EnergyPaper.pdf; Best Paper Award
• Backus, Erik (2011), "True Sustainability: A Rubric for Evaluating Infrastructure Rating Systems and Resiliency", The Infrastructure Security Partnership, http://adweb.clarkson.edu/~ebackus/TISP.pdf, November 20, 2011
• Showalter, William Eric and Backus, Erik Carl (2010). "Recruiting Construction Leaders and Managers for the Future." The 10th International Conference "Modern Building Materials, Structures and Techniques", Vilnius Gediminas Technical University Publishing House "Technika" May 19, 2010, Lithuania, pp. 524–531, http://adweb.clarkson.edu/~ebackus/Construction.pdf
• Backus, Erik C., Major (2008). "A Time for Hope: Iraq Founds a New Kind of Village." Castle Chronicle, February-July 2008; Volume 2, pp. 6-9
• Backus, Erik C., Major (2008). "Field Force and Facility Engineer Training." Engineer Bulletin, April-June 2008; Volume

Clarkson UNIVERSITY

Martin D. Heintzelman, Ph.D.

Associate Professor, School of Business
Director, Center for Canadian Studies
Fredric C. Menz Scholar of Environmental Economics

Contact Me

Martin Heintzelman, Ph.D.
Associate Professor, Economics and Financial Studies
Frederic C. Menz Scholar of Environmental Economics
Clarkson University School of Business
Director, Clarkson University Center for Canadian Studies

Download Current C.V.

Education

- Ph.D. Economics, University of Michigan, Ann Arbor, MI, 2006
- M.A. Economics, University of Michigan, Ann Arbor, MI, 2003
- M.S. Natural Resource Policy and Behavior, University of Michigan, Ann Arbor, MI, 2010
- B.S. Economics, Magna cum Laude, Duke University, Durham, NC, 1998
  Second major in Canadian Studies

Fields of Specialization

- Environmental Economics
- Natural Resource Economics
- Urban Economics
- Industrial Organization
- Applied Microeconomics

Publications

Walsh, Patrick J., Stephen D. Bird and Martin D. Heintzelman, "Understanding Local Regulation of Hydro-Fracking: A Spatial Econometric Approach," *Agricultural and Resource Economics Review* (forthcoming, accepted March 2015).

Tuttle, Carrie M. and Martin D. Heintzelman,"A Loon on Every Lake: A Hedonic Analysis of Lake Quality in the Adirondacks," *Resource and Energy Economics,* Vol. 39 pp.1-15, February 2015

Heintzelman, Martin D.Patrick J. Walsh, and Dustin J. Grzeskowiak, "Explaining the Appearance and Success of Open Space Referenda," *Ecological Economics* Vol. 95 (pp 108-117), November 2013.

Sauer, Stephen J., Scott M. Desmond, and Martin D. Heintzelman, "Beyond the Playing Field: The Role of Athletic Participation in Early Career Success," *Personnel Review,* Vol. 42 Iss: 6, pp.644 – 661, October 2013

Tuttle, Carrie M. and Martin D. Heintzelman, "The Value of Forever Wild: An Economic Analysis of Land Use in the Adirondacks," *Agricultural and Resource Economics Review,* Vol. 42(1), April 2013.

Heintzelman, Martin D. and Jason J. Altieri, "Historic Preservation: Preserving Value?," *Journal of Real Estate Finance and Economics* Vol. 46(3), April 2013.

Heintzelman, Martin D. and Carrie M. Tuttle, "Values in the Wind: A Hedonic Analysis of Wind Power Facilities," *Land Economics*, Vol. 88(3), August, 2012.

Twiss, Michael R., Jeffrey J. Ridal, and Martin Heintzelman, "Introduction to the Saint Lawrence River: Flowing Towards Regional Governance," *Great Lakes Research Review*, Vol. 8, 2011.

Heintzelman, Martin D., "The Value of Land Use Patterns and Preservation Policies," *The B.E. Journal of Economic Analysis & Policy*: Vol. 10 : Iss 1 (Topics), Article 39, May 2010.

Heintzelman, Martin D., "**Measuring the Property Value Effects of Land-Use and Preservation Referenda**," *Land Economics*, Vol. 86(1), February, 2010.

Heintzelman, Martin D. and Diego Nocetti, "**Where Should we Submit our Manuscript? An Analysis of Journal Submission Strategies**," *The B.E. Journal of Economic Analysis & Policy*: Vol. 9 : Iss. 1 (Advances), Article 39, September, 2009 (with Diego Nocetti).

Heintzelman, Martin D., Stephen W. Salant, and Stephan Schott, "**Putting Free-Riding to Work: A Partnership Solution to the Common-Property Problem**," *Journal of Environmental Economics and Management*. Vol. 57, No. 3, May 2009.

Burtraw, Dallas, Karen Palmer, and Martin D. Heintzelman, "**Electricity Restructuring: Consequences and Opportunities for the Environment**," *The International Yearbook of Environmental and Resource Economics 2001/2002* (Tom Tietenberg and Henk Folmer, Editors), June 2002. Edward Elgar: Northampton, MA.

Krupnick, Alan, Anna Alberini, Maureen Cropper, Nathalie Simon, Bernie O'Brien, Ron Goeree, and Martin D. Heintzelman, "**Age, Health, and the Willingness to Pay for Mortality Risk Reductions: A Contingent Valuation Survey of Ontario Residents**," *The Journal of Risk and Uncertainty*, Vol. 24, no. 2, March 2002.

Working Papers

"**The Value of Wetlands for Flood Mitigation: A Hedonic Analysis**," with Eric Ziemba (Clarkson University) and Allison M. Borchers (USDA) , June 2014

"**Strategic Environmental Policy in a New Trade Theory Context**," with Luciana Echazu (Clarkson University), June 2012

"**A Theoretical Analysis of Bargaining and Interstate Rivers**," January 2011.

Works in Progress

"Visualizing Property Values in the Adirondack Park: A Focus on Land Use,"

"Property Price Effects of Public Fishing Rights in New York State," with Allison Borchers (USDA), Kevin Anderson (Trout Unlimited), and Eric Ziemba (Clarkson University)

"Wind Turbines and Property Values: A Choice Experiment Approach including Sociological and Psychological Factors," with Stephen Sauer (Clarkson University)

"Hedonic Analysis of Mercury and Acid Deposition in New York State" with Thomas Holsen and Chuan Tang (Clarkson University)

"Wetlands, Young and Old, and Property Value Impacts in Northern New York" with David Chandler (Syracuse University), Tom Langen (Clarkson University), Michael Twiss (Clarkson University), and Rick Welsh (Syracuse University)

"Analysis of Agricultural Property Values in New York State: Transactions vs. Assessments vs. Survey Data" with Allison Borchers (USDA), Devin Kapper, and Sumona Mondal (Clarkson University)

"Wind Turbines Across Borders: A Hedonic Analysis of Wind Turbines in the Thousand Islands Region" with Richard Vyn (University of Guelph) and Sarah Guth (Middlebury College)

"The Economic Feasibility of Distributed Green Data Centers" with Stephen Bird (Clarkson University) and David Gower (Clarkson University)

Stephen Bird

Associate Professor of Political Science / Director of ISE Adirondack Semester
Humanities & Social Sciences

Email: sbird@clarkson.edu
Phone: 315/268-3990
Office: 271 Bertrand H. Snell Hall
Mailbox: CU Box 5750
Website: http://people.clarkson.edu/~sbird/

Department(s): Humanities and Social Sciences
School(s): Institute for a Sustainable Environment

On This Page

CU COVID ALERT: Gold, Low-Moderate-Risk - Maintaining the Bubble – Spring 2021 Info

Awards

Grants

Publications

Education

Ph.D. - 2009
Boston University
A.L.M - 2003
Harvard University
B.A. - 1989
Berklee College of Music

Courses Taught

- Energy Policy
- Environmental Policy
- US Politics
- Public Policy
- Happiness

Biography

Dr. Stephen Bird has a primary focus on energy and environmental policy. His current research is focused on microgrid governance, energy conflict and social acceptance, Smart Housing and split incentives, fracking, green data centers, activism and social movements, social influence, and policy learning. He is a Research Faculty Affiliate with the Positive Energy Project, and a Fall 2016 Fulbright Research Fellow at the Centre on Governance, both at the University of Ottawa. He completed his PhD on energy policy, social networks, and interest groups at Boston University in 2009. He received his Masters' from Harvard University (extension) in 2003, was a Kennedy Rappaport Fellow in 2004, and worked for Harvard's Electricity Policy Group from 2001-2010. Currently he is PI or Co-PI on a variety of research projects for New York State and the National Science Foundation with research partners that include IBM, AMD, and National Grid. Other engagements include the U.S. State Department, the European Commission, Massachusetts' Environmental Affairs, and Mass Energy (a consumer's energy non-profit). He is an avid outdoors person (climbing, hiking, ice climbing), advisor to the outing club, loves smashing a racquetball often, and plays electric bass in a variety of jazz and rock settings in the north country.

Research Interests

Scholarly Interests

Energy and environmental politics, social networks, public policy, U.S. electricity policy, democratic participation, political behavior, and pedagogy.

Awards

2016 Fulbright Visiting Research Chair in Governance and Public Administration and Senior Fellow, Centre on Governance, University of Ottawa

Faculty Research Affiliate at Positive Energy, University of Ottawa

CU COVID ALERT: Gold, Low-Moderate Risk - Maintaining the Bubble – Spring 2021 Info

Developing Advanced Resilient Microgrid Technology to Improve Disaster Response Capability. Supported by National Science Foundation, National Grid, GE, and NYSERDA. Co- PI, (lead : Tom Ortmeyer) 2015 – 2018.

Split Incentives: The Smart Housing Project at Clarkson. Clean Energy and Smart Student Housing: Motivational Interventions for Improved Energy Efficiency in University Housing. Supported by NYSERDA, FLIR Corp., and IBM (PI, and co-PI) 2013-2015. Project video.

Grants

2015-2018 - National Science Foundation (NSF). Developing Advanced Resilient Microgrid Technology to Improve Disaster Response Capability. Co- PI, (lead: Tom Ortmeyer) $1 million.

2010-2018 - National Science Foundation (NSF). Research Experience for Undergraduates (REU), Advancing Sustainable Systems and Environmental Technologies to Serve Humanity (ASSETs to Serve Humanity). Investigator (undergraduate research support);Sustainability Seminar.

2016-2017 - New York Department of Public Service / National Grid / New York State Energy Research Development Agency (NYSERDA). Potsdam REV Demonstration Project. 2016-2017. New York Prize (Microgrid) Stage 2. Co- PI, (lead: Tom Ortmeyer) $220,000 (anticipated), with GE Energy Consulting.

Clarkson University Institute of Sustainable Environment. Revealed and Stated Preference Approaches to Predicting Residential Solar PV Adoption. Co- PI, $25,000.

2013-2015 - New York State Energy Research Development Agency (NYSERDA). Clean Energy and Smart Student Housing: Motivational Interventions for Improved Energy Efficiency in University Housing. $120,000. PON 2631. PI: Stephen Bird; Lisa Legault & Sue Powers –co-PIs.

Leveraging Existing Campus-Wide Wireless Network and Ubiquitous Mobile Devices to Predict Room Occupancy and Save Energy in HVAC. $100,000. PON 2606. PI: Daqing Hou. Co-PI: Stephen Bird et al.

FLIR Systems. Thermo-Imaging analysis for behavioral energy efficiency. $50,000 (under contract agreement). PI: Phil Hopke. Co-PIs: Stephen Bird et al.

2011-2014 - New York State Energy Research Development Agency (NYSERDA). Green Data Center Computing: A Demonstration Project. $350,000. Co-PI; PI: Pier Marzocca.

2013: $50,000 Supplemental for Policy, Economic, and Market Analysis, PI: Stephen Bird.

Publications

Selected Publications

Bird, Stephen, and Chelsea Hotaling. forthcoming 2017. “Multi-Stakeholder Microgrids for Resilience and Sustainability.” *Environmental Hazards*, Special issue on Sustainability and Environmental Hazards, Peter Walker, Guest Editor.

Bird, Stephen, and Martin D. Heintzelman. 2017 (forthcoming). "Canada/U.S. Transboundary Energy Governance." In *Transboundary Environmental Governance Across the World's Longest Border*, edited by Stephen Brooks and Andrea Olive. East Lansing, MI: Michigan State University Press.

Cleland, Michael, Stephen Bird, Stewart Fast, Shafak Sajid, and Louis Simard. "A Matter of Trust: The Role of Communities in Energy Decision-Making." Ottawa Canada: University of Ottawa and Canada West Foundation, October 2016.

Bird, Stephen. "Gas Fired Power Facilities Case Study: Oakville and King Township Ontario." A Matter of Trust: The Role of Communities in Energy Decision-Making. Ottawa Canada: University of Ottawa and Canada West Foundation, October 2016. https://www.uottawa.ca/positive-energy/research-publications.

Amanda K. Sherman, Stephen Bird, Susan E. Powers, Alexandra J. Rowe, Lisa Legault. "Motivational orientation explains the link between political ideology and proenvironmental behavior." *Ecopsychology*. Forthcoming. Accepted September 2016.

Stephen Bird, Dan Kolundzic, Martin Heintzelman, Nik Nanos, and Bill Olson. Nanos Clarkson Research Collaboration, "Exploring the impact of the proposed Galloo Island energy project" for the Town of Henderson, NY. April 2016.

Walsh, Patrick J., Stephen Bird, and Martin D. Heintzelman. 2015. "Understanding Local Regulation of Fracking: A Spatial Econometric Approach." *Agricultural and Resource Economics Review* 44 (2): 138–63.

"Distributed (Green) Data Centers: A New Concept for Energy, Computing, and Telecommunications." Bird, Stephen, Ajit Achuthan, Othman Ait Maatallah, Wenjin Hu, Kerop Janoyan, Alexis Kwasinski, Jeanna Matthews, David Mayhew, Jay Owen, and Pier Marzocca. (2014). *Energy for Sustainable Development* 19 (April 2014).

Agitation with a Smile: The Legacies of Howard Zinn and the Future of Activism. Stephen Bird, Joshua Yesnowitz and Adam Silver, eds., and co-authors. Paradigm Publishers, CO, 2013. Contributing authors include Frances Fox Piven, Martín Espada, & Noam Chomsky.

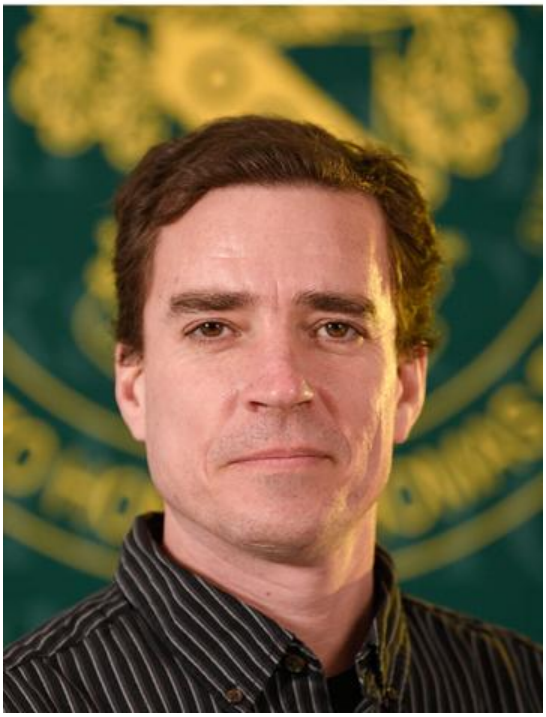
"Policy Options for the Split Incentive: Increasing Energy Efficiency for Low-Income Renters."
Stephen Bird and Diana Hernández. *Energy Policy* 48, September, 506-514 (2012).

"Energy Burden and the Need for Integrated Low-Income Housing and Energy Policy."
Hernández, Diana, and Stephen Bird. *Poverty & Public Policy* 2, no. 4 (2010).

"The Structural Underpinnings of Policy Learning: A Classroom Policy Simulation." In *From Sociology to Computing in Social Networks: Theory, Foundations, and Applications*, ed. Reda Alhajj and Nasrullah Memon: Springer, 2010.

Clarkson University

8 Clarkson Ave., Potsdam, New York 13699
315-268-6400
80 Nott Terrace, Schenectady, NY 12308



William Olsen

Professor of Practice
Civil & Environmental Eng

Email: wbolsen@clarkson.edu
Phone: 315/268-3878
Office: 271 Rowley Lab
Mailbox: CU Box 5710

Department(s): Department of Civil and Environmental Engineering
School(s): Coulter School of Engineering

On This Page

Education

Geography B.A. - 2000
University of Buffalo

Courses Taught

- CE301 - Geographic Information Systems
- CE408 - Building Information Modeling and Integrated Project Delivery

Research Interests

Sustainable Building Design, GIS/BIM Convergence, Geodesign, Construction and Asset Managment.

Awards

Honors and Awards

RESPECT Award for Teaching, 2014 Clarkson University Office of Accommodative Services.
Excellence in Teaching Award, Walter H. Coulter School of Engineering, 2010 - 2014.

Publications

Publications

Gao, N., Armatas, N.G., Shanley, J.B., Kamman, N.C., Miller, E.K., Keeler, G.J., Scherbatskoy, T., Holsen, T.M., Young, T., McIlroy, L., Drake, S., Olsen, B., & Cady, C. (2006). Mass balance assessment for mercury in Lake Champlain. Environmental science & technology, 40, 82-9.

Carol Cady, William H. Walters, William Olsen, Eric Williams-Bergen, Bart Harloe (2008). Geographic Information Services in the Undergraduate College: Organizational Models and Alternatives. Cartographica, 43, 239 - 255.

Appendix B: LEED for Communities Lab – Initial Meeting Notes and White Paper

Erik C. Backus, PE, LEED AP BD+C
Director, Const. Engr. Mgmt.
Clarkson University
PO Box 5710
Potsdam, NY 13699-5710
315-268-6522
Fax 315-268-7985
ebackus@clarkson.edu

TO: Susan Powers, PhD., PE, Spence Professor of Sustainability and Director of the Institute for a Sustainable Environment (ISE), Clarkson University
Joseph Skufca, PhD., Professor and Chair of Mathematics, Co-Director Data Analytics Program, Clarkson University
Michelle Crimi, PhD., Professor and Director of the Interdisciplinary Engineering and Management Program, Clarkson University
Jan Dewaters, PhD., Assistant Professor, School of Engineering, Clarkson University

CC: Vatsal Bhatt, Program Director, LEED for Cities and Communities, US Green Building Council
Tracie Hall, Director, New York Upstate Community, US Green Building Council (USGBC)
William Vitek, PhD., Professor and Chair of Humanities and Social Sciences, Clarkson University
Stephen Bird, PhD., Associate Professor of Political Science and ISE Adirondack Semester Director, Clarkson University
Marcias Martinez, PhD., Associate Professor, Aeronautical Engineering, School of Engineering, Clarkson

FROM: Erik C. Backus, Director, Construction Engineering Management Program

SUBJECT: LEED for Communities Lab – Initial Meeting Notes and White Paper

DATE: 20 November 2017

On 1 September 2017, Susan Powers, Jan Dewaters, Joseph Skufca, and Erik Backus met to discuss the development of a "LEED for Communities Lab" pilot at Clarkson University. This paper documents the discussions that occurred and provide a white-paper for further discussion and shape of such a pilot effort.

Background

As presented by Erik Backus, USGBC has an existing program called "LEED Lab" that was originally piloted at Catholic University or America in Washington, DC[1]. This program gives students at an institution of higher education the opportunity to learn sustainability principles, the inner workings of the Leadership in Energy and Environmental Design (LEED) Existing Buildings Operations and Maintenance (EBOM) rating system, and obtain a LEED Accreditation as a LEED AP O+M upon completion of the course. The students in this program actually perform the certification tasks on a campus registered LEED EBOM project. LEED Lab is managed under the Center for Green Schools in conjunction with the Green Business Certification, Inc., both a part of the USGBC.

The USGBC, at the beginning of 2017, launched the LEED for Cities/LEED for Communities rating systems[2]. Washington, DC was the first city to adopt the system and became certified in August 2017. Pilot applications

[1] https://www.usgbc.org/leed-lab
[2] https://www.usgbc.org/articles/new-certification-now-available-leed-cities-and-leed-communities

continue, and USGBC is in conversation with the Lake Placid-Olympic region and the City of Schenectady as pilot sites for the program. The LEED for Communities/Cities system is a data focused rating system, which certifies based on fourteen (14) key metrics across the areas of Energy, Water, Waste, and Human Experience. Communities, however, can track numerous other metrics that are important to them within the Arc platform, within which the LEED Communities program conducts its data management and online certification.

USGBC is interested in developing a "LEED for Communities Lab" to help educate the next generation of sustainability professionals across the spectrum of planning, engineering, data analytics, policy, and so forth, to help develop their communities more sustainably and with higher quality of life. As the system is in the pilot stage, no such offering is yet in place at an institution of higher learning, and this would enable Clarkson to become the national leader in this effort. Given the proximity of the Lake Placid-Olympic Region and the city of Schenectady to Clarkson's campuses, we are in a unique position to move this initiative forward.

Discussion

The gathered faculty discussed what might be required to develop a "LEED for Communities Lab". It was felt that there are a range of capabilities required for students to be effective in participating in the certification process for a community. Similarly, the size and scale of a community may be too large to start from as students are learning about the fundamentals of their chosen disciplines. To that end, the students must obtain proficiency in key knowledge areas in order to be an effective team member on a LEED for Communities/Cities certification effort. This would require the completion of some level of basic courses that support participation in a multi-disciplinary course sequence working towards LEED for Cities/Communities certification. In some cases a full course may not be required, but instead certain stand-alone modules that can be accessed or taken outside of standard courses (or bundled into a seminar series or course later). It was also felt that before students worked on an actual certification, with an actual community, they needed to appreciate and understand the challenges at the community or city scale. Also, it would also be critical that they learn in an environment that was more familiar to them, such as their own college or university campus. Thus, it was felt that a LEED for Communities Lab have three (3) elements: preparatory course work, a preliminary problem definition and test bed course, and a final capstone application course.

Initial LEED for Communities Lab Concept

The gathered faculty felt that the way forward was to develop a LEED for Communities curriculum that leads to an accreditation as a LEED AP Communities. This curriculum would be executed in three stages:

- Fundamental Skills Courses that equip students with core knowledge in the various technical and specific discipline domains that would be required at the community/city scale
- A hands on test bed using the college campus itself as a laboratory in order to understand the challenge of scoring and managing sustainability at the community/city scale.
- A capstone hands-on application, working with a local community as it seeks to obtain certification or recertification as a LEED community.

Fundamental Skills Courses

Given that students are studying to become practitioners and/or researchers in their chosen fields, they have yet to obtain the needed core skills to function within a team looking to manage the sustainability and quality of life of a community. Thus, it would make sense that certain courses within the standard academic curriculum be identified as those that provide those key skills (either in the full course or as a result of various modules within them), which would be required. In a pilot of LEED for Communities, which Clarkson would run, courses (or modules) in the following areas would be so identified:

- Data Analytics and Mathematics
- Public Policy and Planning
- Business and Economics
- Environmental Science and Engineering
- Civil Engineering (and its sub-disciplines of Transportation, Structural, Materials, etc.)
- Electrical and Computer Engineering and Computer Science
- Sustainable Systems
- Sociology, Psychology, Organizational Behavior
- Other Domain Knowledge[3]

Courses within the existing course catalog would be identified and designated through a listing or similar mechanism, that would support the development of the background skills to be an effective LEED for Communities team member. There may also be required learning modules that may be required outside of courses that might be sourced through Education @USGBC or similar venues. Students that seek to pursue participation in the LEED for Cities Lab would have to completed at least one course or a series of modules so designated in five (5) of the eight (8) areas in order to be able to enter the formal LEED for Communities Lab course sequence as articulated in the following stages.

Test Bed and Problem Definition

Students that have met the requisite number of skills courses would become eligible to take part in a two-course sequence that would come at the end of their undergraduate experience. The first of this sequence would occur in this stage and would center on helping the students understand the challenges created in working at the community and city scales. In order to do this, the students would use their campus as the first test-bed for their experience. Using the Arc platform the students would perform a pre-certification effort on the Potsdam Campus, in a Clarkson LEED for Communities Lab (other institutions would use the campus in which the course is offered as their test-bed). Students would work to track the fourteen (14) key metrics for certification, but also incorporate such metrics as support the University Climate Action Plan and Resilience Plan (once developed). The University would use this as a mechanism to track its own progress and support STARS certification on an ongoing basis. This stage would occur over a standard fifteen (15) week collegiate course through a project based learning model involving faculty oversight and guidance and participation of supporting USGBC staff as well as outside experts in various technical, social, and other fields. Those that successfully complete this first course in the sequence move on to the second course in the next stage.

Hands-on Application – Community Certification

In this final stage, serving as a capstone course, the students in the LEED for Communities Lab will work as a project team to accomplish pre-certification and/or certification for a real community/city that is partnered with the University. Over a fifteen (15) week semester, the students will work closely with public officials, community members, and others to aid their selected community in their LEED for Cities or LEED for

[3] To be determined based on various local and regional conditions related to particular communities

Communities certification efforts, entering data into Arc and submitting the data for review through GBCI for the partnered community. This might be a part of a near-term future Adirondack Semester program (which is inherently inter-disciplinary and community focused). Upon successful conclusion of the course, in addition to meeting a final core curriculum requirement, the students would be eligible for accreditation as LEED professionals for communities.

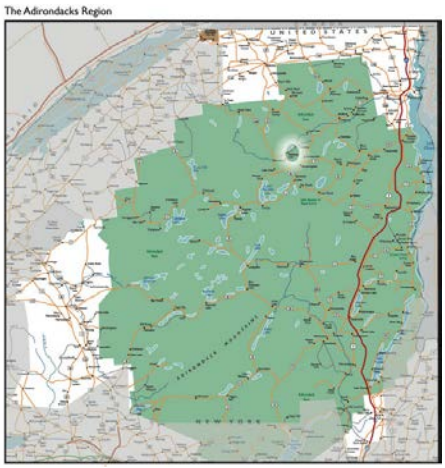
LEED for Communities Minor

In order to better control the Lab's cohorts and manage those students attempting to engage in the LEED for Communities Lab, a university wide minor might be the best tool to identify these students early and help to advise those seeking to pursue this opportunity. This would be structured to clearly articulate the requirements of the overall LEED for Communities Lab program through all of the above stages. Based on the unique nature of the program, it is likely that on an annual basis the program would have to be capped at 20 students in the final two stages (courses). It will also require commitments on the part of faculty to support the program through-out the curriculum and especially in the senior year as a part of the currently evolving multi/interdisciplinary capstone projects effort.

Appendix C: Supporting Course Syllabi

CLARKSON UNIVERSITY
Institute for a Sustainable Environment
The Adirondack Semester
Fall 2018

EV 322: Adirondack Park—A Sense of Place



Course Information
Instructor: Bethany Garretson

Bethany Garretson
Pickett 218
bgarretson@paulsmiths.edu
Office Hours: MWF: 9 am to 11 am and by appointment

COURSE DESCRIPTION

The Adirondack Park was no accident. It was the result of radical new ideas about natural ecosystems that went against the status quo assumptions driving America's relentless economic and technological growth in the 19th Century. As cities became polluted and forests disappeared, philosophers and writers were the first to call attention to nature's aesthetic and spiritual dimensions, and the need to protect natural resources for future generations. It was the beginning of the American Environmental Movement, and New York's Adirondack Mountains were at the center of it. They still are.

This course will introduce students to the writers and thinkers—who first proposed a new way of thinking about nature and place. We will see how their ideas influenced those who fought to preserve the Adirondacks as both a natural sanctuary and a source of water for drinking and transportation in cities to the south, particularly New York City. Students will come to understand the tensions created by this unique conservation experiment and the diverse perspectives the Adirondack Park reflects, from those who seek to make a living here to those who visit to experience its natural beauty.

But the course will be much more than reading about the history and philosophy behind the Adirondack's sense of place. Students will have the opportunity to participate in seasonal outdoor activities and will learn how these recreational activities have impacted social, cultural, economic and physical aspects of the Park. Additionally, students will seek to understand their role as a participant, student and observer in the complex dynamics of the Adirondack region through an inquiry of place and values. Students will review historical and contemporary land use policies and become familiar with the Park's agencies that govern and enforce regulations; read and analyze Adirondack literary works and journals, and write journals of their own. Leave No Trace travelling and camping skills will be taught in order to facilitate sustainable practices that can preserve natural and man-made areas.

Course Objectives:

1. Experience Adirondack attractions and recreation while studying the cultural and economic impact on the Park.
2. Become familiar with the agencies and regulations that govern the 6-million-acre Park.
3. Reflect on one's relationship with nature, wilderness and sustainability by examining and creating literary and artistic responses to place.
4. Understand the complex dynamic of relationships both within the peer group and the Adirondack society at large.
5. Acquire skills in Leave No Trace wilderness travel and camping.
6. Work collaboratively with a group of peers in order to maximize results and address conflict.

Grading: The grading system is based on a 300 point scale: A+: 100-98; A: 93-97; A-: 90-92; B+: 86-89; B: 82-85; B-: 79-81; C+: 74-78; C: 70-73; C-: 66-69; D: 60-65; F: 59 and below.

Assignments:

1) One 3-5 page word book review on material from *Woodswoman or Clarence Petty* (100 pts). Due: Sunday, September 21th.

2) An Adirondack-style journal that explores both a sense of place and the conflicts between "wild" and "people" in the Park (50 pts). Students will turn in five journal entries of at least 800-1000 words each over the course of the semester that discuss your evolving sense of place. You should also attempt to incorporate personal experiences (hiking, walking, and interactions with community members) with course readings.

3) Quizzes and Tests (100 pts): Two short quizzes will be given at the end of week one and two on the course readings (25 pts each). A final exam will be given at the end of the last week covering all course material (50 pts)

4) Sense of Place Project and Presentation (50 pts): This project is to be creative and expressive of your relationship with the Adirondack Park. It can be captured with words, photographs or an art medium of your choice. You will present your project to your classmates on the last week of class. Rubric will be provided.

Course Format:

The course will fluctuate between traditional classroom activities (reading, critical analysis and discussion of literary texts on place and Adirondack history and policy) and visits throughout the Park to experience its beauty and to meet and speak with its citizens.

Required Texts:

- *Woodswoman,* Anne LaBastille
- *The extraordinary Adirondack journey of Clarence Petty: Wilderness guide, pilot, and conservationist*, Christopher Angus
- *Hidden Heritage*, Curt Stager

Tentative Schedule: *Note, all course material is subject to change

Date	Topic/Assignment
Preparation Weeks: August 6-26	*Read *Woodswoman* pages 1-119 *Read *Clarence Petty* (First half)
Week 1: August 27-September 2	**Sense of Self**
Monday, August 27	PSC Orientation
Tuesday, August 28	3-5pm: Introductions and overview of syllabus at Osgood Farm 5-6: Cookout **Assignment**: Read handout *Hidden Heritage* by Curt Stager
Wednesday, August 29 *Please note, if the weather is more ideal, we will have our expedition 8/30-9/1	*Preparation for Backcountry Expedition 9-11 am Backcountry Expedition (Depart Campus 11 am) **Assignment**: Journal What is your heritage? *Discuss *Hidden Heritage*
Thursday, August 30	Backcountry Expedition **Assignment**: Journal What is wilderness? What are your environmental ethics?
Friday, August 31	Backcountry Expedition **Assignment**: Journal Gender roles in the outdoors **Assignment:** Sense of Place Project Rubric
Saturday, September 1	Optional Activity: Visit 6 Nation's Indian Museum over Labor Day weekend (Hours 10-5) $5 admission, you will be reimbursed
Sunday, September 2	Optional Activity: Giant Mountain High Peak Trek **Assignment**: Finish *Woodswoman* by 9/4
Week 2: September 3-9	**Sense of Community**
Monday, September 3	Enjoy your long weekend! Check out Hobo Fest in Saranac Lake!
Tuesday, September 4	Class: 10-12 *Regulations within the ADK Park *Romantic notions of yesteryear *Environmental Ethics **Assignment**: Read *Clarence Petty*
Wednesday, September 5	Hike Saint Regis Mountain: 10 am to 2 pm *Discuss *Woodswoman* on trail and summit
Thursday, September 6	Class: 9:30-12:30 (VIC) *Discuss the life of Clarence Petty *Interview ADK Local, views on Olympics **Assignment**: Journal, IRP practical application
Friday, September 7	Reading, Homework and Library Day
Saturday, September 8	Read and work on projects
Sunday, September 9	**Assignment**: Finish *Clarence Petty* by 9/13
Week 3: September 10-17	**Sense of Global Home**

Monday, September 10	Class: 9:30 am - 11:30 am *Birch Baskets and Cordage **Assignment**: How do you build community? SWOT survey of ADK Park
Tuesday, September 11	Class 9 am-12pm (3hrs) VIC *Current environmental issues of the ADK Park *Social ADK issues
Wednesday, September 12	Class: 9:30 am – 12 pm *Visit Old Growth Forest *Discuss *Wandering Home* **Assignment**: Final Journal What do the Adirondacks mean to you?
Thursday, September 13	Class 9 am-12pm (3hrs) *Final Exam *Present Projects *Cookout 6 pm Osgood
Friday, September 14	Reading, Homework and Library Day
Friday, September 21	Book Review Due

Backcountry Expedition

Dates: Wednesday, August 29 – Friday, August 31 or Thursday, August 30 – Saturday September, 1

Location: Corey's Road, Seymour Mountain or Seward Range, Cold River and Duck Hole

Schedule: (*All logistics dependent on weather and group's ability)

Wednesday, August 29: Gear layouts and prepacking 9-11 am, depart campus at 11 am, arrive at trailhead at 11:50 am, hike to Number 4 double lean-tos and make camp.
*Optional late afternoon hike of Seymour Mountain or to Duck Hole (Journal activities and dinner)

Thursday, August 30: Day hike to Cold River and Duck Hole or Seymour Mountain, enjoy lunch and explore area.

Friday, August 31: Break camp by 8 am, hike to Corey's parking lot and return to campus by 1 pm
*On campus: Unpack and return borrowed gear
*Enjoy your long weekend! Read and explore the ADKS.

Gear List for Backcountry Expedition

Individual Gear

Clothing: In the backcountry, it's important to stay warm and dry. Layers are critical. Avoid cotton and jean material. Wool, fleece, and poly wicking are best.
*Under layer: Poly tops and bottoms
*Fleece top
*Rain shell
*3 pairs of socks
*Light weight hat and gloves
*Extra outfit
*Durable hiking shoes
*Underwear

Extras: Think about what will make your trip enjoyable in the backcountry. Also, be mindful of the amount of weight you pack in.
*Headlamp
*Course Material: *Woodswoman*, journal and writing implement
*Spoon and cup
*Two Nalgenes
*Camera/Phone (Optional) Service will be limited
*Sleeping bag (Rated 0-20)
*Sleeping pad
*50-60 L pack

Hygiene:
*Tooth brush and tooth paste
*If you wear contacts, please bring a spare set and glasses

Group Gear: Group gear will be dispersed among group members and unpacked at campsites.

Hygiene: Pack of baby wipes, gold bond, bug spray, toilet paper, first aid kit, sun screen

Food: We will be supplied with group food for three meals a day. Please bring personal snacks and let me know if you have any food allergies or preferences (Ex: Vegetarian). All food must be bear hung at night. Each student will be provided with a bear bag and as a group we will have ropes. We will cook the food using stoves, fuel, and campfire.

*Water***:** All water must be treated. We will have a pump and iodine system to give our water double treatment.

Camping: Lean-to sites do not guarantee they will be available. We will also bring 3-4 group tents. Please let me know if you'd prefer to use a personal tent.

Fire: Fires are permitted in the Seward Wilderness. We will have a group lighter.

Safety: Instructors will carry a map and compass at all times.

NOTE: <u>Cell phones and/or computers are not to be brought to class.</u> They are distracting to the user, fellow students, and to the overall function and success of the class. Leave them in your room, or if you forget give them to me before class starts.

Title IX Statement:

Paul Smith's College investigates all reports of sexual misconduct. College Faculty are required to report incidents of sexual misconduct to their supervisor or to the Title IX Coordinator. As part of any Title IX investigation that may be conducted as a result of such reports, College Faculty must provide details including the names of those involved in the incident. Requests for confidentiality will be respected but cannot be guaranteed.

Disabilities/Accommodative Services Statement:

1. It is the college's policy to provide, on an individual basis, academic adjustments to students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities are encouraged to contact personnel in the Center for Accommodative Services on the second floor of the Joan Weill Adirondack Library, Room 209, at 518-327-6414 or email at accommodativeservices@paulsmiths.edu to discuss their particular need for academic adjustments.

2. This material is available in alternative formats upon request.

Academic Integrity Policy:

Academic Honesty:
Paul Smith's College (PSC) values intellectual integrity and the highest standards of academic conduct, as set forth in the Ten Principles of Academic Integrity. To be prepared to meet societal needs as leaders and role models, students must be educated in an ethical learning environment that promotes high standards of honor and integrity in scholastic work. Academic dishonesty undermines institutional integrity, threatens the academic fabric of the College, and is not an acceptable avenue to success. It diminishes the quality and value of PSC education. Fostering an appreciation for academic standards and values is a shared responsibility among students, faculty and staff. Therefore, the entire academic community must establish and enforce rules governing violations of academic honesty.

Academic Dishonesty:
Academic dishonesty is any treatment or representation of work as if one were fully responsible for it, when it is, in fact, the work of another person or work in which one has received unacknowledged assistance from others. It includes, but is not limited to:

1. Submitting any fraudulent or plagiarized academic work. This includes, verbatim use of a quotation without quotation marks; use of another person's idea or information without acknowledging your source; and submission of work prepared by another person as one's own
2. Giving or receiving answers and/or any materials pertinent to any academic work without the permission of the instructor
3. Stealing, manipulating, or interfering with any academic work of another student
4. Multiple uses of the same work, by presenting the same or substantially the same written work (or portion thereof) as part of the course requirements for more than one project or course, without the express prior written permission of the instructor(s) involved

Academic dishonesty is a serious violation that is counter to the purpose and aims of Paul Smith's College. A substantiated case of academic dishonesty may result in:

- Permanent dismissal from the College
- Suspension for a designated period of time
- Lesser sanctions as deemed appropriate

CE301 GEOGRAPHIC INFORMATION SYSTEMS (ADK SEMESTER)

Fall 2018

Instructor: William Olsen
Office: 271 Rowley Labs | Office Phone: 315-268-3878 | Cell: 315-212-1337
Email: wbolsen@clarkson.edu

Typical Meeting Times: Monday and Wednesday afternoons 2:00 -5:30 PM:

September 17 - October 22. See schedule below for detailed dates.

Course Description

Every activity on earth has a spatial component to it and Geographic Information Systems (GIS) is a collection of software tools designed to capture and analyze the relationships between various earth activities. These tools help us to make better decisions about where activities should happen, why phenomena occur in certain areas, and many other spatial questions that can only be solved when using data's location, in addition to its characteristics or attributes.

The first week of the course will introduce students to using ESRI's ArcGIS software in an Adirondack context. A large store of data has been produced for the Adirondack Region and is freely available through the internet. We will examine spatial data types and availability of these existing data sets for the Park and surrounding areas. We will quickly move into analysis of the data and focus on assembling data to assist the Lake Placid Community in gaining LEEED for Communities accreditation.

YOU ARE REQUIRED to have A USB DRIVE and bring it to every meetings. MINIMUM of 8 GB. We will use these nearly every day.

Course Objectives

By the end of the course, students will:

- Have an understanding of the fundamental skills necessary to work with GIS using ESRI's ArcGIS software
- Understand use of GIS to solve problems, with particular focus on the Adirondack Region and the Community of Lake Placid
- Develop skills in cartography and geospatial visualization techniques
- Understand GIS data structure (vector and raster) and database management and query
- Know how to find and use publicly accessible GIS data sources in a project
- Understand how spatial data is created and use GPS receivers to collect information

Method of Evaluation

Participation	10%
2 Map Assignments (each 20%)	40%
Final Map Project	30%
Final Exam	20%

Grading will be on a straight scale. Scores calculated using the above assessment methods are as follows:

93% or above	A
90-92.99%	A-
87-89.99%	B+
83-86.99%	B
80-82.99%	B-
77-79.99%	C+
73-76.99%	C
70-72.99%	C-
67-69.99%	D+
60-66.99%	D
Below 60%	F

Tentative Schedule

Date	Topics/Activities	Readings / Assignments Due
Monday 9/17	Software Installation Intro to GIS in the ADK's Vector and Raster Data SQL Basic Cartography	ADK Atlas pp 1-8 https://tinyurl.com/9xvmotz
Wednesday 9/19	Coordinate Systems Map Projections Data Sources	https://tinyurl.com/jjnjgro
Monday 9/24	Geo-referencing Digitizing Data Creation Cartography	Data Creation and Types
Wednesday 9/26	Remote Sensing	**Due: Map 1 - ADK Shaded Relief** http://www.nrcan.gc.ca/node/9309
Monday 10/1	Vector Analysis	Analysis
Wednesday 10/3	Network Analysis	https://tinyurl.com/ybwvztou
Monday 10/8	Raster Analysis	
Wednesday 10/10	GIS Suitability Modeling	**Due: Map 2 - Lake Placid Community** Spatial Analyst Extension
Monday 10/15	GPS/GNSS Surveying Field Trip	Handouts
Wednesday 10/17	Geo Statistics and Data Visualization/ Advanced Cartography	Spatial Statistics
Monday 10/22	Project Work	**Final Map Due: Lake Placid Final Report**

Note: Schedule is tentative and subject to change. Please refer to Moodle site for changes.

BY/EV 312 Lecture and Laboratory Syllabus

Adirondack Ecology and Environmental Science

2018

Instructor: Stephen F. Langdon. M.S.

Contact: sflangdon@gmail.com, (518) 593-5723

Required Texts:

Jenkins, Jerry, and Andy Keal. 2004. The Adirondack Atlas a Geographic Portrait of the Adirondack Park. Syracuse, N.Y: Syracuse University Press.

Jenkins, Jerry. 2018. Woody Plants of the Northern Forest: A Photographic Guide: A Northern Forest Atlas Guide.

Internet Resources:

Ecological Communities of New York State:
https://www.dec.ny.gov/docs/wildlife_pdf/ecocomm2014.pdf

Course Objectives:

The Adirondack region of Northern New York State is nested in the North American boreal-temperate ecotone and is home to ecosystems and species representative of two global biomes. This biodiversity is a result of interacting geologic, climatic, and biotic factors including the complex human history and disturbance. In this course you will learn about the natural history of the Adirondacks including an introduction to its geological history, ecosystems, and biodiversity. You will also learn about human impacts on ecosystems, and the conservation programs and organizations that are working to conserve biodiversity in the Adirondack Park.

There will be an emphasis on oral communication – being able to explain what you know in ways that the public can understand. At the end of the course, you will have the foundations for being an environmental educator on Adirondack natural history, will be well-equipped to participate in citizen science projects, and will understand how you as a citizen can impact conservation in the Adirondack Park.

By the completion of the course you will be able to:

1. Explain how the Adirondack landscape has formed,

2. Describe the characteristics of important ecosystems found in the park,

3. Identify common representative species of plants and animals and evaluate their adaptations for life in the cold,

4. Recognize how humans impact the Adirondack region,

5. Explain the missions of the major government agencies and non-profit organizations involved in conservation in the ADKs, and

6. Apply your knowledge of these concepts to the LEED for Communities/Cities (LFC) initiative.

Course Format:

The course will meet on Thursdays and Fridays during September and October; see the schedule below for specific days. Typical classes will run 9-12 and 1-4. Each day we will leave the classroom and take a field trip to learn natural history in the field and/or to visit a set of local agencies and organizations that play important roles in conservation and in collecting ecological data in the Adirondack Park. Students will keep a field notebook during the trips. Readings will be assigned during each class to be due the following class.

Preparation

The Adirondacks are a cold and rugged country. You are responsible for being prepared for bad weather and rugged/wet terrain. When we are in the field please have a pack with a rain coat, extra warm layers, and sufficient water and food. Please do not get separated from the group.

Assessment

Your knowledge with be assessed via assignments, presentations, quizzes, your field notebook, participation, and a final exam.

Grading	
Presentation/Assignments	300 points
Quizzes	200 points
Participation	100 points
Field Notebook	100 points
Final Exam	300 points

Final grades will be assigned based on the following point system:

A+ ≥ 95%
A 90-94.9%
B+ 85-89.9%
B 80-84.9%
C+ 75-79.9%
C 70-74.9%
D 60-69.9%
F <60%

Tentative Course Schedule:

Tuesday September 18, 2018 Plants of the Adirondacks
An introduction to plants, plant identification, and taxonomy.
Location: Paul Smith's College campus and VIC.
Assignment:

1. Create a species list with common name, scientific name, family, location, time, habitat and notes.
2. Choose a species for your species account.
3. Read Adirondack Atlas: Chapter 3, "The Adirondack Park", Page 25–33.

Thursday September 20, 2018 Regulatory Agencies of the Adirondacks

An overview of the New York State Adirondack Park Agency: it's function, tools and history.

Location: Ray Brook New York. (leaving Paul Smith's at 9:15 am)

Optional Reading:

New York State Adirondack Park Agency Act:
https://www.apa.ny.gov/Documents/Laws_Regs/APAACT.PDF

Adirondack Park State Land Master Plan:
https://www.apa.ny.gov/Documents/Laws_Regs/APSLMP.pdf

McMartin, Barbara. 2002. Perspectives on the Adirondacks: A Thirty-Year Struggle by People Protecting their Treasure.

Tuesday September 25, 2018 Geology of the Adirondacks

An overview of how geology sets the stage of Adirondack biodiversity.

Lecture at Paul Smith's College. Field trip to the Sandstone Pavement Barren in northern Clinton County and a Pitch Pine Barren in western Clinton County.

We will be in the field all day, bring water, lunch and appropriate clothing.

Required Reading:

Edinger et al. 2014. Introduction pp ix - xiii, Terrestrial Ecosystems, B. Barrens and Woodlands, 8. Pitch Pine Heath Barren (pp 101-102), V. Terrestrial Ecosystems B. Barrens and Woodlands 10. Sandstone Pavement Barrens (pp 102-103).

Assignment: prepare a species list of all species mentioned/seen at the field sites.

Thursday September 27, 2018 Alpine Ecology, Atmospheric Deposition

An overview of montane and alpine ecological communities of the Adirondacks and threats to these ecosystems by Human Caused Global Environmental Change.

We will meet at the vehicles at 9 am and travel to the Atmospheric Science Research Station in Wilmington NY to get a tour of facilities used to monitor Atmospheric Deposition.

We will be driving to the summit of whiteface mountain and spending a few hours outside. Be prepared with warm clothing (i.e., hats, gloves, parka, good boots, etc.), food and water.

Required reading:

Edinger et al. 2014.Open Alpine Community (p. 92), Alpine Krummholz (p. 104), Mountain Spruce-Fir Forest (p. 123), Mountain Fir Forest (p. 124)

Goren 2015 Summits in Recovery (handout)

85 Acres (handout)

Assignment: Prepare a list of plant species observed at the summit of Whiteface.

Tuesday October 2 – Wednesday October 3, 2018. Lowland Boreal Wetland Ecosystems of the Adirondacks

Overnight Trip to Shingle Shanty Preserve and Research Station.

An overview of lowland boreal peatland ecosystems of the Adirondacks with a visit to one of the largest lowland boreal wetlands in the Adirondacks and State of New York at Shingle Shanty Preserve and Research Station.

We will be conducting a survey of red squirrel abundance across canopy openness gradients within a peatland complex to understand the role of predation on declines in boreal bird species in the Adirondacks.

Required reading:

Glennon et al. 2014. Dynamics of Boreal Birds at the edge of their range. (handout)

Edinger et al. 2014: V. Palustrine System p (47). B. Open Peatlands (p 55) Dwarf Shrub Bog (p 64), Inland Poor Fen (p 60). D. Forested Peatlands (p 73) Black Spruce Tamarack Bog (p 74), Northern White Cedar Swamp (p 76).

Assignment: Defined in lab exercise handout.

SS320 – Social/Political (Economic) Issues in the Adirondacks

Prof. Martin D. Heintzelman
377 Snell Hall
Office Phone: 268-6427
mheintze@clarkson.edu

Prof. Christopher Robinson
275 Snell Hall
Office Phone: 268-3986
edraper@clarkson.edu

Clarkson University, Fall 2018
Adirondack Semester
Office Hours: By Appointment, through e-mail

Course Description: This course is designed to give students an opportunity to explore some of the Economic and Social issues in the park. The course is co-taught by an environmental economist and a political theorist to give diverse perspectives on these issues. The focus is on sustainability, and the balance between economic and environmental sustainability in the Adirondacks. In order to inform these issues, the course will first provide necessary background in economics and political science.

Grading: Your grade is determined by four factors: 1) Participation in class discussions, 2) Writing assignments, 3) Quizzes, and 4) A final exam.

Course Schedule

Thursday, October 25 (3 Hours) [HEINTZELMAN]
Energy Conference (Glens Falls)

Tuesday, October 30 (3 Hours) [HEINTZELMAN]

Adirondack Region Economic History (10-11:30)
Reading: *The Adirondack Atlas*: pgs. 86-95, 208-229
Terrie (1981), "The Adirondack Forest Preserve: The Irony of Forever Wild"
Economic Basics; Basic Growth Theory (1-2:30)
Presentation: Growth Theory
Reading: Essex and Chalkley (2004), "Mega-sporting events in urban and regional policy: a history of the Winter Olympics"
[QUIZ 1]

Thursday, November 1 (3 Hours) [ROBINSON]
Ethical and Political Thinking (Morning Session)

The Political Economy of the Adirondacks (Afternoon Session)
[Rd. Fred Magoff and John Bellamy Foster, "Business as Usual: The Road to Planetary Destruction"; and Taylor-Ide and Taylor, "The Adirondacks: An evolving Balance Between People and Nature." Write a one to two page response for each.]

Tuesday, November 6 (3 Hours) [HEINTZELMAN]
Location and Spatial Markets (10-11:30)
Presentation: Location, Space, and Growth

Reading: Bennett et al. (2018) “Geographic differences in recovery after the Great Recession”
Land, Labor, and Capital Markets (1-2:30)
Presentations: Input Markets
Reading: Rupasingha et al. (2015) “Rural Bound: Determinants Of Metro To Non-Metro migration In The United States”
[QUIZ 2]

Thursday, November 8 (3 Hours) [ROBINSON]
Attend Adirondack Park Agency Meeting (Morning)

Political Strategy and Action
[Rd. James Scott. “The Uses of Disorder and Philip Terrie, “A Crisis Looms.”
Write a one to two page response paper for each.”]

Tuesday, November 13 (3 hours) [HEINTZELMAN]
Land Use Decisions, Environmental Amenities and Public Goods (10-11:30)
Reading: Deller et al. (2001), “The Role of Amenities and Quality of Life in Rural Economic Growth”
Public Policies for Protecting Environmental Amenities (1-2:30)
Reading: Banzhaf et al. (2006), “Valuation of Natural Resource Improvements in the Adirondacks”
[QUIZ 3]

Thursday, November 15 (3 hours) [ROBINSON]

Is Growth Always a Public Good? [Rd. John Barry, “Sustainability, Political Judgement and Citizenship,” and “A Genealogy of Economic Growth as Ideology and Cold War State Imperative.” Write a one to two page response to both.]

Tuesday, November 27 (3 Hours) [HEINTZELMAN]
Visit to ADK Council, Elizabethtown, NY (10:00-12:00)
Reading: Heintzelman and Tang (2015)
Policies for Local Economic Development (1:30-3:00)
Presentation: Public Policies for Regional Economic Development
Reading: Erickson (1998) “Sustainable Development and the Adirondack Experience”
[QUIZ 4]

Thursday, November 29 (6 hours) [ROBINSON]

Democracy and Sustainability Continued. [Rd. Vandana Shiva, “Recovering the Real Meaning of Sustainability,” and Amanda Machin, “Celebrating Disagreement: The Radical Democratic Approach.” Write a one to teo page response to each.]

Tuesday, December 4 (3 hours) [ROBINSON]

Ecological Governance [Rd. Lester W. Milbrath, “A Governance Structure Designed to Help a Society Learn How to Become Sustainable,” and Christian Parenti, “Environment-Making in the Capitlocene: Political Ecology of the State.” Write a one to two page response to each.]

Thursday, December 6 (3 hours) [HEINTZELMAN/ROBINSON]

Concluding Discussion

FINAL EXAM TBD

SS320 – Economic/Political Issues in the Adirondacks

Prof. Martin D. Heintzelman
377 Snell Hall
Office Phone: 268-6427
mheintze@clarkson.edu

Prof. Christopher Robinson
275 Snell Hall
Office Phone: 268-3986
robinscc@clarkson.edu

Clarkson University, Fall 2018
Adirondack Semester
Office Hours: By Appointment, through e-mail

THE SCOPE OF THE COURSE

The historical, social, political, and environmental factors contributing to the fabric of the Adirondack Park is an evolving social experiment. The course readings will focus upon the New York State constitutional provisions that engendered the park, the policies that shaped the park, along with the political actions that influence the park today. The Adirondack State Park is extraordinary for its history and because it is a place where human residents live and recreate in sustainable ways that conserve resources and "forever wild" regions of the park.

This course will examine social issues, politics, and energy and environmental concerns in the Adirondack Park. The Park has a long history that is deeply integrated with its ecological goods and services. It was originally intended to protect the northern watershed and forests and has 10,000 lakes, 30,000 miles of rivers and streams, and many different habitats. It is the largest publicly protected area in the contiguous United States, and has a complex interaction between public and private lands, and towns adjacent to “forever wild” areas. Managing energy and environmental concerns in the park is a difficult and unique challenge.

The Adirondacks are rich in natural resources and have a low population density. These characteristics have led to a resource-based economy that is vulnerable to climate change. Agriculture, predominantly diary and some smaller vegetable farms, is an important resource. Landowners and other users are also involved in hunting, fishing, and forest products. There is a significant tourism industry with multiple forms of land-use that include skiing, snowmobiling, hiking, climbing, “leaf-peeping,” and the development of vacation residences.

COURSE REQUIREMENTS (Robinson)

- Attendance and Participation: Thirty percent of your final grade is based on your participation in class including those days when your reading group is presenting and facilitating class discussion. I expect you to be in class on time, awake, and ready to talk about the course readings. Cell phones are to be used only for course-related purposes. You may use a laptop computer for taking notes only. Recording devices are also permitted. But be aware that research shows that notetaking by hand is more effective for learning than notetaking by computer. If I see you using your computer inappropriately during class time, I will mark you absent for the day and rescind your computer privileges. Sorry for sounding so strict on this, but inappropriate computer use and/or cell phones is unbelievably disruptive.
- Assignments: 1) Each class member of the class is required to turn in a one to two page reaction to each of the day’s reading assignments. This should not be a summary. Rather, it should be a two page display of your reaction to what you are reading. Do you agree or disagree? Did you have difficulty understanding an idea, action, or character? In effect, I want you to engage and argue with the reading. Appended to your reaction paper will be a list of your questions designed to inspire discussion or to seek clarification on a difficult idea or passage. Each reaction paper

will be typed, double-spaced, with a ten or twelve point font, and written with care. You should include a one or two sentence quote in your paper. This quote might be used to instigate class discussion. The possible grades for a reaction paper are A (for excellent work), a check (for satisfactory work), and NA (for work that is unacceptable and must be revised and resubmitted). You have one week to turn in revisions for a response paper that has been graded with a check or NA. Failure to re-write a paper rated as NA will result in an F on the assignment. (2) There is a weekly journal assignment due on the last day of class. This is a two-page weekly reflection on your work in the course and the ADK Semester. This project will be worth 20 percent of your final grade. 3) There will be a final exam composed by both instructors.

Failure to turn in any written assignment – even one response paper – can result in a failing grade for the course. A response paper graded as NA that has not been revised and resubmitted will result in a failing grade for the assignment.

- Academic Honesty/Plagiarism: Plagiarism is a growing problem on college campuses across the country. The main culprits contributing to this problem are the Internet, the computer's cut and paste functions, and bad personal choices. Plagiarism is a matter of using other people's words or ideas without crediting them. This should not be a problem in this course. No assignment requires any outside research. What I want is your personal response to the course texts. If you should found guilty of plagiarizing, the result will be an immediate failure for the course. You will also be asked to appear before the university's committee on academic integrity for further consideration. The committee is there to ensure that you have been treated fairly by your instructor. If you suspect that you may be plagiarizing an idea or phrase on a paper, please stop by and we can talk about how to cite the source.
- Both thought pieces will be submitted to turnitin.com on the due date for these papers. Use the course MOODLE page to upload your paper. Failure to submit the paper on time to turnitin, along with a hard copy at class time on the due date, will result in the reduction of the paper grade by one letter.
- Atmospherics: What we are seeking in the classroom is a friendly environment for the free exchange of ideas and questions. Dare to challenge yourself! If you are shy, strive to say or ask something as early as possible in class. Once you have broken the ice, participation does get easier. If you tend to succumb to peer pressure that is manifested usually in the form of anti-intellectualism, then resist and present yourself as the interested student that you are. You will help create an atmosphere of real intellectual excitement. Most importantly: Be considerate of the opinions and feelings of others.

Ground Rules for Class Discussion (Borrowed from Dr. Jennifer Ball)

1. Be clear when you are discussing your personal opinion versus your learned opinion. Personal opinion is based in our biases and past experiences; learned opinion is based in intellectual and critical review of expert opinion and stakeholder testimony.
2. Respect. You are to respect all information and opinions by actively listening or reading. In addition, you are not to make personal attacks on others for their opinions. For example, saying to another person, "Of course you'd say that -- you're gay/a slut/straight/ignorant/Christian, etc," is unacceptable.
3. Introspection: Critical thought demands that you be introspective. If something upsets or troubles you in the presentation of course material you should ask yourself why this is the case. What is it in your personal beliefs or experiences make this troubling for you? You do not necessarily need to share this with the class, but it will help you gain critical perspective on reviewing personally difficult sources. It is always good to try to figure out what your biases and privileges are.
4. No silencing. Make sure that your actions do not make another participant feel like they cannot offer their perspective. This could occur as a result of verbal or non-verbal behaviors.
5. Recognize Diversity and Be Inclusive: Do not assume that people share or do not share your opinion because you perceive them to be like you or different from you. Statements like "everyone knows that makes you trashy/easy/popular," fail to recognize diversity and silence and marginalize individuals.

6. Be Aware of Boundaries. People have different comfort levels. If someone follows the rules and acknowledges that they personally feel uncomfortable with something or wish to pass in a discussion, then respect that boundary.
7. Be Engaged and Enjoy. Don't be afraid to have a good time discussing even the most difficult of topics. Just remember that laughing with people is distinct from laughing at them. Humor is an important tool in community formation Use it to unite and not divide. Remember what a privilege it is to sit in a room with smart and motivated people eager to learn. Make the most of your time together.

Course Schedule

Thursday, October 25 (3 Hours) [HEINTZELMAN/ROBINSON]
Energy Conference

Course Overview; Adirondack Region Economic History; ???
Supplemental Reading: *The Adirondack Atlas*: pgs. 86-95, 208-229

Commented [MDH-m1]: I was thinking we both attend this first day and split the time with a little intro to the course/table-setting; We can then discuss a little about the Economic History (past-present) of the park and perhaps another topic of your choosing?

Tuesday, October 30 (3 Hours) [HEINTZELMAN]
Economic Basics; Basic Growth Theory
Reading: *Community Economics*, Chs. 1,2

Thursday, November 1 (3 Hours) [ROBINSON]

Ethical and Political Thinking (Morning Session)

The Political Economy of the Adirondacks (Afternoon Session)
[Rd. Fred Magoff and John Bellamy Foster, "Business as Usual: The Road to Planetary Destruction"; and Taylor-Ide and Taylor, "The Adirondacks: An evolving Balance Between People and Nature." Write a one to two page response for each.]

Tuesday, November 6 (3 Hours) [HEINTZELMAN]
Location and Spatial Markets
Reading: *Community Economics*, Chs. 3, 4, 14
Land, Labor, and Capital Markets
Reading: *Community Economics*, Chs. 5-7

Thursday, November 8 (3 Hours) [ROBINSON]

Attend Adirondack Park Agency Meeting (Morning)

Political Strategy and Action
[Rd. James Scott. "The Uses of Disorder and Philip Terrie, "A Crisis Looms."
Write a one to two page response paper for each."]

Tuesday, November 13 (3 hours) [HEINTZELMAN]
Environmental Amenities and Public Goods
Reading: *Community Economics*, Ch. 9, 10
Public Policies for Protecting Environmental Amenities

Thursday, November 15 (3 hours) [ROBINSON]

Is Growth Always a Public Good? [Rd. John Barry, "Sustainability, Political Judgement and Citizenship," and "A Genealogy of Economic Growth as Ideology and Cold War State Imperative." Write a one to two page response to both.]

Tuesday, November 27 (3 Hours) [HEINTZELMAN]
Balancing Development/Environmental Protection in the Park

Thursday, November 29 (6 hours) [HEINTZELMAN/ROBINSON]
Trip to the APA, Ray Brook (10:00) & the Nature Conservancy, Keene Valley (2:00)

Democracy and Sustainability Continued. [Rd. Vandana Shiva, "Recovering the Real Meaning of Sustainability," and Amanda Machin, "Celebrating Disagreement: The Radical Democratic Approach." Write a one to teo page response to each.]

Tuesday, December 4 (3 hours) [ROBINSON]

Ecological Governance [Rd. Lester W. Milbrath, "A Governance Structure Designed to Help a Society Learn How to Become Sustainable," and Christian Parenti, "Environment-Making in the Capitlocene: Political Ecology of the State." Write a one to two page response to each.]

Thursday, December 6 (3 hours) [HEINTZELMAN/ROBINSON]
Concluding Discussion

Commented [MDH-m2]: This kind of day with visits to relevant organizations can move anywhere in the semester. This is just a placeholder.

EV314 ADIRONDACK INTEGRATED RESEARCH PROJECT – FALL 2018

ERIK BACKUS ebackus@clarkson.edu
315-268-6522
Rowley 140a || Office Hours: T/W 9-10 am; T 3-6 pm (last hour can be virtual) cell: 573-774-0962

STEPHEN BIRD
sbird@clarkson.edu
Snell 271 || Office Hours: Tu/Th 130-3, We 9-11 or by phone / skype appt. 315-268-3990
cell: 857-753-5507

THE SCOPE OF THE COURSE

This is a problem-based learning course that will task students to analyze and develop solutions to a complex problem relevant to the economic, social, and environmental welfare of the Adirondack Park. The course is intended to be reinforced by what you are learning in the other Adirondack semester courses.

One important way that governments, businesses, academic researchers, and NGOs investigate and attempt to solve complex technological, environmental, and social problems is by forming task-force groups. The groups are comprised of individuals with diverse skills and interests, who are tasked to analyze the many facets of a problem and then provide a consensus document on their findings. The document, often referred to as a white paper or position paper, designed to objectively inform the reader about the issue, and then make some recommendations about how to move forward with an implementation plan. This course will culminate in a ***white paper*** and ***accompanying presentations*** to the public and at Clarkson.

Main Theme:
LEED for Communities in The Lake Placid Olympic Region

The Fall '18 IRP will develop new research and analysis to inform the U.S. Green Building Council's new *LEED for Communities* Program (LFC; LEED = Leadership in Energy and Environmental Design) in Lake Placid. Students from all disciplines will focus on interconnecting technology with community engagement, knowledge, and action to improve planning for community and regional goals.

Students will work to help the Village of Lake Placid, The NY Olympic Regional Development Authority, the Town of North Elba, and other key stakeholders in the Olympic Region to understand numerous community goals using smart and connected technologies. These efforts will use LEED for Communities/Cities (LFC) as a leveling framework, to evaluate the impact of technology on communities.

Two key research questions will guide the effort:
1. What methods for collecting, organizing, sharing and using non-homogeneous data support the community's assimilation of disparate visions, plans, goals and projects?

2. Does LEED for Communities (and other *Smart Cities* approaches) interconnection of technology with community knowledge and action lead to improved planning and engagement processes for regional goals?

Your Team should take a Sustainability approach – Considering Environmental, Economic and Social aspects of whatever strategy or strategies you decide on. Once the analysis is completed, the team will have to communicate policy recommendations, management strategies, and/or alternatives in both an oral presentation and in a written report. We expect these presentations to be professional, with **each member** of the team contributing equally.

General Background. The historical, social, political, and environmental factors contributing to the fabric of the Adirondack Park is an evolving social experiment. The course readings will focus upon the New York State constitutional provisions that engendered the park, the policies that shaped the park, along with the political actions that influence the park today. The Adirondack State Park is extraordinary for its history and because it is a place where human residents live and recreate in sustainable ways that conserve resources and "forever wild" regions of the park.

This course will examine social issues, politics, and energy and environmental concerns in the Adirondack Park. The Park has a long history that is deeply integrated with its ecological goods and services. It was originally intended to protect the northern watershed and forests and has 10,000 lakes, 30,000 miles of rivers and streams, and many different habitats.[1] It is the largest publicly protected area in the contiguous United States, and has a complex interaction between public and private lands, and towns adjacent to “forever wild” areas. Managing energy and environmental concerns in the park is a difficult and unique challenge.

The Adirondacks are rich in natural resources and have a low population density. These characteristics have led to a resource-based economy that is vulnerable to climate change. Agriculture, predominantly diary and some smaller vegetable farms, is an important resource. Landowners and other users are also involved in hunting, fishing, and forest products. There is a significant tourism industry with multiple forms of land-use that include skiing, snowmobiling, hiking, climbing, “leaf-peeping,” and the development of vacation residences.

Energy activities include numerous rivers have been impounded to provide electricity on different scales, and more recently, wind farms for a healthy wind resource. The forests have been harvested for local, regional, and international biomass supplies. There are numerous groups that work to protect and enhance the regional environment, both natural and human.

Objectives. You will: (1) Develop your skills at evaluating diverse sources of information (written texts, oral interviews) to produce a considered opinion about a complex problem. (2) Hone your skills at collaboratively working in a group toward a common goal. (3) Learn how to write an objective but thought-provoking white paper which will be useful to decision makers and concerned citizens. (4) Acquire an understanding of the complex nature of economic development, poverty and inequality, and the maintenance of environmental goods when trying to encourage sustainable development in the Park. (5) Show how the lessons learned here might be applied in other similar regions of North America.

---

[1] The LA Group, P.C., 2009. The Adirondack Park Regional Assessment Project. Report prepared for Adirondack North Country Association, Saranac Lake, NY and the Adirondack Association of Towns and Villages. (http://aatvny.org/content/Generic/View/1:field=documents;/content/Documents/File/16.pdf)

(6) Communicate accrued scientific information through oral and poster presentations to lay public and scientific audiences.

Course Format. Much of this course is essentially a guided independent research course. We will present the problem and provide an introduction to academic collaboration and research, as well as the application of social science methods for investigating and solving complex problems. A weekly check-in and/or occasional lectures will take place with the group to assign or discuss tasks, assess progress, provide guidance, suggest resources, and address concerns. The class is expected to work on its own, with some scheduled work time each week. Each week will consist on average of ~ 3 hrs didactic time and ~3 to 5 hours of independent research activity time over a 15-week period.

Of course, it's more complicated than all this, and we will discuss further in the first couple of weeks.

LOGISTICS

'**Etiquette**' is an old word that means proper or expected behavior…

We will do our best

1) to come to class well prepared and enthusiastic about the material;
2) to start and end class on time;
3) to present the material clearly;
4) to engage in fair and open discussion; and
5) to treat students like adults.

We have similar expectations of you:

1) to do the reading;
2) to come to class awake, on-time, and prepared;
3) to be ready to learn and participate in discussions; and
4) to listen and respect the views of others.

The *use of texting, cell phones is not necessary in this class*, (if you wish to take notes with a computer, please discuss first…).

GRADING SCHEMA

A / A+	93-100	C+	77-79
A-	90-92	C	73-76
B+	87-89	C-	70-72
B	83-86	D	60-69
B-	80-82	F	< 60

Course Requirements and Basis for Grades:

1.	Discussion & participation	10% (incl. midterm progress presentation)
2.	Weekly Reports	15%
3.	Peer Review	15%
4.	White Paper	30% (Group)
5.	Final Public Presentation	30% (Mixed Group and Individual Grade)
	Total	**100%**

Class participation is an important part of your grade because this is a dynamic student led course. Your class participation grade is determined by the subjective view of your attendance, activities, and engagement. If you participate more than average you will gain points, and if you participate less than average, or are missing from class, or late to class, you will lose points.

Below is a guide to how participation will be graded (out of a possible 10 points).

Score	Criteria
0/10	Consistently poor attendance and preparation and unable or unwilling to participate, even when called upon; may be disruptive
5-6/10	Inconsistent attendance, or is often late for meetings; often unable or unwilling to participate; consistently unprepared
7.5-8.5/10	Consistently attends meetings and activities, and is prepared; occasionally participates in class discussions/activities
9-10/10	Consistently involved and is always prepared; demonstrates insight in activities and is often active in all aspects of the research.

Midterm Progress and Status Presentation. Presentations should highlight work that has been done, work that will be done, and questions that will be answered as work continues towards the end of the semester. These will focus on your specific contributions to the project. This will not be graded, but is designed to help you and us assess our progress so far.

Weekly Reports. Each week you will deliver a weekly report, similar to a consultants hourly billing invoice (and similarly professionally written out), that describes your activities, provides adequate detail on those activities, provides a breakdown of your time spent, and also provides a place to lay out your concerns and/or questions. These will be due on Friday by midnight. Each of you should keep your weekly report on a single google doc that is placed in this google drive folder: https://drive.google.com/open?id=1_6U4srwJdLWRAhihh2iXKMj7nEna4Bif.

Peer Review – 5-week and Final Evaluation. Each student will evaluate their own effort along with the effort of each of their teammates. The system of evaluation will gauge how much contribution each student makes to the project. These will be done anonymously, with the opportunity to provide constructive and helpful feedback to teammates.

The 5-week will not be graded but will provide your classmates anonymous opportunities to provide praise (what are you doing well) and constructive criticism.

The final evaluation will be graded, with anonymous feedback by your fellow researchers, and with input by us.

Final Presentation. The final presentation discusses the outcome of the group's research. The presentation should discuss the background, science, and policy of the group's topic and the recommendations for a new (revised) policy. We are planning for public presentation(s) in the ADK and a Clarkson presentation approximately during exam week and/or dead week. It is possible that there will be multiple presentations, including at other times.

Research/White Paper. Each student should be the lead on specific sections and will work with others to assist in its completion. Information will be gathered from primary sources, from the literature, and

through speaking with other stakeholders or researchers on this topic. You must ensure that scholarly peer reviewed research helps to inform the paper. This will be an iterative process wherein students will be guided and provided opportunities to improve the writing via my feedback.

What is an annotated bibliography? http://olinuris.library.cornell.edu/ref/research/skill28.htm (or google it)

ACADEMIC HONESTY:

Anyone who plagiarizes or cheats in any way in this class will fail the entire class and be reported to appropriate authorities for further disciplinary action. It is the student's responsibility to understand Clarkson University's guidelines regarding plagiarism and cheating: http://www.clarkson.edu/writingcenter/plagiarism.html, The Code of Student Conduct, and **Don't do it!**

Plagiarism is the representation of someone else's work as your own. It can range from copying another essay word-for-word, to paraphrasing an article from Cliff or Monarch notes, to "reading my roommate's paper to get some ideas" and then repeating them in your written assignments, or "re-treading" a paper written by yourself for another class. We do not expect you to have thoughts no one else has had - if nothing else, you will be drawing on class discussion. We do expect you to give credit when you build on the ideas of others. Generally, a paper will develop, synergize, and integrate sources. When in doubt, credit your source or inspiration. If we are in doubt about whether your work is your own, we will take it to the Academic Integrity Committee. **Cases of plagiarism will be severely punished.**

REQUIRED READINGS

· *The Adirondack Atlas: A Geographic Portrait of the Adirondack Park*, Jerry Jenkins with Andy Keal, Syracuse University Press and The Adirondack Museum, 2004.

CLASS SCHEDULE AND ASSIGNED READINGS

Moodle: Access via http://Moodle.clarkson.edu/. **If assigned, readings are to be completed *before* the class for which they are assigned.**

Schedule

This is a completely tentative schedule – changes will occur. Please pay attention to our ongoing communication. Other ad hoc meeting times may be required. Some meeting times are below, and subject to change.

27-Aug-18	1	· 8-9 am intro · 9-3 Orientation · 330 Bird IRP w/ EB on digital connection	Conflict resolution reflection Readings: Background readings Civic Leader Engagement? Vatsal Bhatt, Paul Friley, and John Lee, "Integrated energy and environmental systems analysis methodology for achieving low carbon cities" (2010); https://aip.scitation.org/doi/10.1063/1.3456367. City of Schenectady and US Green Building Council, "Envisioning a Smart City Dashboard" (2018); http://cityofschenectady.com/DocumentCenter/View/1978/Envisioning-a-Smart-City-Dashboard-March-2018-Whitepaper. LEED for Community Slide deck Overview reading from Thomas Gitlin – summer research student
3-Sep-18	2	· Labor Day class: goals / background – lecture (both) · Meeting later in week? – Friday? Late Th? EB?	Data for a Community 3-4 add'l readings: TBD First weekly digest due – Friday at Midnight
10-Sep-18	3	· Mon / Fri: · Digest / feedback || meetings	Data Sources
17-Sep-18	4	· SB on Monday 9-12 · GIS / ES starts (BO teach Mon 1-6) · EB out this week · Possible visit from Clarkson librarian	LEED for Cities
24-Sep-18	5	· Mon. 9-12 peer evals; · Meetings / data coll – trajectory · Class on presentation	Data Point Selection what do we have and what are we doing trajectory
1-Oct-18	6	· Presentation on LFC implement only · by class to us	Data Collection
8-Oct-18	7	· Check-in on Monday/Fr	Data Collection
15-Oct-18	8	· Check-in on Monday/Fr · Oct. 18 – USGBC (Th-Fr; EB there)	Data Collection

22-Oct-18	9	· Check-in on Monday/Fr · Outline (and draft) due · SB out Ottawa Mo-Tu · CEC??; MANECCS?? - TBD · IRP/Soc-Pol-Econ starts Oct. 24	Data Check
29-Oct-18	10	· Check-in on Monday/Fr · Nov. 2-3-4 Nepal @ PSC · Writing in earnest · presentation prep for APA if necc.	Data Collection
5-Nov-18	11	· Check-in on Monday/Fr · APA meeting (and present??!!) Th Nov. 8 · SB out Th-Fr	Data Collection
12-Nov-18	12	· Check-in on Monday/Fr	Baseline – Status update – ready to roll Presentation prep
19-Nov-18		· Thanksgiving – OFF!	10 day break There may be some work to be done during this period, while you are away
26-Nov-18	13	· Check-in on Monday/Fr	Report Intensive writing
3-Dec-18	14	· Check-in on Monday/Fr · Dry runs on presentation	Report Intensive writing
10-Dec-18	15	· Presentations (exam wk)	

Week 1 Readings (read after intro class):

· *The Adirondack Atlas*: pgs. 22-33, 104-107, 122, 130, 152, 170-173

· McMartin: 1-9, 17-76, 281-286 (entire PDF)

· The Adirondack Park Regional Assessment 2014: Seeking Balance. http://www.apra2014.com/s/APRA-2014-pages.pdf

http://northcountrynow.com/news/adirondack-park-population-declines-average-age-increases-new-report-shows-0115439

Readings:

· Sustainable Development and the Adirondack Experience. Jon Erickson. Adirondack Journal of Environmental Studies. 1998. http://www.uvm.edu/~jdericks/pubs/AJES.pdf

· http://www.apa.ny.gov/Documents/Guidelines/CitizensGuide.pdf

· Phil Terrie, Contested Terrain, Chap. 9 "It's no Damn Park" (Moodle)

· Adirondack Energy & Greenhouse Gas Inventory [Moodle]

·

Additional Resources

· Agency regulation documents found on our website:
Adirondack Park Agency Rules and Regulations -- (pdf 426kb)
Adirondack Park Agency Act -- (pdf 300kb)
Adirondack Park State Land Master Plan -- (pdf 440kb)ADK Museum
· http://www.wildcenter.org/thrive-together/a-vital-experiment
·
· Clarkson's Adirondack Research Guide: http://libguides.library.clarkson.edu/adk
· The Adirondack Research Consortium http://adkresearch.org/

Appendix D: USGBC LEED for Communities Certification of the New York State Olympic Region Clarkson University Adirondack Semester

USGBC LEED for Communities Certification of the New York State Olympic Region

Clarkson University Adirondack Semester

Last Revised: 17 December 2018

Paul Barber, Benjamin Buck, Sarah Chase, Lindsay Clark, Adeline Danyla, Megan Flory, Lucas Fudo, Chloe Gatulik, Daniel Melgar, Adam Meyer, Pranav Singh, Laryssa Terleckyj, Louisa Ulrich-Verderber, Benjamin Vondrak

Table of Contents

Executive Summary

Leadership in Energy and Environmental Design (LEED) for Communities is a rating system created by the United States Green Building Council (USGBC) that measures a community's environmental sustainability and quality of life of residents. LEED for Communities (LFC) is currently a pilot program that builds upon the same principles as LEED for Buildings, the world standard in green building certification, but significantly expands the scope of the program. LFC promotes better management of resources and smart city planning and design. The USGBC's LFC program is also compatible with other smart city measuring programs such as CitiStat, Estidama, EcoDistricts, and Climate Smart Communities.

A fundamental aspect of LEED for Communities is the principle of continual data collection and comparison against previous data. The steps for LFC Certification are registration, Precertification, inputting data, Green Business Certification Incorporated (GBCI) review, and Certification. Data collected is input into Arc, a system that then evaluates performance. The program requires data collection for 14 Core Metrics spanning the categories Energy, Water, Waste, Transportation, and the Human Experience. Additional Community Metrics may also be created to measure data more specific to the region. In addition to data collection, LFC Certified communities must submit goals and plans to achieve their goals each year. These are plans to improve the community's baseline data measurements. The first set of data collected is baseline data from which the region can work on and improve over the coming years as the program develops.

The initial LFC Certification in the New York Olympic Region was undertaken by 14 students from the Clarkson University Adirondack Semester (CASS) for the duration of the 2018 fall semester. This was done to help the community reach environmental sustainability goals, lessen the region's environmental impacts, and improve the quality of life for residents of the community. The Certification and ongoing measurement processes educate members of the community on environmental impact and engage community response and action to lower environmental impact in the region.

Through LFC, the New York Olympic Region will be able to track progress in efforts in resource management as well as the human experience of the community. The stakeholders and jurisdictions involved in the New York Olympic Area LFC Certification are the Town of North Elba, the Village of Lake Placid, the Lake Placid Central School District, and the Olympic Regional Development Authority (ORDA). The physical boundary for Certification will be the Town of North Elba and Lake Placid Central School District combined, with the ORDA venues of Whiteface and Gore acting as satellite facilities.

This region is the first of its kind to be LFC Certified; it is a multi-jurisdictional community in a rural area with a sizable tourist population. To find baseline data for the 14 Core Metrics, the Clarkson Adirondack Semester Students searched in public databases and contacted local organizations for available information. A common roadblock was that data was only available at the county level, not at the boundary level specifically. In this case, students

contacted local offices and created data estimates. The data collected for the 14 Core Metrics will serve as a baseline from which the community should strive to improve.

Data for the additional Community Metrics has not yet been gathered. The Community Metrics were chosen in concurrence with the goals and plans of the individual stakeholders. The Clarkson Adirondack Semester Students compiled a list of Community Metrics with the stakeholders that incorporated their interests and goals. For each metric, a stakeholder was assigned as a lead on data collection. The community also has a comprehensive plan that highlights projects and sustainability goals that they want to accomplish.

As mentioned earlier, LFC Certification is about the ongoing journey and commitment to sustainability. Data is measured annually, in addition to new plans being proposed.
LEED for Communities is currently a pilot program, so the metrics and other Certification requirements are not necessarily the most compatible with our jurisdiction. To ameliorate this issue, we have compiled recommendations for both the USGBC and the individual stakeholders. Most LFC Certifications have been conducted in urban areas where information is easily accessible and the metrics are more relevant. Something to consider regarding LFC Certification is to create a more flexible and relevant set of the 14 Core Metrics that are more specific to different geographic regions. For instance, development of green infrastructure, connectivity, and data tracking are much easier to do in cities than in rural areas.

Going forward, data collection could be administered by local organizations such as ROOST and ANCA. The creation of a website where stakeholders and those responsible for data collection can collectively share and input data publicly will likely be important for future work. This way the data is stored in one location and is easily accessible to the community and to input the most current measurements into Arc. We recommend that the LFC initiative be highly publicized to educate the public on why it's happening and who the stakeholders are, so that the community can begin working towards improving the baseline measurements.

1.0 *Introduction*

With the recent increase of environmental awareness among the general public, there have been calls to improve sustainability practices worldwide. As a result of this, several organizations, including the United States Green Building Council (USGBC), have begun to pioneer smart city programs that aim to promote green and sustainable design in cities and communities[1].

This whitepaper will examine the approach of the USGBC's Leadership in Energy and Environmental Design (LEED) for Cities & Communities pilot program (LFC) in the New York Olympic Region (NYOR), which includes the Village of Lake Placid, the Town of North Elba, the Lake Placid Central School District (LPCSD), and the Olympic Regional Development Authority (ORDA).

2.0 *Background*

2.1 *Creation of Leadership in Energy and Environmental Design (LEED) Program*

Founded in 1993, the USGBC was created with the purpose of promoting sustainability in building design, construction, and operation with the goal of improving human wellbeing. From this, the USGBC has expanded their operations to include new initiatives. Leadership in Energy and Environmental Design (LEED), the USGBC's green building certification program, is used worldwide. As of April 2016, there are 93,800 active LEED programs operating in 167 countries[2].

LEED programs have been developed for use in homes, building design and construction, building operation and maintenance, interior design, and neighborhood development[3]. The USGBC's newest sustainability initiative is an expansion of the LEED platform. LEED for Cities and Communities aims to adapt the rating system previously used in LEED for buildings to encompass entire communities[3].

2.2 *Creation of LEED For Cities and Communities (LFC) Program*

2.2.1 Smart Cities

Trends in urbanization, the recent wave of environmental awareness among the general public, and the need for sophisticated frameworks to monitor and regulate city data has led to the creation of "smart cities[4]." Because the concept of a "smart city" is fairly new, there can be numerous ways to define this phrase. The term "smart city" can refer to a community that approaches development using a technical and economic mindset with oversight from a strong central governance structure[4]. Smart cities can also include strong community input and the adoption of sustainable technologies. However, smart city programs do not conform to a specific ideal of a smart community and smart city projects are unique in their individual approaches[4, 5].

Smart city programs address areas of sustainability which traditional building-centric programs do not. These programs deal with large scale, multifaceted issues that affect the community. Furthermore, the numerous stakeholders within the community may bring conflicting agendas. Thus, smart city programs are designed with a flexibility that accommodates these elements[4]

Each community that adopts a smart city program will likely face unique difficulties and obstacles, and each program chooses to address these challenges in different ways. However, despite their different methods of operation most of these projects operate with the overall goal of increasing a community's livability and mitigating the adverse effects of community development on the natural environment[5].

2.3 *LFC Certification Process*

2.3.1 Summary

Since LFC's formation in 2016, the goal has been to improve the sustainability of communities by providing a framework to monitor community performance, define goals, and track data[3]. The result has been a system where communities establish a benchmark, continuously improve their performance, and compare their progress to similar communities. As of September, five communities have achieved LFC Certification, two have been Precertified, and 13 have begun the process to be Certified[6].

To begin the process of LFC Certification, a community must first register with the USGBC on the Green Business Certification Inc.'s (GBCI) online data tracking software, Arc Skuru or Arc. Next, the boundaries, governance, and stakeholders of the community must be identified. Once this is accomplished the community may begin the data monitoring necessary for Certification. LFC has established fourteen Core Metrics used for the Certification process, which are divided into five themes: Energy, Water, Waste, Transportation, and Human Experience[1]. To further improve their scores, communities can also choose or create additional metrics, or submit plans to meet specific goals set forth by the USGBC; these options will be explained further in Section 2.3.3. Once communities have entered data for the fourteen Core Metrics and either chosen additional metrics or submitted plans, the community's benchmark is established and a Performance Score is given.

2.3.2 Core Metrics & Scoring in Arc

LFC uses the software tool Arc as the platform for data monitoring. Arc acts as the forum in which all the data gathered is uploaded for review by the GBCI and made available to other communities. As such it is equipped to receive data regarding the 14 Core Metrics and any additional documents necessary for Certification[1].

The LFC approach uses a set of 14 Core Metrics to monitor community performance. Monitoring the 14 Core Metrics is integral to LFC, as the project emphasizes the use of quantitative data that can be easily understood and compared. To retain Certification, data for the 14 Core Metrics must be updated annually; this allows the USGBC and the community to gauge the success of the strategies the community has implemented to improve their Performance Score[1].

A community's Performance Score can range from 1 to 100 based on the 14 Core Metrics. The metrics are scored in the Arc platform, and each category of Energy, Water, Waste, Transportation, and Human Experience is given an individual score out of 100. These scores are then weighted so that Energy can contribute up to 33 points, Water can contribute up to 15 points, Waste can contribute up to 8 points, Transportation can contribute up to 14 points, and Human Experience can contribute up to 20 points to the Performance Score. The remaining ten points come from the Base Score, which can be improved by either tracking additional metrics or

submitting specific plans for community improvement to the USGBC (see Section 2.3.3 for more detail about the Base Score)[1].

The final Performance Score translates into the community's Certification Level. Communities are Certified with a minimum of 40 points, but can achieve Silver Certification (minimum 50 points), Gold Certification (minimum 60 points), or Platinum Certification (minimum 80 points). Scores are evaluated annually when the community submits new data, and as such a community's Certification Level may vary from year to year[1].

2.3.3 Options for Improving Base Score

In recognition of the fact that not all of the plans a community has will immediately affect the community's Performance Score, the USGBC requires communities to choose from one of two options that will improve the Base Score up to ten points. In Option A, the community submits plans for achieving goals set forth by the USGBC, such as a carbon reduction or disaster preparedness plans. Each plan submitted to the USGBC will earn up to two points. For Option B, communities commit to tracking a minimum of two additional metrics, with each additional metric earning half a point, up to ten total points. These additional metrics can come from the list of over 200 suggestions provided by the USGBC or can be created by the community to tailor to specific needs; communities must provide information about the data sources, methods of collection, and accuracy, in addition to identifying who specifically will be in charge of data measuring and tracking[1].

2.3.4 Community Roadmap

An integral part of LFC Certification is ongoing commitment and planning, therefore the creation of a comprehensive Roadmap is a further requirement for LFC Precertification. The Roadmap is a document that consolidates all existing and planned sustainability projects, the methods through which these projects are enacted, and the metrics associated with these projects. In addition, the Roadmap contains information regarding the state of data monitoring in the community including the roles that the various stakeholders play in the data gathering process[1].

2.4 *Benefits of LFC*

LFC is a versatile system which utilizes a data-driven approach. Performance is presented in an easily understood score intended to highlight community achievements. Furthermore, the score is updated every year, giving an idea of continued progress made by the community[2].

The Core 14 Metrics are designed to be applicable to any community in order to allow communities to compare against one another. This proves useful when searching for new strategies to implement, as newly registered communities can learn from prior successes and already Certified communities can observe the effects of new strategies[2]. Additionally, LFC is designed to work with, not against, other data-centric sustainability programs.

LFC Certified communities also gain an economic advantage. By implementing LFC and gaining higher Certification Level, communities improve their attractiveness towards potential investors. Through this, an influx of financial capital can be gained used to fund ongoing improvement in the community[1].

LFC can also be used as an educational tool for residents and visitors. By studying the goals and techniques of LFC, individuals are educated on the importance of sustainable design in modern communities and the role of Human Experience Metrics in sustainability programs[1].

2.5 *Comparison to Other Smart City Programs*

As mentioned previously, a key aspect of the LFC program is its compatibility with other sustainability frameworks. Other community-based sustainability programs discussed below include CitiStat, Estidama, EcoDistricts, and Climate Smart Communities.

2.5.1 CitiStat

CitiStat is a popular data monitoring framework that, similar to LFC, records community-based data. Originally it was a modification to the New York Police Department's CompStat, a system developed to keep track of New York City's crime rates. But the City of Baltimore has taken the CitiStat program and expanded it to track a variety of Community Metrics. Essentially, the program acts as a common forum in which various city agencies can contribute data. This data is available not only to city agencies but also to the public. This allows neighborhoods to easily track several metrics including but not limited to: recycling rates, permits issued, and crime rates[7].

A crucial difference between CitiStat and LFC is that CitiStat allows separate cities and communities to freely choose what data they want to collect. Data collection in CitiStat is easily adaptable and can be prioritized by metric, depending on the city's unique needs[7]. In contrast, cities using LFC must collect data for all 14 Core Metrics to achieve Certification. However, because CitiStat cities select different metrics for measurement, CitiStat is less ideal for comparing performances across different communities[7].

2.5.2 Estidama

Estidama was developed by the United Arab Emirates (UAE) Department of Urban Planning and Municipalities. The goal of Estidama is to promote environmental, economic, cultural, and social sustainability across the UAE. To address some of the unique issues faced by the UAE, such as water shortages caused by the arid climate and high energy use for air conditioning, Estidama aims to provide incentives for reducing consumption of resources[8].

Similar to LFC, this program tracks specific data metrics and awards a score. There are currently 3 rating systems in the Estidama program: Pearl Villas (scored out of 90 points), Pearl Buildings (scored out of 177 points), and Pearl Communities (scored out of 159 points). Points

are given based on the performance of the villa, building, or community, with an emphasis placed on the reduction of water and energy consumption. Uniquely, Estidama aims to sustain the culture of the Arab people. It does this by applying the Estidama values to traditional Arab architecture and engineering. Thus, modern housing projects operating under Estidama feature unique Arab designs[9].

2.5.3 EcoDistricts

A third framework that has been developed and used in Portland, Oregon, is the EcoDistricts project. Headed by the Portland Sustainability Institute (PoSI), EcoDistricts prioritizes infrastructure implementation and active monitoring. Another component of EcoDistricts is how it integrates residents. By employing Civic Ecology, a model that describes human, social, and cultural interactions with nature, EcoDistricts plans to empower residents to take on values of sustainability by operating on the policy of community-led sustainability[10, 11].

This emphasis on community led operation is similar to LFC. Both programs intend to act as a medium through which the values of residents promote sustainability. Furthermore, both programs have the community engaging with regional institutions through encouraging meetings between the two groups. However, a key difference between the two projects is the scale at which they are implemented. While LFC is designed to scale its operations to the level of the community, EcoDistricts instead focuses on a smaller scale, with multiple neighborhood level projects that work in conjunction with each other. Because of this, a single municipality can have several EcoDistricts operating within it[11].

2.5.4 Climate Smart Communities

Climate Smart Communities (CSC) is a New York State-based sustainability framework that places a high priority on mitigating the adverse effects of climate change. This is primarily done through reducing greenhouse gas (GHG) emissions across New York State. CSC uses a series of 10 pledges that communities must follow in order to maintain their certification as a CSC. These pledges are functionally similar to the LFC's 14 Core Metrics, in that community performance is judged and scored based on their adherence to the 10 pledges. However, because the focus is on reducing GHG emissions, every pledge is in some way contributing to this overarching goal. Furthermore, CSC also utilizes an online data portal for communities and community agencies to contribute to[12].

A further similarity between LFC and CSC is how they reward ongoing commitment. CSCs are awarded points for a variety of actions including but not limited to: planning, policy implementation, and community outreach. These points are then tallied, and a CSC Certification tier is granted. Similar to LFC, the certification tiers are meant to represent a community's performance and provide an incentive for improvement[12].

2.6 *Community Background*

The New York Olympic Region (NYOR) has a variety of unique characteristics that make it fundamentally different from other LFC projects. NYOR is the first multi-jurisdictional project, as well as being one of the few rural communities in LFC, and has a unique tourist-based economy due to its placement in the Adirondack Park as well as its Olympic background. The region's Olympic legacy is critical to its character, while its placement in the Adirondack Park means it's under very strong environmental protections that can both help and hinder the sustainability efforts of LFC.

NYOR is comprised of four different jurisdictions that include the Town of North Elba, the Village of Lake Placid, LPCSD, and ORDA, making it is the first multi-jurisdictional LEED for Communities effort. The Village of Lake Placid is also involved in New York State's CSC program in addition to LFC. As a public benefit corporation, ORDA maintains the region's world-class winter sports facilities (such as the Lake Placid Olympic Ski Jumping Complex and the Mount Van Hoevenberg Olympic Bobsled Run), as well as the ski resorts of Whiteface, Gore, and Belleayre. Whiteface and Gore are included in NYOR as satellite facilities, however, Belleayre is not included because it is far removed from the region and because ORDA is only concerned with Olympic level facilities.

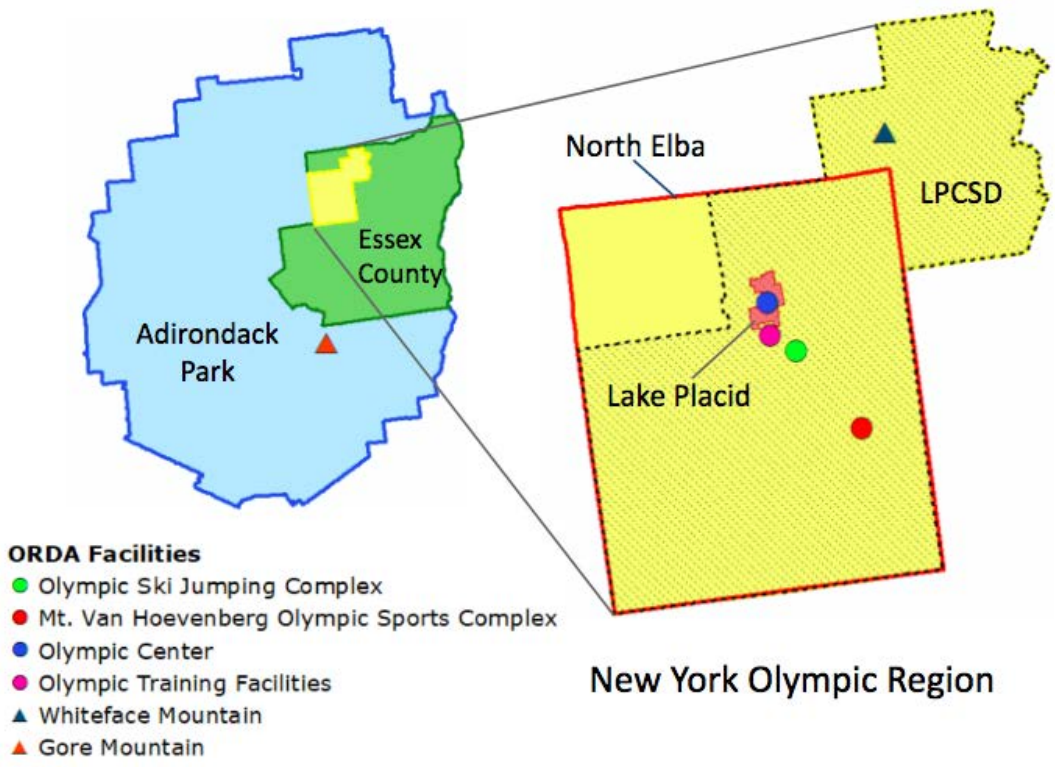


Figure 2.6 The New York Olympic Region

It is important to note that for much of the data collection discussed in the following sections of the paper, the Town of North Elba was the main reference area used. In the state of

New York, villages must reside within a town, therefore any data regarding Lake Placid is included in North Elba data, unless otherwise noted. Additionally, most of the residents of NYOR reside within the clearly defined town boundaries, making it the simplest border for data collection.

An integral part of NYOR's background is its placement in the Adirondack Park. The Adirondack Park is a highly regulated amalgam of public and private land which aims to uphold the "Forever Wild" clause of the state's constitution. Agencies such as the Adirondack Park Agency (APA) and the Department of Environmental Conservation (DEC) help create and enforce laws to preserve the quality of life and wilderness within the Park. They have control over both the 2.6 million acres of public and the 3.4 million acres of private lands in the Park. The state lands are divided into four main different classifications, which are Forest Preserve, State Forests, Wildlife Management Areas, and Conservation Easements. The Forest Preserve classification is then broken down into Wilderness, Wild Forest, Canoe (Adirondack specific), Primitive (Adirondack specific), Intensive Use, Travel Corridors (Adirondack specific), Historic (Adirondack specific), State Administrative, Detached Forest Preserve, and Wild, Scenic, and Recreational Rivers (Adirondack specific). These categories are based upon the land's capacity to withstand use. The State Forest classification is then broken down into Reforestation Areas, Multiple Use Areas, Unique Areas, and State Nature and Historic Preserves[13]. Because of these existing APA regulations within the Park, NYOR is already well on its way to being a leading sustainable community. However, projects that require construction may be difficult because new development is extremely limited.

Within NYOR the private land use classifications are a mix of Hamlet, Moderate Intensity, Low Intensity, Rural Use, and Resource Management. The state lands within the region fall under Wilderness, Wildforest, Intensive Use, Historic, and State Administrative. The jurisdiction also includes a mix of residential, commercial, and larger scale industrial structures and buildings.

One of the main challenges with Certifying the Olympic Region is its rural location. As part of the Adirondack Park, NYOR is isolated from urban centers and therefore has little data readily available for metric evaluation. Much of the data available was not specific to NYOR and instead existed only as county-wide data. As a result, some data had to be tailored to fit the region. These cases will be further explained throughout the paper.

Lake Placid was home to the Winter Olympics in both 1932 and 1980. This legacy, along with park recreation, is a large part of the area's tourist-driven economy. The historic Olympic facilities still standing, such as the hockey arena where the Miracle on Ice occurred, are highly trafficked by tourists, and still draw many visitors to the region. According to ORDA officials, nearly 800,000 people visited the Olympic facilities in the 2017-18 season. NYOR hopes to host Olympic events again in the future, and LFC Certification may improve the likelihood of an accepted bid from the International Olympic Committee. Additionally, other major sporting events are frequently held in Lake Placid. NYOR is currently preparing to host the 2023 World University Games, which are an international sporting event similar in scale to the Olympics[14].

These games, much like the Olympics, take great care in choosing their host locations. To prepare for the Games, ORDA is renovating much of their existing facilities, improving infrastructure, and making the old Olympic facilities more sustainable. Improving the region's well being and sustainability is a large part of plans to attract similar events to the area in the future.

The Village of Lake Placid's industry is service-based, with hotels, restaurants, and shops making up much of the village's main pull for tourists. This is a key aspect of the region's culture, which began in the early 1800s with the famous Adirondack Guides[15] and Great Camps[16]. The only 4-year college in the Adirondacks (Paul Smith's College, located just 30 minutes North of Lake Placid), is a hospitality and service-oriented college.

3.0 *Analysis*

3.1 *Investigator Background*

The primary investigators of this project were fourteen Clarkson University sophomores and juniors with a variety of majors ranging from engineering, to psychology, to business. The Clarkson Adirondack Semester Students (CASS) worked under the guidance of two professors, Erik Backus and Stephen Bird, and completed a 15 credit program hosted at Paul Smith's College. The classes, which lasted 3-6 weeks each, included: a course designed to acquaint the students with the community and the natural environment of the Adirondack Park; a session of training with ESRI's geographical information system program, ArcMap; an introduction to the ecology of the Adirondack Park; and an overview of the social and political issues the Park currently faces. Throughout the entire semester, the students worked on the Integrated Research Project course that focused on the LEED Certification of NYOR.

Professors Bird and Backus, the latter of whom is a member of the USGBC, provided an overview of the LFC process and how CASS can help with the Certification of a rural community. CASS's responsibilities for achieving Certification included collecting data for the base 14 metrics, choosing and creating Community Metrics, and suggesting future goals for NYOR. Additionally, CASS was tasked with evaluating the Certification process and providing recommendations to the USGBC for improvement of LFC. Throughout this semester, the efforts of CASS included creating presentations, meeting with stakeholders, and doing extensive research. CASS had the opportunity to visit various locations within the region to see first-hand the features of the community with which they would be working.

3.2 *Research Strategies*

The CASS team divided the fourteen Core Metrics among the group for research. To get the necessary data, we reached out to various stakeholders, individuals, and departments between the middle of September to November. For specific information on data collection, refer to Section 4.0 below.

The next stage of the project involved compiling future goals and finding Community Metrics for the NYOR Roadmap. In order to do this, CASS contacted the representatives of North Elba, Lake Placid, LPCSD, and ORDA. By meeting with stakeholders, CASS was able to interpret both individual and shared goals for the parties involved. A detailed list of all meetings can be found in Appendix A. Using these goals, CASS selected additional Community Metrics from the Arc website and created our own additional metrics which related to the pre-existing goals and future steps of our stakeholders. These Community Metrics were compiled into a single document which included possible sources for data collection and which stakeholder would take the lead on gathering the data. This document can be found in Appendix C, and more information about this process can be found in Section 5.0. To communicate the progress of the project to the community and stakeholders, several presentations were given. Details of these presentations can be found in Appendix B.

3.3 *Boundaries of the Investigation*

There were many conceptual and physical boundaries which shaped the progress and products of this investigation. As the semester progressed, we uncovered more roadblocks and uncertainties which we needed to resolve before we could move forward. Our goals in resolving all of these issues were to:

1. Create an accurate and intuitive data set which the stakeholders of NYOR could use to inform decision making,
2. Allow for ease of replicability of our process for future data collection in NYOR, and
3. Create a model for any future rural, tourism-oriented, or multi-jurisdictional communities.

In terms of conceptual boundaries, the most important challenge we faced was how, specifically, to fit the LFC process to our region. This required us to evaluate which of the four stakeholders each metric applied to. We came to the consensus that the 14 Core Metrics were most relevant to the Village of Lake Placid and to the Town of North Elba, as they deal mostly with information about resident populations. Much of the data for LPCSD and ORDA was already included in the town and village data (e.g. water consumption and municipal solid waste generated; see Section 4.0 for more details). Therefore, we decided that the numbers we arrived at for North Elba would be what we input into Arc as the NYOR numbers, seeing as all other jurisdictions resided completely or almost completely within this boundary. Any desire to track

stakeholder-specific metrics would be satisfied through the addition of Community Metrics during the Roadmapping phase of Certification.

Another conceptual challenge was the question of how to deal with the impact of tourists on our data. The 2017 Village of Lake Placid Annual Drinking Water Quality Report[17] estimated an average of 10,000 visitors to the region per day, over the course of a calendar year. The population of North Elba (including the population of Lake Placid) was 8,484 in that year[18]. This means that there are more visitors to the area than there are permanent residents. Because many of these visitors use town water and energy, contribute to town waste, and are capable of committing violent crime during their stay, we thought that it would be logical to include these visitors in the population of the New York Olympic Region. Therefore, we added the full estimate of 10,000 to NYOR's population for several Core Metrics (1 through 5, 14) in our initial calculations. The remainder of the metrics are either not population-based (12, 13), or they are specifically geared toward year-round residents (6 through 11).

However, the USGBC is hesitant to allow inclusion of the transient visitor population. This is because comparability between cities is an important part of the scoring process in LFC, and they have not allowed addition of visitors for any prior Certifications. We feel that NYOR's situation is an extreme one, and as such, that it is inherently incomparable to any Certifications the USGBC has done before. Even though it is the first community of its kind to attempt LFC Certification, it is not the only community of its kind. Therefore, we feel that it is important to set a precedent for any future rural, tourist-centric communities that may want to take part in LFC. Such communities might include those placed at the entrances to national parks (like Tusayan, Arizona on the South Rim of the Grand Canyon), or other recreation-based, former Olympic communities (like Park City, Utah). We feel that the benefits of representing this unique aspect of these communities in the scoring process are many, and so conversations with the USGBC on this subject are ongoing. However, for the initial Certification, NYOR's numbers will not include visitor population as per the USGBC's request. Numbers including the full tourist population will be expressed in additional Community Metrics, which are not scored, for comparison.

One key physical boundary defined our research. As discussed in Section 1.4, the New York Olympic Region is composed of four separate, but connected, jurisdictions. The geographical area which they all share stake in lies within the town of North Elba's boundary, and therefore, most of the data collected for the region's initial LFC Certification was specific to this well defined geographical and informational boundary. Some thought was given to further tailoring the geographical boundary by excluding data from the northwest corner of North Elba, which extends partway into the Village of Saranac Lake; a village with its own separate laws and regulations, and whose actions cannot be directly impacted by policy change enacted by NYOR. However, given our time and resource restraints, we could not discern an efficient way to accurately and universally remove Saranac Lake data from North Elba data, and as a result, it remains in our final dataset.

4.0 *Core Metrics*

In this section, we will explain individually the research processes and results of data collection for the 14 Core Metrics in NYOR. At the end of each section, we will list the decided upon number to be input into the Arc platform. For applicable sections, the number which includes tourist population will also be provided.

4.1 *Greenhouse Gas Emissions*

Metric one of the USGBC LFC Certification process is carbon dioxide equivalent in tons per capita, usually measured via a greenhouse gas inventory. A greenhouse gas (GHG) is defined as a gas that contributes to the greenhouse effect by absorbing infrared radiation[19]. Examples include carbon dioxide and chlorofluorocarbons. Greenhouse gasses have many local and global effects and are one of the primary causes of global warming. Reduction of GHG emissions worldwide is crucial in order to slow the effects of climate change and increase resource and energy security[1]. At the local level, responsible energy use and emissions tracking can help municipalities save money, improve their image, and become more environmentally responsible[20]. Tracking greenhouse gas emissions is important to create a baseline, track progress, and regulate emissions.

The USGBC recommends that the GHG inventory be specific to the region being Certified. There is no existing GHG inventory for NYOR; however, there are estimates for North Elba and Whiteface, and existing inventories for Essex County and ORDA facilities. Even though Essex County includes all of NYOR, the data is not sufficiently precise, and other actions are needed in order to obtain an inventory exclusive to NYOR.

All of our county data has been supplied by the New York State Energy Research and Development Authority (NYSERDA) in their 2010 North Country GHG Inventory[21]. A GHG estimate for North Elba was obtained from the U.S. Department of Energy State and Local Energy Data[22]. Whiteface emissions were estimated by comparing the electricity usage of Gore and Whiteface in 2016. Since they both used approximately 13,000,000 kilowatt hours and are both completely supplied by renewable resources it was determined that they must emit similar levels[23]. All greenhouse gas emission data in metric tons of carbon dioxide equivalent (MT CDE) can be found in Table 4.1. NYOR emissions per capita were determined using 2016 population information. The data was all converted into MT CDE using the U.S. Environmental Protection Agency's greenhouse gas equivalencies calculator[24]. Figure 4.1 shows the sources of GHG in North Elba. It can be assumed the breakdown is similar for all of the NYOR jurisdiction.

In the future, alternative data collection methods may have to be used such as performing our own GHG inventory in conjunction with the Climate Smart Communities program being initiated in Lake Placid, or using the EPA's *Local Greenhouse Gas Inventory Tool*[25].

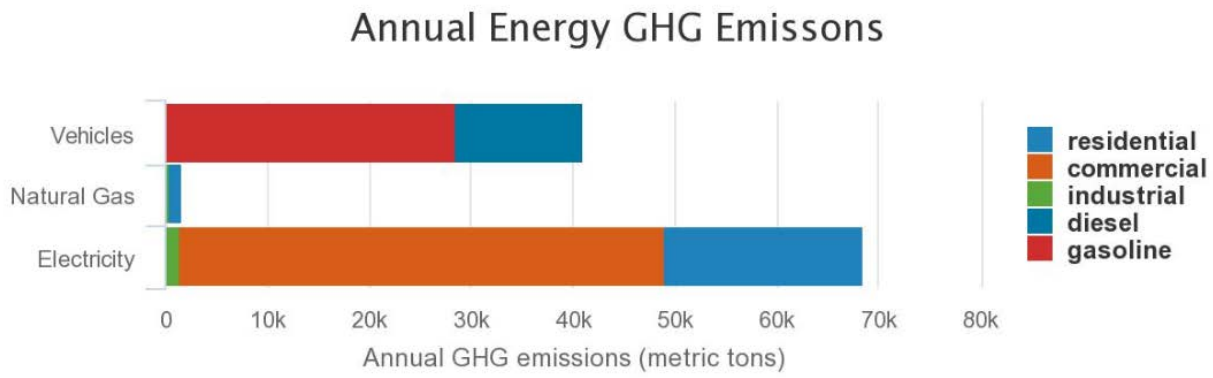


Figure 4.1 (State and Local Energy Data. 2018)

LOCATION	YEAR PERFORMED	TOTAL EMISSIONS (MT CDE)	MT CDE PER CAPITA
Essex County, NY	2010	868,508.00	22.06
Whiteface	Estimated for 2016	900.00	N/A
North Elba, NY	Estimated for 2016	111,000.00	12.00
Gore	2017	900.60	N/A
ORDA*	2015	7,717.19	N/A
NYOR	2017	112,800.60	13.14
United States	2006	5,902,750,000.00	19.78
*ORDA facilities within Essex County/North Elba boundaries included in Essex County/North Elba totals			
*ORDA emissions include all ORDA facilities			

Table 4.1 (State and Local Energy Data. 2018), (NYSERDA Executive Order 166 for ORDA. 2016) and (North Country Greenhouse Gas Inventory Report. 2010)

The value including tourist population was: 6.07 MT CDE per Capita
The value input into the Arc program was: 13.14 MT CDE per Capita

4.2 *Water Consumption*

The second metric for LEED Certification is water consumption measured in gallons per person per year. As the population rises, more water must be provided and distributed, decreasing the overall supply of fresh water while increasing energy needed to pump and clean water. In parallel with increased energy use is an increase in pollution and greenhouse gas

emissions. There has been an upsurge in demand for water without necessary improvements in efficiency or management of existing water supply[26]. Factors impacting water consumption include income, household size, habits, and environmental awareness[27]. With the growing demand for water comes more uncertainty of the total supply of fresh water available. Taking water out of rivers and lakes at higher rates can also negatively impact the surrounding ecosystems. These factors are important to keep in mind for communities trying to become more sustainable and lessen their environmental impact.

The first data source used was the United States Geological Survey (USGS) database. As was the case with many other metrics, the data from this source was too broad. The USGS website only includes water consumption for counties; in this case, the entirety of Essex County was available in an Excel table. Upon further investigation, water consumption data for the Village of Lake Placid was found through the 2017 Village Drinking Water Quality Report[17].

Gathering data for the Town of North Elba, however, was more challenging. The Town of North Elba's water is supplied by a variety of sources without a sole contact for collecting the data. Sources for the town include municipal sources, the village water system, and private wells.

The Ray Brook Water District, a hamlet nested within North Elba, informed us that Ray Brook's water is included in the 2017 Village Drinking Water Quality Report found earlier. We were told that the Town of North Elba potentially gets its water from other municipal sources, such as Saranac Lake, in addition to private wells. Saranac Lake was unable to provide data for the portion of North Elba that lies within the Village of Saranac Lake. The municipal water data was consolidated to the 2017 Village Drinking Water Quality Report. The next step was to focus on private water wells.

Since North Elba is a rural community, many homes use private wells as their water supply. Private wells are not metered, so acquiring a precise number, location, and flow rate of each individual well was impossible. Before getting in touch with the DEC, we attempted to map private wells using GIS but found no data available except for large-scale water pumps in the Village and Town. We also contacted the NY Department of Health, but a response from their data management service was not provided in the time frame of our research. The DEC provided a table of all wells constructed in North Elba since 2000, which only included 71 wells. However, this data did not include the unknown quantity of wells constructed before that date. The maximum flow rate capacity for the wells was given, which does not allow us to calculate the actual consumption from those wells. Using this information, the average flow rate for private wells was calculated and used to estimate water usage for the residents of North Elba using private wells.

Water consumption for the Village of Lake Placid was found to be about 304,000 gallons per year. This data was found through the 2017 Village of Lake Placid Annual Drinking Water Quality Report. The Village has its own municipal water system that withdraws water from Lake Placid through four pumps. These pumps output 1,500 gallons per minute averaging 83,000 gallons of water per day. The system serves 5,000 permanent residents, both in the Village and some customers of the Ray Brook Water District extending outside the Village into North Elba.

To account for the other 3,484 residents in North Elba, we estimated average flow rates for residential wells. This number was found to be 15.8 gallons per minute, which yields 8,304,480 gallons per year. This data was found by averaging the flow rate of private wells given in a spreadsheet provided by a DEC contact with every well constructed in North Elba since 2000. The total gallons per year for the entirety of North Elba was calculated by combining the Village data and the private well estimate and found to be 312,304,480 gallons per year. This was then divided by the total population of North Elba. The water consumption for the Town of North Elba was found to be 36,810.9948 gallons per person per year, which is only marginally higher than the national average, 36,500 gallons per person per year. See Appendix D for specific calculations.

Another challenge faced in calculating water usage in NYOR is how to account for the water consumption of ORDA's facilities. Whiteface and Gore are two ski resorts that consume massive quantities of water daily for snowmaking; however, both ski resorts draw their water from rivers (the Ausable and Hudson, respectively) rather than municipal sources, so their water consumption is better measured using additional Community Metrics, which will be discussed later in the Section 5.0 and can be seen in Appendix C.

The value including tourist population was: 16,805.924 gallons/yr/person
The value input into the Arc program was: 36,386.401 gallons/yr/person

4.3 *Municipal Solid Waste Generated*

Metric three is the total community-wide municipal solid waste generated from within community boundaries in a year divided by the total population of the community. This metric excludes construction waste and industrial process waste. In NYOR, waste data is tracked by the local transfer station as well as the waste management company, Casella.

Waste is a growing issue in the world. Currently, humans generate 1.3 billion tons of waste globally, and are projected to generate 2.2 billion tons by 2025[28]. As population rises, human consumption will likely continue to increase, resulting in a higher tonnage of waste generated, posing a threat to air and water quality, and human health. Having a reliable monitoring system put in place to keep track of waste in cities is critical as it can promote recycling and environmentally-friendly waste disposal methods[1]. If communities put an emphasis on promoting recycling efforts, this would decrease solid waste generated which would reduce the urban solid waste footprint[1].

Casella Waste Management, which services Whiteface and Gore as well as households throughout NYOR and the surrounding area, brings its waste to a landfill in Clinton County. Waste from Whiteface and Gore is only taken to Casella's landfill until a cap is reached; any waste generated at these facilities after this point is brought to the North Elba Transfer Station.

Additionally, it is believed that the waste data from the Transfer Station is generated by all of Essex County, as it is the most easily accessible transfer station in the area.

Because the two entities track waste data separately, with different techniques, and include data not relevant to our region, conceptualizing how this data should be used was challenging. There are private households in Essex County that hire Casella to collect waste. This includes Ray Brook, Wilmington, Saranac Lake, North Elba, and Lake Placid, however, our jurisdiction only includes Lake Placid, North Elba and Ray Brook. To get an accurate tonnage per person per year we needed to subtract the households from outside the NYOR boundary. We did this by finding the percent of Casella serviced households within Lake Placid and North Elba and applying it to the total waste collected from Casella.

Casella provided the total number of households from which they collect waste and what town they were located in. This made subtracting the locations within Wilmington and Saranac Lake from the total more convenient. After the places outside our jurisdiction were taken out, the remainder was divided by the original total number of households to find the percentage of households within the NYOR boundary. The percentage was then applied to the amount of waste provided by Casella which gave a total that only included what was generated within our jurisdiction.

A similar process was done for the North Elba Transfer Station. For the purpose of this project, we assumed the Transfer Station accepted waste from all of Essex County. Rather than account for a percent of households, we looked at the percent of population from Lake Placid and North Elba in terms of the total population of Essex County. The percentage was found by dividing the 2017 ACS North Elba population (which includes Lake Placid) by the 2017 ACS Essex County population. This percent was applied to the total amount of waste collected at the North Elba Transfer Station.

To find the total overall amount of waste, we combined the waste contribution of NYOR households from Casella with the waste contribution of North Elba's population from the Transfer Station. This number was then divided by the 2017 North Elba population to find the amount of waste generated in tons per person per year in NYOR.

The 2017 population of NYOR without tourists is 8,484. The specific numbers as well as facility breakdowns used in calculations can be found in Appendix E. For NYOR, the amount of waste generated per person yearly is 0.37 tons, which was the value input into the Arc platform. The NYOR number is significantly lower than the national average in 2015 of 0.801 tons per person per year, according to the EPA[29]. If tourists are included in the calculations, the population number would be 18,484, resulting in 0.172 tons per person.

The value including tourist population was: 0.172 tons/yr/person
The value input into the Arc program was: 0.37 tons/yr/person

4.4 *Municipal Solid Waste Diverted From Landfill*

Metric number four is the measured ratio of municipal solid waste diverted from landfills out of the total waste stream. This would include the percentages of recycling, composting, and energy recovery, but in NYOR, recycling is the only diversion method tracked. The rate percentage is the weight of diverted waste, divided by the sum of the weight of all the diverted waste and the weight of total landfill waste.

Casella and the North Elba Transfer Station were able to provide us with data that could be used to calculate a value for this metric. Casella collects waste from private homeowners and records solid waste amounts as well as what is diverted, which includes anything that is being recycled. The North Elba Transfer Station tracks their recycling by using punch cards, which record the amount of recyclables sold. In this way they track the weight of recycled material that leaves the transfer station. For our calculations, we had to assume that the amount sold was equivalent to the amount generated over a year.

To arrive at the final NYOR value, we had to again apply the percent of households to the Casella total and the percent of population to the total from the Transfer Station. The value from Casella was combined with the value from the Transfer Station to get the gross recycling amount from within our jurisdiction. To get the overall waste stream, we had to add the NYOR recycling total with the NYOR waste total. The recycling amount was divided by the overall waste stream to get a percentage of waste diverted from landfill.

The total waste generated was 3,813.22 tons and the recycling amount was 636.88 tons, therefore the percent of municipal solid waste diverted from landfills was 16.7%, which was the number input into the Arc platform.

The value input into the Arc program was: 16.7%

4.5 *Distance Traveled in Individual Vehicles Daily*

Metric five, Distance Traveled in Individual Vehicles Daily, otherwise known as vehicle miles traveled (VMT), is a measure of the distance traveled by vehicles within a city or community boundary. In addition to miles traveled within the boundary, half of travel to and from the region is accounted for. This metric is measured in miles per day per capita.

The VMT for NYOR, excluding the tourist population, was calculated to be 100.5 miles per person per day. This number is notably higher than the national average of 26.9 miles per person per day[30]. This is partly due to the fact that a high percentage of the vehicle traffic measured is coming into NYOR. Tourist travel has the largest impact on NYOR VMT, with 77.4% of VMT for North Elba coming from tourist travel into the region.

High amounts of vehicle travel deteriorates the natural environment and, in turn, peoples' health. Vehicles emissions include particulate matter, volatile organic compounds, and nitrogen

oxide, all three of which negatively impact air quality and can have serious health implications[31]. In fact, transportation emissions are responsible for nearly a quarter of global GHG emissions[32], which are major contributors to climate change[1]. VMT, therefore, is closely related to Air Quality and GHG emissions. Thus, taking steps toward reducing VMT reduces transportation-related emissions, mitigates the effects of climate change, improves air quality, lowers air pollution, and improves the health of local residents.

Cities with lower VMT tend to be safer, better connected, and healthier[33]. Methods to reduce reliance on vehicles include improving existing public transportation or constructing new public transportation, incentivizing alternative forms of travel, and investing in pedestrian and cyclist infrastructure. Improved public transportation can be utilized to shuttle tourists around notable sites in and out of a community, while also providing a reliable transportation network for local workers who may not have access to personal vehicles. Public transportation reduces dependence on personal vehicles, and aids in reducing the number of vehicles on the road, making for safer, less crowded streets[34]. Bike lanes and pedestrian pathways encourage community members to travel in non-motorized routes that can improve their own fitness and reduce the risk of health issues[33].

Improving public transportation systems in a rural region is a challenging process. Due to low population density, it is often not worth the cost to put in a rail or even increase bus infrastructure. Complicating the matter, development in the Adirondack Park is heavily regulated, making it difficult to build new large-scale infrastructure. Whatever method is used, care should be taken to not negatively impact the number of tourists drawn to the region, as tourists are a major economic driver in NYOR.

The value including tourist population was: 46.1 miles per person per day
The value input into the Arc program was: 100.5 miles per person per day

4.6 *Population with (at least) a High School Degree (25 and older)*

Metric number six, one of the two education metrics, measures the percentage of people over the age of 25 who have at least a high school diploma, or equivalent degree. Educational attainment within a community is important to measure for a variety of reasons. Higher educational attainment has been shown to improve well being and vitality of individuals and communities, lower the risk of unemployment, and improve the productivity of a workforce[35, 36, 37, 38, 39].

The data for this metric was found through the American Community Survey (ACS), which can be found on the FactFinder website run by the US Census Bureau. The American FactFinder website is a tool that can be used to research population, education, economic, and geographic details about specific locations. The data for this metric was found in the Community

Facts section of the website in the category “Education” in the table for “Educational Attainment.”

The calculations done to find the percentage included adding up the population of people 25 years and over who have at least a high school degree and dividing it by the total population over the age of 25. Specific numbers used in the calculations can be found in Appendix H.

The results from the 2017 ACS showed that in Lake Placid, the percent of the population with a high school degree was 88.2%. This was slightly lower than the percentage for North Elba, which was 90.2%. Given the boundaries of the investigation explained in Section 3.3, the final percentage for NYOR was 90.2%[40].

The same calculations were followed to calculate the national educational attainment, and the value for the United States were found to be 87.3%[16]. In comparison to the United States data, NYOR is 2.7% higher.

The value input into the Arc program was: 90.2%

4.7 *Population with (at least) a Bachelor's Degree (25 and older)*

Metric seven, the second education metric, measures the percentage of people over the age of 25 who have a Bachelor's degree or higher. Similar to the data for metric six, data for metric seven was found on the Census Bureau’s American FactFinder website in the table “Educational Attainment.”

The calculations done to find the percentage involved adding up the population of people 25 years and over who have at least a Bachelor’s degree and dividing it by the total population over the age of 25 years. Specific numbers used in the calculations can be found in Appendix I.

The results from the 2017 ACS showed that in Lake Placid, the percentage of the population with at least a Bachelor’s degree was 29.5%. This was slightly lower than the percentage for North Elba, which was 33.9%. Given the boundaries of the investigation explained in section 3.3, the final percentage for all NYOR was 33.9%[40].

The same calculations were followed to determine national educational attainment, and the value for the United States was found to be 30.9%[40]. In comparison to the United States data, North Elba is 3% higher.

The value input into the Arc program was: 33.9%

4.8 *Median Gross Rent as a Percent of Household Income*

Metric eight measures the median percent of household income spent on housing costs for renters. For this metric, the data was not readily available in the 2017 American Community

Survey. However, we were able to find data necessary to calculate this metric. For our calculations, we used the median annual household income for renters provided by the ACS ($49,632 for Lake Placid and $48,772 for North Elba) and median housing costs for renters ($833 per month in Lake Placid and $857 per month in North Elba). To calculate this metric, the monthly housing costs were converted to annual housing costs and divided by the median annual income. The median gross rent as a percent of income for Lake Placid and North Elba in 2017 were calculated to be 20% and 21% respectively.

Nearly a quarter of median household income, both for Lake Placid and North Elba, is used to pay off rent annually. The United States Department of Housing and Urban Development (HUD) classifies households that spend more than 30% of their annual income on housing as "cost burdened[41]." The ACS data for North Elba includes data for Lake Placid, therefore the value calculated for North Elba will be entered into the Arc platform as the value for NYOR. Although this value is lower than the 30% threshold set by HUD, this is only the median percent; housing costs are still a concern for stakeholders.

The value input into the Arc program was: 21% for 2017

4.9 *Gini Coefficient*

The Gini Coefficient is a standardized way of measuring income distribution inequality within a population. A Gini Coefficient of 0 represents perfect equality in income distribution, and a Gini Coefficient of 1 represents perfect inequality in income distribution. The Gini Coefficient is determined by looking at the cumulative percentage of income held by the cumulative population. In a situation with perfect equality, each individual would have the same income as every other individual. In reality, it is often the case that large amounts of income are held by small portions of the population; the greater the amount of income that is held by fewer individuals, the higher the Gini Coefficient. For a more detailed description of the Gini Coefficient, see Appendix J.

This data was found on the American FactFinder website by using the Advanced Search tool to locate the Gini Coefficients of the NYOR communities[42]. Lake Placid's Gini Coefficient was 0.408 and North Elba's was 0.402 in 2017, according to the ACS. However, since North Elba's boundary includes both North Elba and Lake Placid, North Elba's data will be input into the Arc platform. Ideally, the Gini Coefficient should be as close to zero as possible. To get a better understanding of NYOR's standing relative to the nation as a whole, we compared these two communities to the Gini Coefficient of the United States, which is 0.4815. Stakeholders were surprised that the local Gini Coefficient was better than the nation's. This discrepancy was due to the difference in income between permanent year-round residents and second homeowners in the region. However, the Gini coefficient is calculated only using the income of

permanent residents that file their taxes in the region, therefore seasonal or part-time residents do not impact the Gini Coefficient calculation.

The value input into the Arc program was: 0.4017 for 2017

4.10 *Median Household Income*

Metric 10, the first metric in the category of prosperity, is the median annual income of all households in the jurisdiction. This data, in conjunction with metric 11, acts as a measure of the economic situation experienced by the average resident of the area. Its significance to the LFC project lies in the project's human-centric approach to smart community development. The data was found on the American FactFinder website in the "Income" section of the Community Facts tool in the "Selected Economic Characteristics" table.

According to the ACS, in 2017 North Elba recorded a median household income of $60,651 and Lake Placid recorded a median income of $53,487; this does not include seasonal or part-time residents. This information would be beneficial to the community due to the visible divide between season or part-time residents and the year round population. To provide context, the median household income for the United States was recorded as $57,652 in 2017.

The value input into the Arc program was: $60,651

4.11 *Unemployment Rate*

The unemployment rate of an area, metric eleven, is defined as the percentage of the labor force above the age of 16 years that do not have a formal, legally recognized employment[1]. As with metric ten, the data for this metric was found on the American FactFinder website. In 2017, the unemployment rate in Lake Placid was recorded as 8.8% and North Elba recorded a rate of 6.7%. North Elba's lower unemployment rate could be attributed to a better fit between the skills of the workforce and the skills required by the available jobs. Furthermore, due to the seasonal nature of employment in certain sectors (such as ORDA facilities), the unemployment rate will fluctuate to a measurable degree on a monthly basis. However, in both cases, there is not much deviation from the unemployment rate of the United States, which was recorded as 6.6% in 2017.

The value input into the Arc program was: 6.6%

4.12 *Median Air Quality Index*

Median AQI is a yearly measure of a region's air quality. It is found by taking the maximum AQI reading for the most prominent airborne pollutant on each day of the year, and then selecting the median value from the list of readings for the year. Created by the EPA, AQI is a unitless number between 0 and 500 used to characterize air quality based on the concentrations of given airborne pollutants. An AQI in the 0-50 range is considered "good", while an AQI between 301-500 is considered "hazardous". The calculations vary by each pollutant[43].

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health warnings of emergency conditions. The entire population is more likely to be affected.
Hazardous	301 to 500	Health alert: everyone may experience more serious health effects.

Table 4.12: The Air Quality Index categories, numerical values, and their corresponding meanings.

NYOR's AQI data comes from air pollutant concentration measurements made at the Marble Mountain Lodge on a shoulder of Whiteface Mountain. At approximately 1800 feet in elevation, this research station managed by the University at Albany's Atmospheric Sciences Research Center (ASRC) gives a relatively accurate representation of the quality of air which the people of the region breathe at ground level. Pollutant concentrations measured at this station include gases such as carbon monoxide (CO), sulfur dioxide (SO_2), ozone (O_3), and nitrous oxides (NO_X), as well as both small and coarse particulate matter ($PM_{2.5}$ and PM_{10}) which are particles with diameter less than 2.5 microns and 10 microns, respectively[44].

The most common pollutants in this region are O_3 and $PM_{2.5}$. Ozone can form at ground level due to chemical reactions between gases emitted from vehicles, factories, or numerous other pollution sources. This formation process is facilitated by sunlight, so ozone is often at its highest concentration during the summer. Small particulate matter can take many forms, but some common examples are ash from wildfires or molecules emitted by aerosol cans. Both of

these pollutants can have negative health impacts on humans when concentrated too heavily[45]. In 2017, the Marble Mountain Lodge station measured O_3 as the most prominent pollutant on 362 days of the year, and $PM_{2.5}$ on 3 days of the year, contributing to a calculated median AQI of 39 for the year[46].

The value input into the Arc program was: 39

4.13 *Air Quality Days Unhealthy for Sensitive Groups*

On the AQI scale, the "unhealthy for sensitive groups" zone lies between 101-150. This metric is a measure of how many days are within that zone per year. Sensitive groups are divided into two different groups: people affected by small particulate pollution and people affected by ozone. People affected by small particulate pollution include people with lung diseases, people with heart diseases, children, and older adults, while people affected by ozone include people with lung diseases children, older adults, and active people[45].

Both sensitive groups are affected by different potential health risks when AQI reaches the 101-150 range. These health risks can vary from small health risks such as chest pains and fatigue for people with existing heart diseases, but can lead to even larger risks such as heart palpitations, shortness of breath, heart attacks, or even death. Lung diseases such as asthma or chronic bronchitis can be aggravated when people that suffer from these lung diseases are exposed to either ozone or small particulate pollution. They may also suffer from symptoms such as reduced lung function, the lungs becoming susceptible to infection, irritation of the respiratory system, and inflammation and damage to the cells lining the lung[45].

In 2017, NYOR experienced 0 days unhealthy for sensitive groups[46].

The value input into the Arc program was: 0 days

4.14 *Violent Crime*

Violent crime, the fourteenth metric, measures the number of violent crimes per capita per year in the region. Our research began with the Federal Bureau of Investigation (FBI), which defined violent crime. According to the FBI, violent crime must involve force or threat of force; specifically, the four offenses of murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault[47].

The next step in our process was to start looking for data on violent crimes that have occurred in recent years. From the New York State Crime Report: 2016 Final Data, we found two different sets of data for Essex County (Appendices 3 and 6 in the New York State Crime Report, or NYSCR)[48]. The first set of data, Appendix 3 of the NYSCR, gave the crime rate value of violent crime per 100,000 people. The second set of data, Appendix 6 of the NYSCR, gave

information on the percent change of total violent crime from year to year separated into the four categories of violent crime in Essex County[48].

In search of more data, we contacted the Lake Placid Village Police Department who suggested we file a Freedom of Information Law (FOIL) request. However, because this option is costly and time consuming, we continued the rest of our research online. After further investigation, we found data from the New York State Division of Criminal Justice Services (NYS DCJS) on violent crime rates per 100,000 people that closely correlated with the data found from the New York State Crime Report: 2017 Final Data[49]. The most useful data set provided by the DCJS was an Excel file that gives the individual number of violent crimes reported in Essex County, and who the crimes were reported to, from 2013-2017[49]. Included in this data set is the Lake Placid Village Police Department and the New York State Police. After contacting the Ray Brook State Police and confirming that North Elba is protected by the State Police rather than a town police force, we were able to derive accurate and precise data for North Elba. We used the NYS DCJS Index Crimes Reported Excel file, and after subtracting all other police departments in Essex County we were able to acquire data for North Elba that matched other data sources. With this accurate and reliable data measured in crimes per capita per year, we were able to enter it into the Arc platform. It is important to note the population difference in Lake Placid and North Elba when comparing violent crime. Lake Placid is roughly 3.5 times smaller than Lake Placid; this accounts for the higher total number of violent crime reported in North Elba. This is mitigated by converting the data into per capita per year.

Our data, as entered in the Arc platform for the year of 2017, came out to 0.00578 total violent crimes reported per capita in North Elba and .00079 total violent crimes reported per capita in the Village of Lake Placid. This data is important because LEED for Communities and Cities focus on sustainability in terms of the Human Experience. Living in safe communities promotes a positive Human Experience. Smart cities see a reduction in violent crime compared to non-smart cities. One hospital in Wales saw a 42% decrease in crime-related injuries after implementing a new crime data sharing and collective smart city program[50].

The value including tourist population was: 0.00265 Total Violent Crimes Reported per Capita
The value input into the Arc program was: 0.00578 Total Violent Crimes Reported per Capita

5.0 *Community Metrics*

As discussed in Section 2.3, there were two options for improving the community's base score beyond the Core Metrics. NYOR made the decision to track additional metrics within the community, following Option B. The metrics chosen by the community stakeholders were compiled by the Clarkson student team and consisted of metrics taken directly from the USGBC list, metrics modified from the USGBC list, and metrics created for NYOR specifically. The

metrics were suggested to the stakeholders based on their stated goals and current projects and were divided into four themes and thirteen categories. The categories within the Human Experience theme were Community Engagement and Satisfaction, Connectivity, Health and Accessibility, Sustainable Recreation, and Affordable Housing and Prosperity. The Energy theme included categories of Energy Consumption, Renewable and Alternative Energy, Electricity, and Building Efficiency. The Waste theme was broken into categories of Recycling and Waste Management, and the Water theme into categories of Water Monitoring and Water Sources (see Appendix D). In each of these categories, several metrics were chosen, modified, or created to measure the progress of community goals.

Several meetings were held between CASS and stakeholder representatives to create a comprehensive list of metrics that matched the community's expectations and provided the information required by the USGBC. At these meetings, each metric was discussed to determine relevance, ease of data collection, possible sources of data collection, concerned stakeholders, and "lead" stakeholders (those responsible for data collection and input into Arc).

Given the incredibly unique nature of the New York Olympic region, many metrics had to be created to thoroughly account for community goals. In some cases, this was a simple task; for instance, the Village of Lake Placid wanted all connected municipal water users to be metered, which can be measured with the straightforward metric of "percent of metered connected users." Other goals were more difficult to find clear measurements for. Water usage for snowmaking at ORDA's winter sports facilities posed an interesting challenge, as the snowmaking operations at each ORDA venue are very different. To overcome this challenge, three separate metrics were created to track snowmaking: total energy used for snowmaking, total water used for snowmaking, and total water extracted from rivers for snowmaking. Some of the metrics the stakeholders decided to include may have to be modified in the future, and new metrics may be added, as goals and data collection methods continue to evolve.

6.0 *Challenges*

6.1 *Research Challenges*

As with any research project, many challenges were faced during the process of Certifying NYOR as a LEED Community. Several of these obstacles involved the boundaries of data collection. Because information was often available at the county level, which was not precise enough for this project, estimates had to be calculated for several metrics. North Elba was used as the default boundary for data collection, but this included a portion of Saranac Lake that is not affiliated with the LFC efforts in NYOR.

Timewise, CASS was restricted to a 3 month period of time in which to familiarize ourselves with the area, with the LFC program, and to collect and analyze all of our data - all while taking a 15 credit course load. As a result, any problems we encountered with the

availability of data could not be resolved through investigation, but rather had to be temporarily amended through proxy calculations. Time may have been the greatest challenge we faced; however, it did not hinder us from completing the initial LFC Certification for NYOR, or from compiling a thorough analysis of the LFC Certification process for communities such as NYOR.

The implementation of any new infrastructure in a rural community will always pose some difficulties, however, the LFC project taking place here presents its own unique challenges. The multi-jurisdictional nature of the area raises the question of operational boundaries and authorities to appeal to when collecting data. Furthermore, the LFC program in NYOR would be the template by which other rural areas will model similar programs. Therefore, replication of our methodology will be key to ensuring easier implementation of this program in future communities. To this end, we have worked to ensure that our data gathering process is made readily available to those who wish to pursue this project.

Communication provided challenges as well. Despite consistent and early efforts to arrange stakeholder meetings with all parties represented, we were unable to do so until late in our semester, and therefore questions about who to contact for necessary information were delayed. Additionally, contacting individuals and organizations to gather data occasionally proved to be difficult and time consuming.

6.2 *Challenges with LFC*

The LEED for Communities platform has limitations with the scope of the Core Metrics and the scoring system. To allow for community comparison, the weighting of the Core Metrics are uniform across different communities. However, the relevance of the Core Metrics and their significance to the community vary by location. Not only does this mean that points are not equally valuable across all categories and each community, but that some communities will need to measure metrics that are less important to them, are difficult to find data for, or are challenging to make improvements upon. Furthermore, points do not directly correlate to progress. Communities may make improvements that do not receive enough points, if any, to improve their Certification standing or they may earn points in areas that are not in the best interest of the community.

Decision makers need to be aware of the disconnect between scoring and progress. Community Metrics resolve many of these issues; however, they require additional resources to measure, and improvements are not reflected in the community's Performance Score. This can be problematic for smaller communities with fewer resources.

Some of the limitations of LFC are specific to rural communities. Rural communities do not have access to the same levels of information for tracking that urban communities do. Population density is often too low to warrant surveys or implementation of new data tracking systems, so data collection at the local level is rare. Larger organizations, such as the state government, can provide large data sets that include rural communities. However, this data is

often not specific to the community in question. For some purposes, this data can reasonably be used. In some cases, however, approximations may have to be used instead of accurate measurements. This makes tracking progress over time more difficult as approximations lack the accuracy and precision for proper cross-community comparisons.

Communities with highly tourist-dependent economies also face challenges with the LFC process. Perhaps the most significant question they raise is whether or not the transient visitor populations should be included in a region's total population count. In areas with high tourist traffic, such as NYOR, including the visitor population in per capita measurements provides a more accurate assessment of the impact of an individual on use of resources. To exclude tourists from population counts in a community such as NYOR puts an undue burden on permanent residents and does not hold tourists accountable for their impacts on the environment.

The next section will focus on recommendations to resolve these issues.

7.0 *Future Steps*

7.1 *Recommendations to USGBC for Improvement*

As this project progressed, CASS faced many challenges and roadblocks we believe should be addressed by the USGBC. The following sections outline our suggestions for improving the LEED For Communities program based on our experiences in Certifying NYOR.

7.1.1 Population

We recommend that the USGBC allow communities that have consistent daily visitor populations the option to include visitor population in their region's population for metrics 1 through 5 and 14. As mentioned before, the tourist population of the New York Olympic Region exceeds the full time residential population (10,000 to 8,484, respectively). The tourists have a significant impact on the community and the metric data measured. It would misrepresent the environmental impacts of the region's residents to exclude visitor impacts. This could make the program unfavorable for rural, tourist-based communities, and therefore lessen the utility of the LEED for Communities project overall.

7.1.2 Community Metrics

Currently, there is little incentive within the program to follow through with tracking and improving Community Metrics. A community can only gain a maximum of 10 Base Score points when they track Community Metrics; these 10 points only account for 20 metrics, and do not account for improvement made on these metrics. Without allowing for points or other forms of incentives or recognition, many improvements seen in Community Metrics will not be reflected in the Performance Score. We recommend that there be some sort of consideration made within LFC for improvements on Community Metrics.

7.1.3 Create a distinction between LEED for Cities and LEED for Communities

Most of the communities that are now LFC Certified are cities. Because of NYOR's unique setting and rurality, the 14 Core Metrics were not an easy or effective way to provide baseline data for the community. LFC is a great program to keep communities thinking about their sustainability efforts, but currently, the system is not completely compatible with all types of communities, especially NYOR. For NYOR, many data points were not easily found, readily available, or specific enough to the area that we wanted. Beyond ease of finding data, urban and rural communities have different priorities and concerns that shouldn't be overlooked. CASS believes it would be beneficial to have separate LFC programs for Cities and Communities that take the differences between urban and rural communities into account.

7.1.4 Greenhouse Gas Emissions

The USGBC should consider providing a service to assist communities who do not have the resources to perform a local GHG inventory. USGBC could possibly work in conjunction with the EPA to provide the necessary tools and knowledge to perform this task. This would help many communities overcome a significant obstacle to Certification.

7.1.5 Water Consumption

In NYOR, not all water consumption is metered and an unknown number of wells are utilized. For our data collection, we figured out the average water usage from connected to metered users and then extrapolated well water use. We found that to be an appropriate approach, though we would recommend setting a standard for finding the most accurate and relevant data when there are private wells to be accounted for.

In NYOR, as in many rural communities, not all water consumption is tracked. Many households use private wells that are not metered; CASS believes a standard should be set by the USGBC to account for this lack of data uniformly across rural communities. We believe the method used in NYOR (calculating the average water usage of metered users and extrapolating well water usage) is a satisfactory method of accounting for private water use.

7.1.6 Distance Traveled in Individual Vehicles Daily

The goal of this metric is to focus on reducing VMT within a community, but it can be difficult to do so in a rural community like NYOR. There is difficulty implementing new public transportation infrastructure in rural communities because the infrastructure costs are greater than the return benefit due to low population density. We recommend that the USGBC look at assigning different weights to the Metric Categories in LEED for Communities than LEED for Cities in recognition that rural communities may value these differently.

7.1.7 Population with (a least) a Bachelor's Degree

In rural communities, Bachelor's degrees are often less valuable than they are in cities. Across the nation, there has been a shift towards technical training rather than higher education, and in rural communities especially there tend to be a greater number of jobs requiring skilled labor[51]. Allowing communities to track the number of people with Associate's degrees and trade school Certifications may be more beneficial and representative of the actual needs of the community. Thus, we recommend LEED for Communities track these in addition to Bachelor's degrees under the education category in the Core Metrics.

7.1.8 Violent Crime

To maintain a good quality of life, it is evident that violent crime should be reduced. Though it is not counted as a violent crime, domestic abuse should not be overlooked. We recommend creating another metric, whether it be part of the Core Metrics or a highly recommended Community Metric, to track domestic abuse. According to Coker[52], domestic abuse damages mental and physical health, therefore reducing the quality of life for those affected.

7.2 *Continuation of LFC in NYOR*

LFC is an ongoing process that does not end when a Performance Score is awarded. The following sections detail our recommendations to NYOR as they move forward with this process.

7.2.1 Future Data Collection and Input

There are several options for continued data collection and tracking. CASS's involvement ends December 2018, so future data collection will need to be carried out by a different group or groups. Options include future Adirondack Semester students, Clarkson Honors Program students, and Lake Placid High School students; additionally, NYOR could create a committee for data collection and input. There will also need to be improvements in data sources and data availability. For example, a GHG inventory will have to be performed specifically for NYOR. Furthermore, efforts can be made to streamline the data collection process by making organizations aware of the need for particular types of data. In the future, the Village Drinking Water Quality Report could include water consumption per person per year; Casella and the North Elba Transfer Station can track waste and recycling and have a report prepared for NYOR annually; stakeholders can discuss potential ways to track VMT of residents and visitors separately and automatically; and the relevant police forces could provide violent crime statistics in an annual report.

7.2.2 Recommendations for NYOR

A huge part of this program is developing future plans for how data can and will be collected for the community. We have collected an initial data set and recorded our processes so that data collection and input can be replicated. As stated in 7.2.1, the LPCSD students could help with data collection and input moving forward. By collecting data for NYOR through clubs and environmental courses provided at the school, students will gain a better understanding of the sustainability efforts and progress made in their community. For data collection and input beyond the scope of a high school course, a committee could be created by the Town and Village, ideally including an ORDA representative. Creating a committee specifically for managing LFC within NYOR would be beneficial for the upkeep of data collection and input required to maintain Certification.

Clarkson University also plans to continue to assist NYOR in their LFC efforts. A Memorandum of Understanding is being finalized between NYOR and Clarkson that will allow NYOR continued access to Clarkson students, faculty, and resources. In addition to some of the members of CASS potentially continuing their involvement in the project, Clarkson's Honors students may become involved and research opportunities may be created for the larger Clarkson community.

7.2.3 Recommendations for LPCSD

Involvement from LPCSD will be very beneficial for both NYOR and the school district itself. Students in the Lake Placid High School AP Environmental Science class, as well as students involved in clubs, are already working on community sustainability projects that are relevant to LFC efforts. Continuing and encouraging these projects will help to give students a sense of ownership of ways they have impacted and helped their own community. As new student projects relevant to community sustainability are created, Community Metrics should be added to track the progress and impact of LPCSD students.

7.2.4 Recommendations for TNE and VLP

As an effort to promote sustainability, the Town of North Elba and the Village of Lake Placid should invest in electric vehicle (EV) charging stations. This will encourage drivers to utilize their electric vehicles. Charging stations in strategic locations will encourage a reduction of GHG emissions. Additionally, the availability of EV charging stations can be used as a marketing tool to encourage EV tourism; people with electric cars are more inclined to visit places that provide charging stations, which could be used as a pull to bring more environmentally conscious people into the area.

7.2.5 Recommendations for ORDA

A model regarding sustainable ski resorts would be Vail Resorts' Epic Promise. It would be beneficial to ORDA to consider competing against Vail either directly as a campaign, or indirectly as a set of objectives. The goals of the Epic Promise include Zero Net Emissions, Zero

Waste to Landfills, Zero Net Operating Impact on Forests, and Community Giving. ORDA has already began the process of including many these ideas in everyday operations; both Gore and Whiteface are in the process of switching over to renewable energy to power their facilities. Furthermore, due to their location within the Park, both ski mountains are already conscious of their impact on the forests surrounding their facilities. Moving forward, ORDA could commit to reducing or eliminating single-use plastics, work with the school to reduce food waste by utilizing a digester, and actively track waste diverted from landfills. In regards to the Community Giving goal, ORDA could track the ways that their facilities are used to support local groups and event. Because ORDA is a public benefit corporation, however, it would not make sense to offer grants like Vail does, but hosting and supporting events still provides support to the community.

7.0 *Conclusion*

This investigation was the first step in the longer process of NYOR improving sustainability. The efforts of CASS have established a solid foundation from which the NYOR community can build and develop their smart city practices. With key connections made between community officials, and research processes defined, the community now has an enhanced ability to measure and track their progress in reducing their environmental impacts. This investigation has also served as an outline for future rural or tourist based communities to follow when seeking either LFC Certification, or participation in one of the numerous other smart city frameworks.

We believe that the strategy of linking local universities with rural communities is an effective one, and is especially useful for communities with fewer human and financial resources available for projects such as this. The positive effects of these relationships between academic institutions and communities are felt in both directions. From community projects, students gain real world research and problem solving experience, while providing outside ideas and perspectives which may inspire fresh approaches that advance the community's goals. With this in mind, the relationship between Clarkson and NYOR will continue.

Though NYOR's Performance Score is still unknown at this time, NYOR has set precedents for future rural, tourist-centric, or multijurisdictional communities and CASS is confident that the community will continue to improve its sustainability with a strong focus on quality of life for NYOR residents.

8.0 *Acknowledgements*

This project was a massive undertaking that was aided by many organizations and individuals, and we would like to give our utmost gratitude and appreciation to everyone who helped this project move forward throughout the semester. This work would not have been

possible without the support of Clarkson University and Paul Smith's College. A special thank you to Stephen Bird and Erik Backus, the directors of the Adirondack Semester Program. We appreciate all of your guidance throughout the whole semester. We want to show sincere gratitude to Vastal Bhatt for helping us get started on the process of finding data. Our program would like to take the time to give thanks to the Mayor of Lake Placid, Mayor Craig Randall, for helping to point us in the right direction on where to find data and giving us names to further help us reach contact. We thank Dean Dietrich, Chairperson of the Lake Placid and North Elba Community Development Commission, for assistance with putting the students in contact with local resources to get information about the metrics. We gratefully wish to thank the Olympic Regional Development Authority in Lake Placid, especially the President and CEO Mike Pratt; Director of Planning and Construction Robert Hammond; Cort Honey; and Nick Zachara. We would also like to thank the Lake Placid Electric Superintendent, Kimball Daby, for his assistance and involvement.

We are especially grateful to all of our professors this semester for providing us with the knowledge needed to succeed this semester. Thank you to Professor Stephen Langdon for educating us on our local environment, Professor Bethany Garretson for her Sense of Place class which gave us our first introduction to the Adirondack Park, Professor Bill Olsen for helping us understand our surroundings by mapping the Adirondack Park with GIS, and Professors Martin Heintzelman and Christopher Robinson for helping us think critically about social, political, and economic issues in the Adirondacks.

We are grateful to Harry Gordon for his help on our presentations and for letting us present with him at the Clean Energy Economy Conference in Glens Falls.

Finally, we would like to thank Keith McKeever (APA), Mark Rooks (APA), Jamie Rogers (ANCA), Jay Rand (North Elba Town Board), Jason Leon (Village Trustee), Steve Baumgartner (Smith Group), Kelly Carter (Wild Center), Kris Cheney-Seymour (Nordic Program Manager at Mt. Van Hoevenberg), and Mike Leblanc (Assistant General Manager at Whiteface) for meeting with us and answering all our questions.

Thank you to everyone who was involved in this project; it would not have been possible without your help.

9.0 *Bibliography*

1. U.S. Green Building Council. (2017). City Performance Guide(Version 1, pp. 1-46, Tech.). U.S. Green Building Council. UNPUBLISHED.
2. U.S. Green Building Council. n.d. “Benefits of Green Building | U.S. Green Building Council.” Accessed December 3, 2018. https://www.usgbc.org/articles/green-building-facts.
3. U.S. Green Building Council. n.d. “LEED | USGBC.” Accessed December 3, 2018. https://new.usgbc.org/leed.
4. Albino, Vito, Umberto Berardi, and Rosa Maria Dangelico. 2015. “Smart Cities: Definitions, Dimensions, Performance, and Initiatives.” Journal of Urban Technology 22 (1): 3–21. https://doi.org/10.1080/10630732.2014.942092.
5. Chourabi, Hafedh, Taewoo Nam, Shawn Walker, J. Ramon Gil-Garcia, Sehl Mellouli, Karine Nahon, Theresa A. Pardo, and Hans Jochen Scholl. 2012. “Understanding Smart Cities: An Integrative Framework.” In 2012 45th Hawaii International Conference on System Sciences, 2289–97. Maui, HI, USA: IEEE. https://doi.org/10.1109/HICSS.2012.615.
6. Backus, Erik. 2018. "LEED for Cities, LEED for Communities", US Green Building Council, EV314, Clarkson University, in-class lecture.
7. Behn, Robert D. 2007 "What all mayors would like to know about Baltimore’s CitiStat performance strategy." Washington, DC: IBM Center for the Business of Government. http://www.web.pdx.edu/~stipakb/download/PerfMeasures/CitiStatPerformanceStrategy.pdf
8. Alobaidi, Khaled Ali, Abdrahman Bin Abdul Rahim, Abdelgadir Mohammed, and Shadiya Baqutayan. 2015 "Sustainability Achievement and Estidama Green Building Regulations in Abu Dhabi Vision 2030." Mediterranean Journal of Social Sciences 6, no. 4http://www.mcser.org/journal/index.php/mjss/article/view/7107
9. Sherif, Aia, Hagar M. Shalaby, and Hasim Altan. 2016 "Towards the Second Sustainable City in the Middle East: Retransforming Ras El Khaimah Costal City with the Estidama First Model of the Abu Dhabi Master Plan 2030." International Journal of Environment and Sustainability 5, no. 2. https://www.sciencetarget.com/Journal/index.php/IJES/article/view/671
10. Waddick, Laura. 2014. “Neighborhood Sustainability: The Genesis of Three EcoDistricts within Portland, Oregon.” https://doi.org/10.15760/honors.50.
11. Seltzer, Ethan, Bassett, Ellen M., Cortright, Joseph, Shandas, Vivek, and Timothy W. Smith. 2011. "Making EcoDistricts: City-scale climate action one neighborhood at a time." https://pdxscholar.library.pdx.edu/iss_pub/32/

12. Brustlin, Vanasse Hangen, and Steve Stanne. 2014. “Climate Smart Communities Certification Manual.” New York State Department of Environmental Conservation, September. https://www.dec.ny.gov/docs/administration_pdf/certman.pdf.
13. “State Land Classifications - NYS Dept. of Environmental Conservation.” n.d. Accessed November 30, 2018. https://www.dec.ny.gov/lands/7811.html.
14. “Lake Placid Set to Host 2023 Winter Universiade.” n.d. Www.Fisu.Net. Accessed November 30, 2018. https://www.fisu.net/news/hosting/lake-placid-set-to-host-2023-winter-universiade.
15. ANGUS, C., & LaBastille, A. (2002). The Extraordinary Adirondack Journey of Clarence Petty: Wilderness Guide, Pilot, and Conservationist. Syracuse, New York: Syracuse University Press. Retrieved from http://www.jstor.org/stable/j.ctt1j5dg12
16. Jenkins, J., & Keal, A. (2004). The Adirondack atlas: A geographic portrait of the Adirondack Park. Syracuse, N.Y: Syracuse University Press.
17. “Annual Drinking Water Quality Report for 2017.” 2017. Lake Placid Village Water System. https://villagelakeplacid.digitaltowpath.org:10228/content/Generic/View/108:field=documents;/content/Documents/File/746.pdf.
18. U. S. Census Bureau. (n.d.). American FactFinder - Community Facts. Retrieved September 23, 2018, from https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml
19. “Definition of GREENHOUSE GAS.” n.d. Accessed November 29, 2018. https://www.merriam-webster.com/dictionary/greenhouse+gas.
20. Scofield, John H. “Efficacy of LEED-Certification in Reducing Energy Consumption and Greenhouse Gas Emission for Large New York City Office Buildings.” Energy and Buildings 67 (December 1, 2013): 517–24. https://doi.org/10.1016/j.enbuild.2013.08.032.
21. “North Country Greenhouse Gas Inventory Report.” NYSDEC, 2010. https://www.dec.ny.gov/docs/administration_pdf/northcoghg.pdf.
22. “State and Local Energy Data.” Accessed November 28, 2018. https://apps1.eere.energy.gov/sled/#/results/emissions?city=North%20Elba&abv=NY&section=electricity&currentState=New%20York&lat=44.2042479&lng=-73.99323329999999.
23. “2018 Whiteface UMP Amendment 4-4-18.Pdf.” Accessed December 3, 2018. http://www.orda.org/corporate/pdf/unit/2018%20Whiteface%20UMP%20Amendment%204-4-18.pdf.
24. US EPA, OAR. “Greenhouse Gas Equivalencies Calculator.” Data and Tools. US EPA, August 28, 2015. https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.
25. US EPA, OAR. “Local Greenhouse Gas Inventory Tool.” Data and Tools. US EPA, June 30, 2017. https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool.
26. Sauri, D, and E. Domene. 2006. “Urbanisation and Water Consumption: Influencing Fa...: Full Text Finder Results.” Routledge Taylor & Francis Group.

http://resolver.ebscohost.com/openurl?sid=google&auinit=E&aulast=Domene&atitle=Urbanisation+and+water+consumption:+Influencing+factors+in+the+metropolitan+region+of+Barcelona&id=doi:10.1080/00420980600749969&title=Urban+Studies&volume=43&issue=9&date=2006&spage=1605.

27. Gregory, Gary D., and Michael Di Leo. 2006. "Repeated Behavior and Environmental Psychology: The Role of Personal Involvement and Habit Formation in Explaining Water Consumption1." Journal of Applied Social Psychology 33 (6): 1261–96. https://doi.org/10.1111/j.1559-1816.2003.tb01949.x.
28. Hoornweg D, Bhada-Tata P (2012) What a Waste: A global review of solid waste management. World Bank, Washington, D.C. http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1334852610766/What_a_Waste2012_Final.pdf
29. United States Environmental Protection Agency. 2018. "Advancing Sustainable Materials Management: 2015 Fact Sheet."
30. "Moving 12-Month Total Vehicle Miles Traveled/Total Population: All Ages Including Armed Forces Overseas*1000 | FRED | St. Louis Fed." 2018. August 2018. https://fred.stlouisfed.org/graph/?g=lls
31. "Cars, Trucks, Buses and Air Pollution | Union of Concerned Scientists." n.d. Accessed November 30, 2018. https://www.ucsusa.org/clean-vehicles/vehicles-air-pollution-and-human-health/cars-trucks-air-pollution#.XAFGVRM3lmB.
32. "Sustainable Transport .:. Sustainable Development Knowledge Platform." n.d. Accessed November 30, 2018. https://sustainabledevelopment.un.org/topics/sustainabletransport.
33. Zaccaro, Heather N., and Emiko Atherton. 2018. "Bright Spots, Physical Activity Investments That Work—Complete Streets: Redesigning the Built Environment to Promote Health." Br J Sports Med 52 (18): 1168–69. https://doi.org/10.1136/bjsports-2017-097717.
34. Chapman, Lee. 2007. "Transport and Climate Change: A Review." Journal of Transport Geography 15 (5): 354–67. https://doi.org/10.1016/j.jtrangeo.2006.11.008.
35. Barro, Robert, and Jong-Wha Lee. 1993. "International Comparisons of Educational Attainment." Journal of Monetary Economics 32 (3): 363–94. https://doi.org/10.1016/0304-3932(93)90023-9.
36. "Education." n.d. OECD Better Life Index. Accessed December 12, 2018. http://www.oecdbetterlifeindex.org/topics/education/.
37. Zimmerman, Emily, Steven Woolf, and Amber Haley. 2015. "Understanding the Relationship Between Education and Health: A Review of the Evidence and an Examination of Community Perspectives | Agency for Healthcare Research & Quality." Agency for Healthcare Research and Quality. September 14, 2015. https://www.ahrq.gov/professionals/education/curriculum-tools/population-health/zimmerman.html.

38. Sasson, Isaac. 2016. “Trends in Life Expectancy and Lifespan Variation by Educational Attainment: United States, 1990-2010.” Demography; Silver Spring 53 (2): 269–93. http://dx.doi.org/10.1007/s13524-015-0453-7.
39. Berger, Noah, and Peter Fisher. 2013. “A Well-Educated Workforce Is Key to State Prosperity.” Economic Policy Institute (blog). August 22, 2013. https://www.epi.org/publication/states-education-productivity-growth-foundations/.
40. Bureau, US Census. n.d. “American Community Survey (ACS).” Accessed November 27, 2018. https://www.census.gov/programs-surveys/acs.
41. Jillian Frankel. (2016, June 25). The One Thing America’s Most Equitable Cities Have in Common. Retrieved November 2, 2018, from http://www.takepart.com/article/2016/06/25/most-equal-cities-america
42. U.S. Census Bureau. (2016). Gini Index of the Town of North Elba. Retrieved September 29, 2018, from https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml
43. EPA. 2016. “Air Quality Index (AQI) Basics.” Air Quality Index (AQI) Basics. August 31, 2016. https://www.airnow.gov/index.cfm?action=aqibasics.aqi.
44. University at Albany. 2015. “University at Albany Atmospheric Sciences Research Center - Whiteface Mountain Conditions.” 2015. https://www.albany.edu/asrc/wfm.php.
45. US EPA. 2014. “Air Quality Index - A Guide to Air Quality and Your Health.” Government. AirNow. February 2014. https://cfpub.epa.gov/airnow/index.cfm?action=aqi_brochure.index.
46. US EPA, OAR. 2016. “Air Quality Index Report.” Data and Tools. US EPA. August 11, 2016. https://www.epa.gov/outdoor-air-quality-data/air-quality-index-report.
47. FBI. (2011). Violent Crime [.gov]. Retrieved October 4, 2018, from https://ucr.fbi.gov/crime-in-the-u.s/2011/crime-in-the-u.s.-2011/violent-crime/violent-crime
48. Cuomo, A. M., Green, M. C., & Office of Justice Research and Performance. (2018). New York State Crime Report. New York State Division of Criminal Justice Services, 15.
49. NYS Division of Criminal Justice Services. (2018). County Index Crime Rates - NY DCJS (2017 County Index Crime Counts and Rates Per 100,000 Population) (p. 2). Retrieved from http://www.criminaljustice.ny.gov/crimnet/ojsa/countycrimestats.htm
50. Harrison, C., & Donnelly, I. A. (2011). A Theory of Smart Cities. Proceedings of the 55th Annual Meeting of the ISSS - 2011, Hull, UK, 55(1). Retrieved from http://journals.isss.org/index.php/proceedings55th/article/view/1703
51. Acharya, Nish. 2017. “America Needs More Technically Skilled Workers. The U.S. House Just Did Its Part.” Forbes. July 8, 2017. https://www.forbes.com/sites/nishacharya/2017/07/08/america-needs-more-technically-skilled-workers-the-u-s-house-just-did-its-part/.
52. Coker, Ann L., Paige H. Smith, Martie P. Thompson, Robert E. McKeown, Lesa Bethea, and Keith E. Davis. 2002. “Social Support Protects against the Negative Effects of

Partner Violence on Mental Health." Journal of Women's Health & Gender-Based Medicine 11 (5): 465–76. https://doi.org/10.1089/15246090260137644.
53. ROOST. 2018. "Essex 2017 Leisure Travel Study." http://www.roostadk.com/wp-content/uploads/2018/07/Essex-2017-Leisure-Travel-Study-Final.pdf.
54. De Maio, Fernando G. 2007. "Income Inequality Measures." Journal of Epidemiology and Community Health 61 (10): 849–52. https://doi.org/10.1136/jech.2006.052969.
55. Dorfman, Robert. 1979. "A Formula for the Gini Coefficient." The Review of Economics and Statistics 61 (1): 146–49. https://doi.org/10.2307/1924845.
56. IESE: School Bus Project. (2018). Retrieved November 9, 2018, from http://www.ciese.org/curriculum/bus/newhaven/9/lesson1/.

10.0 *Appendices*

Appendix A - *Meetings Held*

Date of Meeting	Location	Individuals Present	Brief Description of Notes
September 7, 2018	Lake Placid Olympic Center	ORDA Representatives: Bob Hammond, Mike Pratt, Cort Honey, and Nick Zachara Lake Placid Central School District: Erik Backus	● First meeting with ORDA ● Modernization and efficiency efforts being made ● Future goals for the company ● Discussion of environmental impacts
September 7, 2018	Lake Placid Olympic Center	USGBC Director of Cities and Communities: Vatsal Bhatt Clarkson students: Kevin Brooks and Thomas Gitlin	● Availability of public versus private data ● Helped determine where we should start with collecting data ● Needed to define the boundaries of the region
September 13, 2018	Pontiac Bay, Saranac Lake	Lake Placid Central School District: Tammy Morgan LPCSD Environmental Science Class Adirondack Semester Professor: Erik Backus DEC, Land, Wood Consulting Representatives	● Went to the remediation of Pontiac Bay and Brandy Brook construction site in Saranac Lake
September 13, 2018	Beach House, Lake Placid	Chairperson of Lake Placid/North Elba Community Development Commission: Dean Dietrich Adirondack Semester Professor: Erik Backus	● First meeting with a Lake Placid representative ● Discussed the 10 year comprehensive plan Lake Placid has ● Talked about the demographics of the city have changed ● Environmental concerns that exist in the community ● Provided a list of resources that would be available for data collection ● Did not have any specific parameters that they wanted fulfilled at the time, but willing to work with different proposals ● Gave ideas for potential

			future projects Lake Placid was interested in completing
September 20, 2018	Adirondack Park Agency	Adirondack Semester Professor: Stephen Langdon APA Representatives: Keith McKeever and Mark Rooks	● The APA wants to start integrating an energy policy into their actions ● Differences between the laws for public and private lands within the Park
October 10, 2018	SUNY Adirondack	Forestry Roundtable Conference	● Main point of the conference was sustaining private forests as working landscapes ● Economic, ecological, societal importance of the Park to New York ● Consideration of making the Forestry Roundtable a stakeholder group
October 19, 2018	Paul Smith's College	Adirondack Semester Professors: Stephen Bird and Erik Backus LEED Fellow and FAIA: Harry Gordon	● First meeting with Harry Gordon ● Discussion and feedback about the presentation ● Figuring out how to incorporate Harry into the presentation we had
November 5, 2018	Beach House, Lake Placid	ORDA Project Coordinators: Cort Honey and Nick Zachara Chairperson of Lake Placid/North Elba Community Development Commission: Dean Dietrich North Elba Town Board: Jay Rand Lake Placid Superintendent: Roger Catania Adirondack Semester Professors: Erik Backus and Stephen Bird	● First meeting with all of the stakeholders involved ● Distributed a handout that described the up to date progress of the project ● Provided other contacts for unfinished metrics ● Spoke to what individual stakeholders wanted to improve on
November 14, 2018	Lake Placid Central School District	Lake Placid Central School District: Tammy Morgan LPCSD Environmental Science Class Lake Placid Elementary School: Jason Leon Youth Climate Program Coordinator: Kelly Carter	● Briefly walked through how to use Arc ● Talked about how the students can help with data collection in the future

November 16, 2018	Paul Smith's College, Beach House in Lake Placid	ORDA Project Coordinators: Cort Honey and Nick Zachara Chairperson of Lake Placid/North Elba Community Development Commission: Dean Dietrich North Elba Town Board: Jay Rand Adirondack Semester Professors: Erik Backus and Stephen Bird	● Teleconference ● Had sent documents previously concerning Community Metrics ● Have both USGBC additional metrics as well as ones that were made up by the students ● Started changing the Community Metric list provided to find the ones most relevant ● Stakeholders were working together to figure out who was going to take lead on each metric
November 26, 2018	Beach House, Lake Placid	ORDA Project Coordinators: Cort Honey and Nick Zachara Chairperson of Lake Placid/North Elba Community Development Commission: Dean Dietrich Lake Placid Electric Superintendent: Kimball Daby Adirondack Semester Professors: Erik Backus and Stephen Bird	● Went through the revised Community Metrics ● Stakeholders provided other data sources that could be utilized for gathering information ● Discussed the process of getting approval for the project and possible Certification

Table 10A: Meetings Held

Appendix B - *Presentations Given*

Date	Location	Notes
October 25, 2018	Glens Falls, Climate Energy Economy Conference	● First public presentation ● Answered questions from the audience ● Received feedback and potential sources for information
December 10, 2018	Lake Placid, ORDA Conservation Center	● Public presentation in Lake Placid
December 12, 2018	Clarkson University, Moore House	● Public presentation at Clarkson University

Table 10B: Presentations Given

Appendix C - *List of Community Metrics*

Theme	Category	Indicator	Description	Origin of Metric
Human Experience	Community Engagement and Satisfaction	Voter turnout	Percent of eligible voting population turnout	New
		Number of farmers' markets per year	Number of farmers' markets held by the LPHS team per year	New
		Number of participants in farmers' markets per year	Number of participants at farmers' markets held by the LPHS team per year	New
		Total area of public parks and playgrounds		Modified from USGBC
		# *public access* buildings with access to high speed internet (100Mbps*)		New
		# *residential* buildings with access to high speed internet (100 Mbps*)		New
		Miles *recreational* bike infrastructure per square mile	Miles of bike infrastructure (bike paths, designated bike lanes) per square mile of jurisdiction	Modified from USGBC
		# volunteers at events		New
		Public access to facilities	hours of access to ORDA facilities	New
	Connectivity	Miles *transportation* bike infrastructure per square mile	Miles of bike infrastructure (bike paths, designated bike lanes) per square mile of jurisdiction	Modified from USGBC
		Miles pedestrian infrastructure per square mile	Miles of sidewalk, trails, etc per square mile of jurisdiction	From USGBC
		Number of visitors who use public transportation	Number of visitors who use public transportation (sort by destination?)	New
		Number of residents who commute with public transportation	Number of people who commute to work via public transportation (not including taxis)	Modified from USGBC

		% workers without access to a vehicle	% of workers 16 and over in households without access to a vehicle (ACS description)	Modified from USGBC
	Health and Accessibility	Miles trails ADA compliant	Miles of trails compliant with the Americans with Disabilities Act	New
		Miles of Universal Access trails		New
		# people who live within given distance of a trail		New
		Population with health insurance coverage		From USGBC
	Sustainable Recreation	Miles singletrack mountain bike trails	Miles of mountain bike trails considered singletrack (users must be single file; generally 18 to 24 inches)	New
		Miles sustainable multi-use trails		New
		Miles maintained Nordic ski trails		New
		Miles maintained alpine ski trails		New
	Affordable Housing and Prosperity	% population below poverty line		From USGBC
		Collection of unemployment benefits	Weekly or monthly, median number collected by residents?	New
		Cost of living		From USGBC
		% of population who spend more than 30% of income on housing		New
		# residential properties listed for short term rental		New
		# residential properties not owned by locals		New
Energy	Energy consumption	Total energy used for snowmaking (kWh)	Venue Facilities	New
		Total energy used for large scale refrigeration (kWh)	Venue Facilities	New
		Total energy use in NYOR		From USGBC

		Total LPCSD energy use		New
		Total residential energy use		From USGBC
		Total commercial energy use		From USGBC
		Total municipal energy use		From USGBC
	Renewable and alternative energy	% energy consumed from renewables		From USGBC
		% energy consumed from renewables by LPCSD		New
		# electric vehicle charging stations	Supercharge? Level 2? etc?	New
		Total energy *consumed* from renewables		From USGBC
		Renewable energy *produced* from solar		From USGBC
		Renewable energy *produced* from wind		Modified from USGBC
		Renewable energy *produced* from hydro		Modified from USGBC
		Renewable energy *produced* from biomass		Modified from USGBC
		# of businesses adjacent to geothermal sidewalks		New
		# of houses with geothermal heating		New
	Electricity	Total electricity *produced*		Modified from USGBC
		Total electricity *consumed*		Modified from USGBC
	Building Efficiency	# LEED Certified buildings		Modified from USGBC
		# buildings certified under a sustainability program		Modified from USGBC
		# people using green appliance incentive programs	Energy STAR, etc.	Modified from USGBC
		Heating Degree Days	# days with average outdoor temperature below set standard	From USGBC

		Cooling Degree Days	# days with average outdoor temperature above set standard	From USGBC
Waste	Recycling	Total recyclable waste collected		Modified from USGBC
		Total recyclable waste collected at large community events	Waste collected as part of LPHS student project	New
		Total municipal recycling coverage	# addresses serviced	New
	Waste management	# businesses committed to reducing or eliminating single-use plastics		New
		Municipal solid waste collection coverage	# addresses serviced	Modified from USGBC
Water	Water monitoring	% metered connected users		New
		Gallons rainwater collected per year	Gallons of rainwater collected as part of LPHS student project	New
		Annual rainfall		New
		Pump efficiency	By facility; only for days (or hours) when snow was made	New
		Annual water usage for snowmaking	By facility; only for days (or hours) when snow was made	New
	Water Sources	# households with self supplied water	# households supplied by private wells or surface water bodies	Modified from USGBC
		# households with municipal water		New
		Total extraction at weirs	Hudson and Ausable	New
		Proportion of households with public water	Proportion of households with public water supply	Modified from USGBC

Table 10C: List of Community Metrics

Appendix D - *Water Consumption Calculations*

Municipal Water for Village of Lake Placid
Source of Water: Lake Placid
Four pumps, 1,500 gallons per minute
Permanent residents: 5,000
2017 water total: 304,000,000 gallons

North Elba
Average flow rate: 15.8 gallons/minute
8,304,480 gallons/year

North Elba and Village of Lake Placid combined
Population of North Elba: 8,484 people

$$(8{,}304{,}480 + 304{,}000{,}000) \div 8{,}484$$

36,810.9948 gallons/year/person

Appendix E - *Municipal Solid Waste Generated Calculations*

Casella Waste in 2017

Households included: 697	Commercial waste: 4,567.23 tons
Households outside of North Elba: 383	Residential waste: 787.93 tons
Total in North Elba: 314	Total waste: 5,355.16 tons

First, to calculate the percent of waste from NYOR households, the number of households in NYOR is divided total number of households serviced by Casella,

$$\frac{314}{697} = 0.450502 \rightarrow 45.1\%$$

45.1% represents the percent of waste from households in NYOR.

This percent is applied to the total waste collected by Casella to determine the waste generated by NYOR households,

$$5{,}355.16(0.450502) = 2412.51029 \text{ [illegible]}$$

North Elba Transfer Station Waste in 2017

Population of Essex County: 37,956	Total Transfer Station waste: 3,417.25 tons
Population of NYOR: 8,484	

To calculate for the percent of waste generated by population of NYOR, the 2017 population of NYOR is divided by the 2017 Essex County population:

$$\frac{8{,}484}{37{,}956} = 0.223521 \rightarrow 22.4\%$$

22.4% represents the percent of Essex County that resides in NYOR.

This percent is applied to the total waste data provided by the North Elba Transfer Station to determine waste generated by NYOR residents,

$$3{,}417.25(0.223521) = 763.83 \text{ [illegible]}$$

The total NYOR waste is determined by adding the calculated total from Casella to the calculated total from the Transfer Station,

$$2412.51029 + 763.8271 = 3{,}176.337 \text{ [illegible]}$$

To calculate the waste generated per person per year, the combined NYOR total is divided by the population of NYOR

$$3{,}176.337/8{,}484 \rightarrow 0.37 \text{ [illegible]}$$

Appendix F - *Municipal Solid Waste Diverted from Landfill Calculations*

Casella Waste Management Recycling in 2017

Commercial recycling: 764.76 tons
Residential recycling: 411.25 tons
Total recycling: 1,176.01 tons

The same process used to determine NYOR's waste contribution was used to determine NYOR's recycling contribution. The total recycling amount provided by Casella was multiplied by the percentage of Casella serviced households in NYOR (45.1%), calculated in Appendix E. The result is the amount of recycling generated by Casella's NYOR customers.

$$1{,}176.01(0.450502) = 529.794857 \text{ [illegible]}$$

North Elba Transfer Station Recycling in 2017

Total North Elba Transfer Station Recycling: 479.08 tons

To find the contribution of NYOR residents to the North Elba Transfer Station's recycling, the total amount of recycling provided by the Transfer Station ws multiplied by the percentage of Essex County residents that live in NYOR (22.4%), as calculated in Appendix E. The result is the amount of recycling generated by NYOR residents that use the Transfer Station.

$$497.08(0.223521) = 107.08 \text{ [illegible]}$$

The total NYOR recycling amount was the combination of the two calculated recycling values.

$$529.794857 + 107.084441 = 636.879298 \text{ [illegible]}$$

To calculate the total NYOR waste stream the total NYOR recycling amount had to be added to the total NYOR waste generated amount.

$$3{,}176.337 + 636.879298 = 3{,}813.2163 \text{ [illegible]}$$

To find the percent of recycling diverted, the total NYOR recycling was divided by the total NYOR waste stream.

$$\frac{636.879298}{3{,}813.2163} = 0.167 \rightarrow 16.7\%$$

Appendix G - *Distance Traveled in Individual Vehicles Daily Calculations*

VMT for NYOR was calculated using traffic counts from the New York State Department of Transportation (NYS DOT). The counts were most widely available on major non-residential roads. For areas that remain uncounted, an approximation was used. While this approximation may not be as accurate as measurements utilizing vehicle counts, it appears to be a reliable way to account for roads which lack traffic counts in the data. Out of the total VMT in North Elba and Lake Placid, 90.1% and 84.4% of the VMT were on counted roads, respectively.

Traffic counts were measured in Annual Average of Daily Traffic (AADT). To convert this to VMT, the AADT was multiplied by the length of the counted road segment. The results for all roads in a jurisdiction were summed to get an overall VMT for counted roads in an area. Uncounted roads were assessed by calculating an average VMT per mile on each road functional class in Essex County and then multiplied by the length of all uncounted roads within the North Elba and Lake Placid boundaries.

To factor in half of tourist travel to and from the region, common areas of origin and the average duration of stay were gathered from ROOST's 2017 Leisure Travel Study[53]. This data was for Essex County, but is assumed to be an acceptable proxy for the NYOR region since Lake Placid and North Elba are the major destinations within the county. A weighted distance traveled was obtained by multiplying the distance to each area of origin by the percentage of tourists from that area. However, the area of origin data did not account for 18.9% of tourists. To account for this, the weighted distance traveled was adjusted to account for all tourists using the average distance traveled for the percentage of tourists unaccounted for. The sum was multiplied by the number of tourists entering the region in a day, which was the tourists in the region divided by the average duration of stay. The total VMT from uncounted roads, counted roads, and tourist travel into the region was summed and then divided by the population.

Several notes should be made about the VMT calculations. First, both residential and tourist vehicles are accounted for in the vehicle counts, however, tourists are not included in the population count for the number being input into Arc. Second, the North Elba VMT calculation accounts for the roads inside of Lake Placid, as Lake Placid is nested within the jurisdiction of North Elba. Traffic count data is expected to be accurate as the counts took place over a year's time, and were averaged to produce a daily value. The averaging of a year's worth of data mitigates the fluctuation in visitors that occurs both on a daily and seasonal basis. The result is expected to be an underestimate due to the lack of data for residential travel outside the investigation boundary. If this data were available, half of the travel outside the region would be included in the calculations. The final number of miles traveled by tourists is an underestimate as tourists traveling from extreme distances are less frequent, making them less likely to be reported and more difficult to measure. This means that the extra miles traveled in those trips are unaccounted for in the calculations above. Of the total VMT count for North Elba and Lake Placid, only 22.6% and 3.7% respectively were from travel inside their jurisdiction. This shows that the majority of VMT can be attributed to tourist travel to and from the region. This

phenomenon is likely unique to rural regions with tourist-based economies. Finally, Saranac Lake has been excluded, despite partly being inside of North Elba, due to lack of data. As Saranac Lake is not a member of NYOR, this was not a significant concern.

Vehicle Miles Traveled Equations

$$VMT_{per\ capita} = VMT_{area} \div P_{region}$$

$$VMT_{area} = VMT_{residents} + VMT_{tourists} + VMT_{residents,outside} + VMT_{outside,residents}$$

$$VMT_{residents} = \sum_{i=1}^{n} (V_i * L_i)$$

$$VMT_{tourists} = \sum_{i=1}^{n} (VMT_{area,functional,i} \div L_{area,functional,i} * L_{area,functional,i})$$

$$VMT_{residents,outside} = \frac{T_{area}}{2 * T_i * T_{area}} \sum_{i=1}^{n} (D_i * P_i)$$

$VMT_{outside,residents}$: travel outside of the region by residents; assumed to be 0 due to lack of data

V_i: Vehicle Count in Annual Average Daily Traffic

L_i: Length of road segment

$L_{area,functional,i}$: countywide total length of roads of a particular functional class

$L_{area,functional,i}$: regional total length of roads of a particular functional class

T_{area}: average number of tourists in the area on any given day

T_i: duration of stay; used to calculate the number of tourists entering an area on a given day

T_{area}: total percentage accounted for in area of residency data

D_i: distance to area of origin

P_i: percent of tourists from a given area of origin

P_{region}: Population in region; this could either be the census population or the population could be modified to better represent those generating VMT

Appendix H - *Population with (at least) a High School Degree (25 and older) Calculations*

North Elba (inclusive of Lake Placid in ACS)	
High School graduate (includes equivalency)	1,817
Some college, no degree	1,368
Associate's degree	534
Bachelor's degree	1,224
Graduate or professional degree	1,011
Total Population	6,603
Total Combined Population with (at least) a High School Degree	5,954
Total Combined Population with (at least) a Bachelor's Degree	2,235
Population over the age of 25 with (at least) a High School Degree (%)	90
Population over the age of 25 with (at least) a Bachelor's Degree (%)	33.9

Table 10H: North Elba Education Level Data

First, to calculate the percentage of the population over 25 that have at least a high school degree, the population ranging from “high school graduate” to “graduate or professional degree” is added together. This sums everyone in North Elba who has at least a high school diploma.

$$1{,}817 + 1{,}368 + 534 + 1{,}224 + 1{,}011 = 5{,}954$$

Then, the sum of everyone with over a high school diploma is divided by the total population in North Elba over the age of 25.

$$\frac{5{,}954}{6{,}603} = 0.9017 \rightarrow 90.2\%$$

Appendix I - *Population with (at least) a Bachelor's Degree (25 and older) Calculations*

North Elba (inclusive of Lake Placid in ACS)	
High School graduate (includes equivalency)	1,817
Some college, no degree	1,368
Associate's degree	534
Bachelor's degree	1,224
Graduate or professional degree	1,011
Total Population	6,603
Total Combined Population with (at least) a High School Degree	5,954
Total Combined Population with (at least) a Bachelor's Degree	2,235
Population over the age of 25 with (at least) a High School Degree (%)	90
Population over the age of 25 with (at least) a Bachelor's Degree (%)	33.9

Table 10I: North Elba Education Level Data

First, to calculate the percentage of the population over 25 that have at least a bachelor's degree, the populations for "bachelor's degree" and "graduate or professional degree" are added together which sums everyone in North Elba who has at least bachelor's degree.

$$1{,}224 + 1{,}011 = 2{,}235$$

Then, the sum of everyone with over a bachelor's degree is divided by the total population in North Elba over the age of 25.

$$\frac{2{,}235}{6{,}603} = 0.3385 \rightarrow 33.9\%$$

Appendix J - *Gini Index Calculation and Limitations*

The Gini Coefficient is one of the most popular, though not the only method of measuring and viewing income inequality. The Gini Coefficient, known as the Gini Index when expressed as a percentage, is primarily affected by the middle portion of the income distribution spectrum. The Gini Coefficient is less affected by inequalities at the high and low end of the income distribution spectrum, therefore communities with concerns about specific types of inequality may need to track another measure of inequality in their Community Metrics[54].

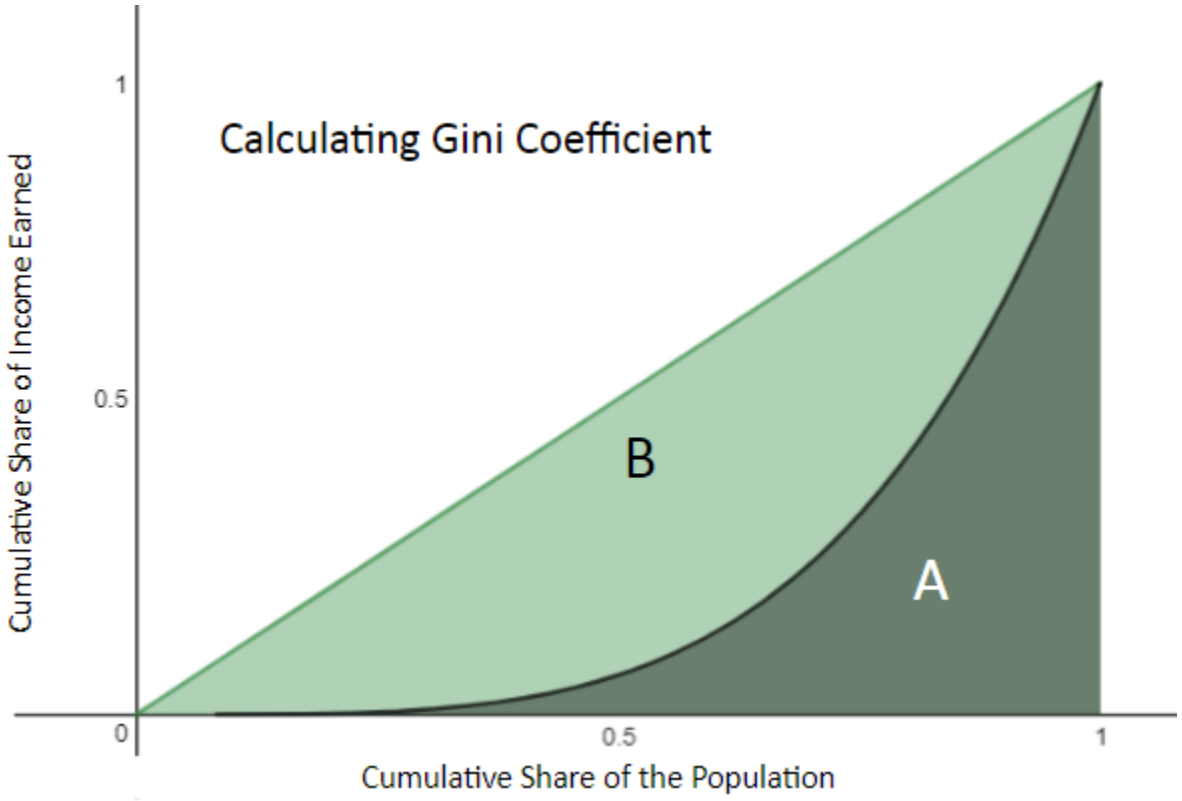


Figure 10J: Gini Coefficient Chart

Graphically, perfect income equality is represented by the line $f(x) = x$ from zero to one, where the horizontal axis is the cumulative proportion of the population and the vertical axis is the cumulative proportion of the income earned, so that the cumulative population increases at the same rate as the cumulative income (10% of the population has 10% of the income, 20% of the population has 20% of the income, and so on). This line of perfect equality, $f(x) = x$, is the green line in the graph above. The line that represents the actual increase in share of income in relation to the increase in population is known as the Lorenz Curve, or $L(x)$. A fictional Lorenz Curve is represented on the graph above by the black line.

To calculate the Gini Coefficient, the area B, shown in the graph as the green area between $f(x) = x$ and the Lorenz Curve, must be divided by the total area beneath $f(x) = x$. The

total area under the line *f(x) = x* is known to be 0.5, and the area under the Lorenz Curve can be calculated as follows

$$A = \int_0^1 f(x)\,dx$$

Therefore, the area B can be calculated as

$$B = 0.5 - \int_0^1 f(x)\,dx$$

Next, to calculate the Gini Coefficient, *G*, the area B must be divided by total area under the line *f(x) = x*

$$G = \frac{0.5 - \int_0^1 f(x)\,dx}{0.5}$$

or

$$G = 1 - 2\int_0^1 f(x)\,dx^{(x}$$

This equation will result in a number between 0 and 1, which will be the Gini Coefficient[55].

Appendix K - *Air Quality Calculations*

Air Quality Index Equation

$$I_p = \frac{I_{Hi} - I_{Lo}}{BP_{Hi} - BP_{Lo}}(C_p - BP_{Lo}) + I_{Lo}$$

I_p- The index for pollutant p

C_p- The rounded concentration of pollutant p

BP_{Hi}- The breakpoint that is greater than or equal to C_p

BP_{Lo}- The breakpoint that is less than or equal to C_p

I_{Hi}- The AQI value corresponding to BP_{Hi}

I_{Lo}- the AQI value corresponding to BP_{Lo}

The Air Quality Index is calculated is through the equation above. As shown, the index of a pollutant uses several different factors in order for it to be calculated. There are a total of six different pollutants that are calculated using this equation including ozone (O_3) measured in parts per million for both an 8-hour span and a 1-hour span; small particulate matter ($PM_{2.5}$) and coarse particulate matter (PM_{10}) which are both measured in $\mu g/m^3$; carbon monoxide (CO) in parts per million; sulfur dioxide (SO_2) in parts per million; and nitrogen dioxide (NO_2) in parts per million[56]. Each pollutant corresponds with breaking points, represented in the equation as $BP_{Hi}$and BP_{Lo} . Each breaking point has a range that corresponds with a AQI range, represented in the equation as I_{Hi} and I_{Lo}. These breaking points are shown in Table 10k below.

Breakpoints for AQI

These Breakpoints							equal these AQIs…	**Category**
O_3 (ppm) 8-hour	**O_3 (ppm) 1-hour[1]**	**$PM_{2.5}$ ($\mu g/m^3$)**	**PM_{10} ($\mu g/m^3$)**	**CO (ppm)**	**SO_2 (ppm)**	**NO_2 (ppm)**	**AQI**	
0.000-0.064	-	0.0 – 15.4	0 – 54	0.0-4.4	0.000-0.034	([2])	0 – 50	Good
0.065-0.084	-	15.5 – 40.4	55 – 154	4.5-9.4	0.035-0.144	([2])	51 – 100	Moderate
0.085-0.104	0.125-0.164	40.5 – 65.4	155 – 254	9.5-12.4	0.145-0.224	([2])	101 – 150	Unhealthy for sensitive groups
0.105-0.124	0.165-0.204	65.5 – 150.4	255 – 354	12.5-15.4	0.225-0.304	([2])	151 – 200	Unhealthy
0.125-0.374	0.205-0.404	150.5–250.4	355 – 424	15.5-30.4	0.305-0.604	0.65-1.24	201 – 300	Very Unhealthy
([3])	0.405-0.504	250.5-350.4	425 – 504	30.5-40.4	0.605-0.804	1.25-1.64	301 – 400	Hazardous
([3])	0.505-0.604	350.5-500.4	505 – 604	40.5-50.4	0.805-1.004	1.65-2.04	401 – 500	Hazardous

Table 10K: The breaking points for the different existion pollutants are shown above. As show, each pollutant has their own set of breaking points that correspond with different AQI categories

Appendix L - *Violent Crime Charts and Figures*

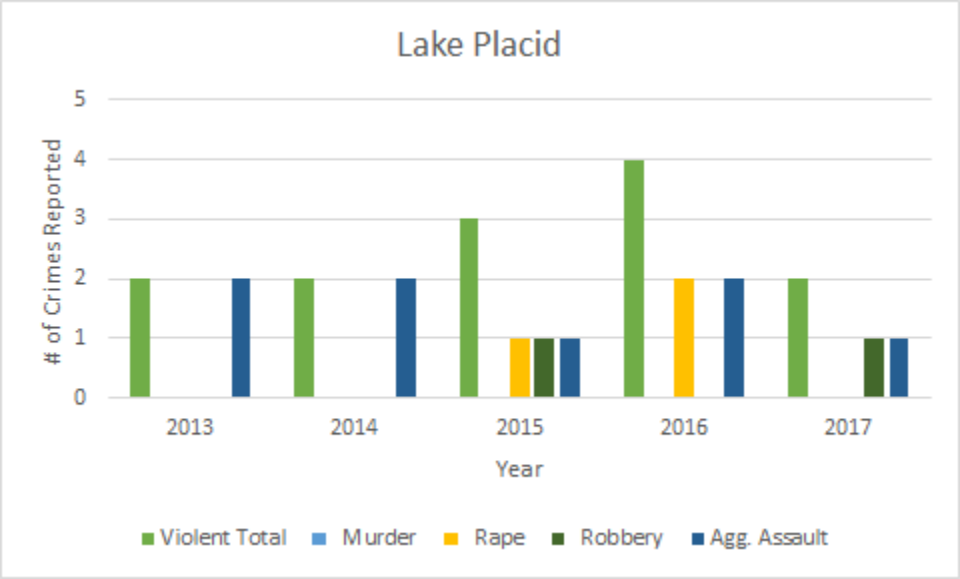


Figure 10La: Total Violent Crime in Lake Placid

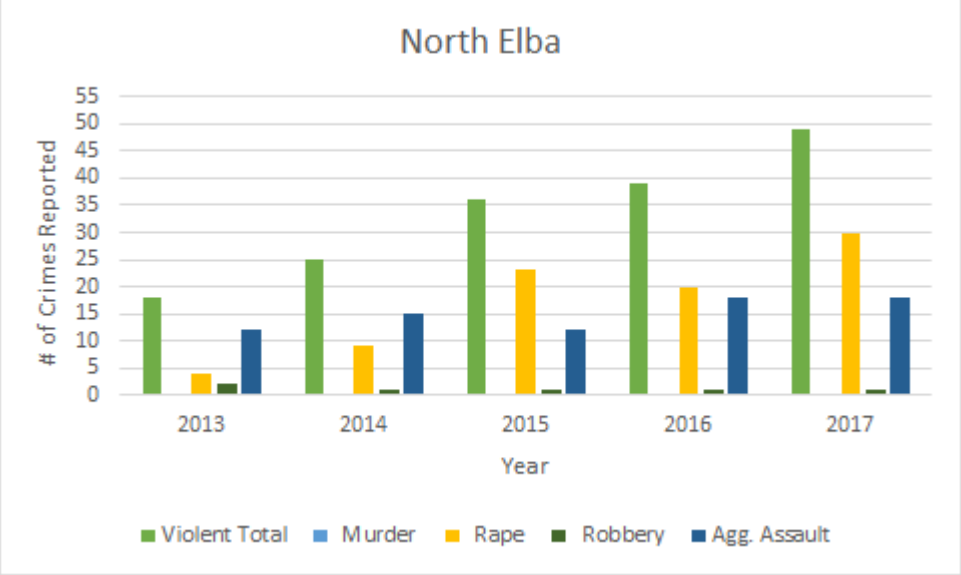


Figure 10Lb: Total Violent Crime in North Elba

New York State Index Crime Summary by County
2015 vs. 2016

County	Year	**Total**	**Violent**	Murder	Rape	Robbery	Agg. Assault	**Property**	Burglary	Larceny	MV Theft
Essex	2015	**382**	**46**	0	25	2	19	**336**	97	227	12
	2016	**394**	**57**	0	22	1	34	**337**	99	230	8
	% change	**3.1%**	**23.9%**	NA	-12.0%	-50.0%	78.9%	**0.3%**	2.1%	1.3%	-33.3%

Table 10La: New York State Crime Report Appendix 3

New York State Index Crime Summary by County: 2016 Rates per 100,000 Population

County	Index	Violent	Property
Essex	1,076.1	155.7	920.4

Table 10Lb: New York State Crime Report Appendix 6

Appendix E: Presentation: USGBC LEED for Communities Certification of the New York State Olympic Region Clarkson University Adirondack Semester

Clarkson Adirondack Semester

LEED for Communities In the New York Olympic Region

Olympic Regional Development Authority

LAKE PLACID adirondacks, usa

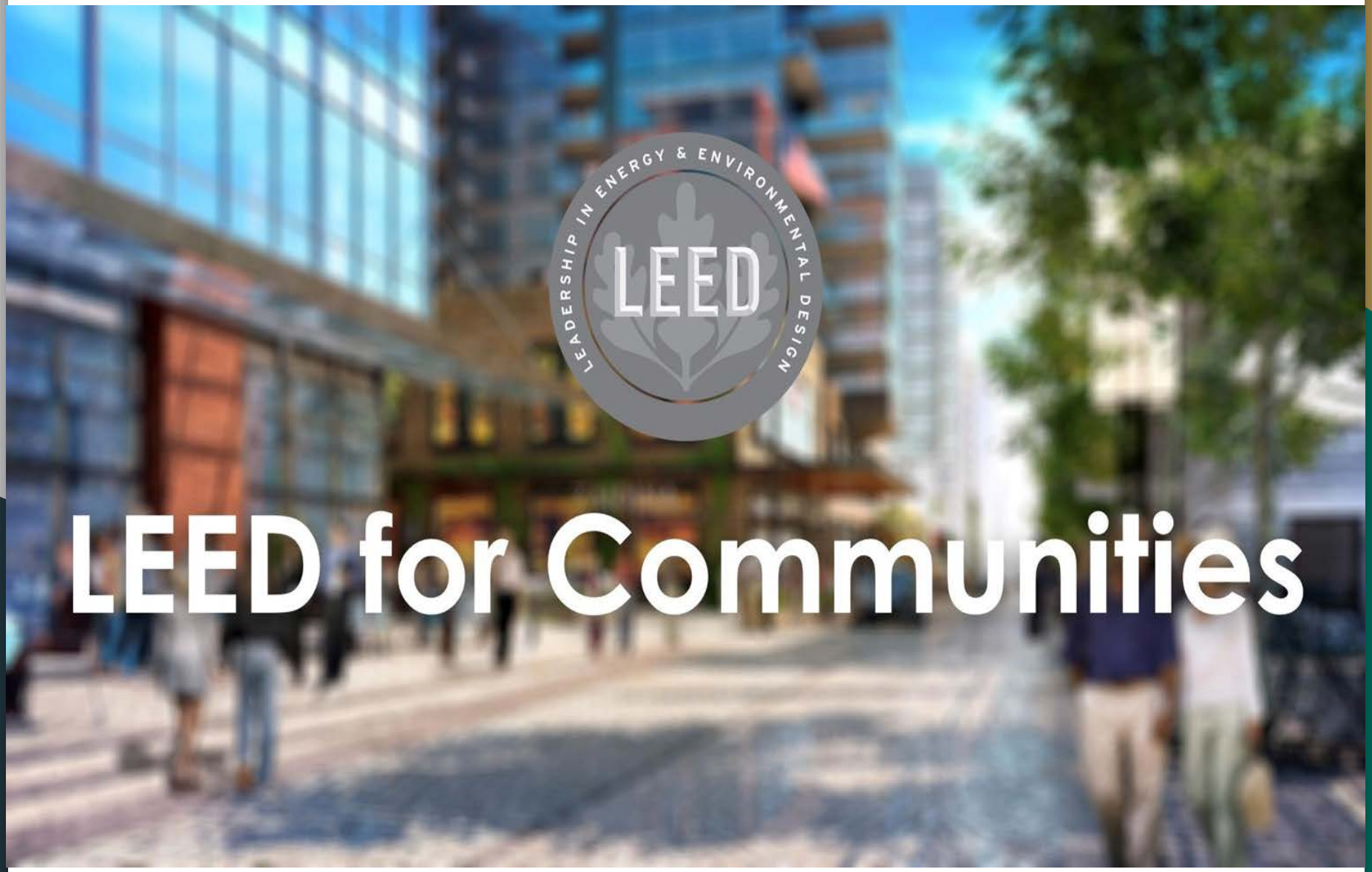
Agenda

- LEED Background
- Role of Investigators
- Community Background
- Project Approach
- Core Metrics
- Community Metrics
- Future Steps
- Recommendations

إستدامة
estidama

CLIMATE SMART COMMUNITIES
NEW YORK STATE

U.S. GREEN BUILDING COUNCIL
LEED
USGBC


LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
LEED
LEED for Communities

Core Metrics

	Energy	1. Greenhouse Gas Emissions (CO_2 equivalent)
	Water	2. Water Consumption
	Waste	3. Municipal Solid Waste Generated
		4. Municipal Solid Waste Diverted from Landfill
	Transportation	5. Distance Traveled in Individual Vehicles Daily
Human Experience	**Education**	6. Population with (at least) a High School Degree
		7. Population with (at least) a Bachelor's Degree
	Equitability	8. Median Gross Rent as % of Household Income
		9. Income Differential/Gini coefficient
	Prosperity	10. Median Household Income
		11. Unemployment rate
	Health & Safety	12. Median Air Quality Index (AQI)
		13. Air Quality Days Unhealthy for Sensitive Groups
		14. Violent Crime

Improve performance and certify LEED for Cities & Communities

Step 1:
Register your community in Arc

Step 2:
Pre-certify

Step 3:
Share data to receive a score

Step 4:
GBCI review of data

Step 5:
Certify to LEED for Communities

Pre-certification

- Commit to track data & measure progress
- Identify city boundaries, governance, and stakeholders
- Share your plans, goals, and strategies for sustainability and quality of life

PERFORMANCE, SCORED.

Energy:	out of 33
Water:	out of 15
Waste:	out of 8
Transportation:	out of 14
Human Experience:	out of 20

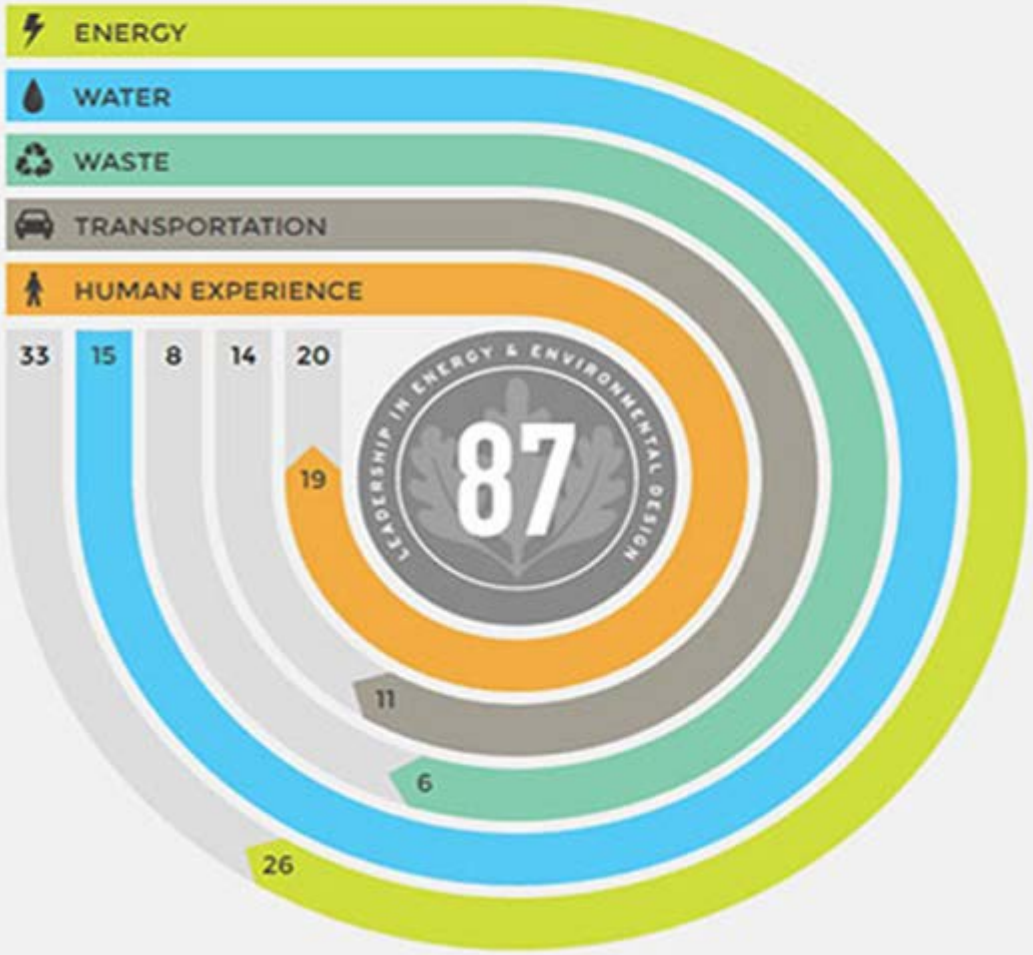
Base score: out of 10

Education, Health, Safety, Equitability and Prosperity

- City provides data across 5 categories to generate score:

  - Energy
  - Water
  - Waste
  - Transportation
  - Human Experience

SCORING 1-100



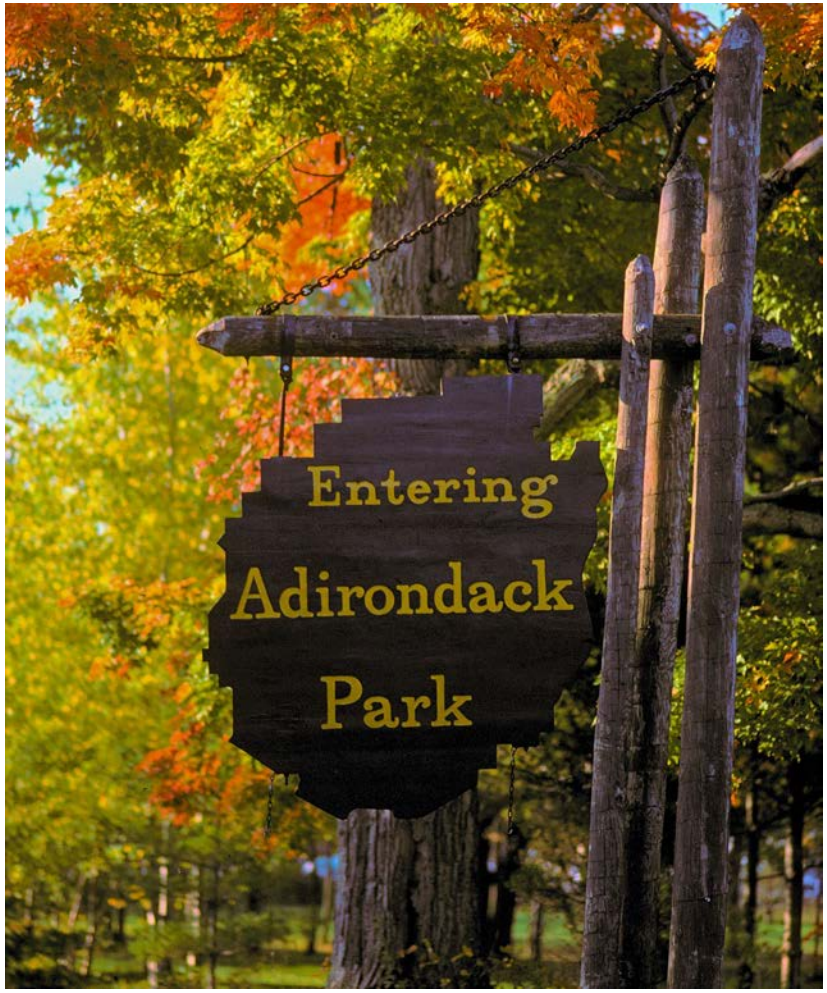

LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
LEED
CERTIFIED
40+
CERTIFIED
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
LEED
SILVER
50+
SILVER
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
LEED
GOLD
60+
GOLD
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
LEED
PLATINUM
80+
PLATINUM

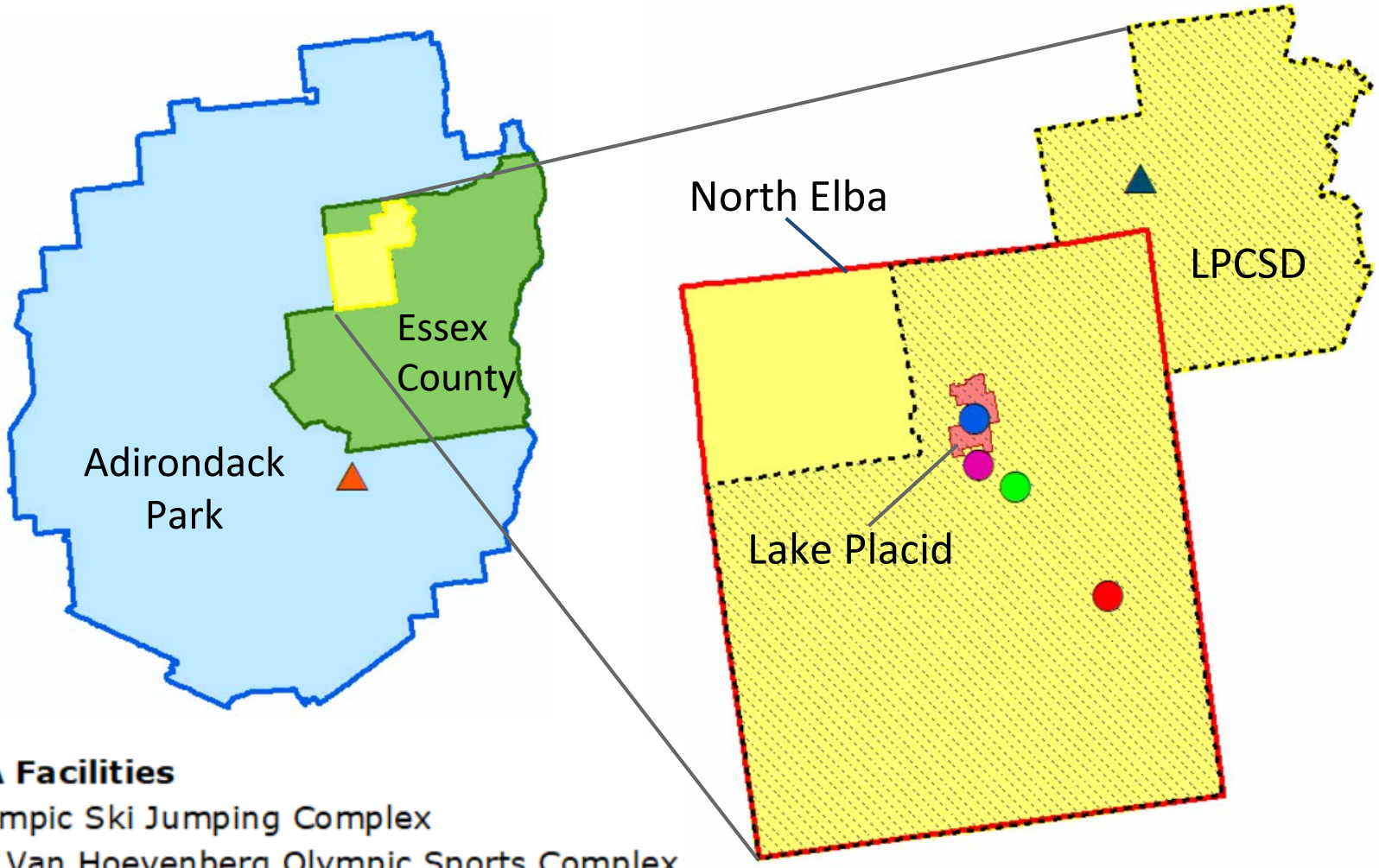
Role of Clarkson Students

- Data collection
  - Collect data for Core Metrics
  - Choose and create Community Metrics
- Enter data into Arc
- Create a preliminary roadmap for NYOR and other similar communities to use in the future.
- Give recommendations and improvements to the USGBC.

Characteristics of NYOR

- Multi-jurisdictional
- Rural
- Tourist-Based Economy
- Park Regulations
  - Maintain “Forever Wild”





New York Olympic Region

Project Approach

1. Create an accurate and intuitive data set
2. Allow for ease of replicability
3. Create a model for future communities

Boundary Questions

Conceptual

- How does LFC fit NYOR?
  - Core metrics
  - Community metrics
- How does the transient visitor population factor in?
  - 10,000 visitors daily
  - Work in progress

Physical

- What area is data consistent for?
  - North Elba
- Can we tailor this region further?
  - No

Energy

1. Greenhouse Gas Emissions

- Climate change
  - Environmental impacts
  - Resource security
  - Energy security
- Responsible Energy Use
  - Save money
  - Improve image
- Estimate for NYOR emission; used North Elba, Whiteface and Gore emissions.

LOCATION	YEAR PERFORMED	TOTAL EMISSIONS (MT CDE)	MT CDE PER CAPITA
Essex County, NY	2010	868,508.00	22.06
Whiteface	Estimated for 2016	900.00	N/A
North Elba, NY	Estimated for 2016	111,000.00	12.00
Gore	2017	900.60	N/A
ORDA*	2015	7,717.19	N/A
NYOR	2017	112,800.60	13.14
United States	2006	5,902,750,000.00	19.78

*ORDA facilities inside Essex County/North Elba included in Essex County/North Elba totals

*ORDA emissions include all ORDA facilities

Table 3.1b (State and Local Energy Data. 2018), (NYSERDA Executive Order 166 for ORDA. 2016) and (North Country Greenhouse Gas Inventory Report. 2010)

Future Emissions Tracking

- Use alternative methods in future collection
  - GHG inventory in conjunction with the Climate Smart Communities
  - EPA's Local Greenhouse Gas Inventory Tool

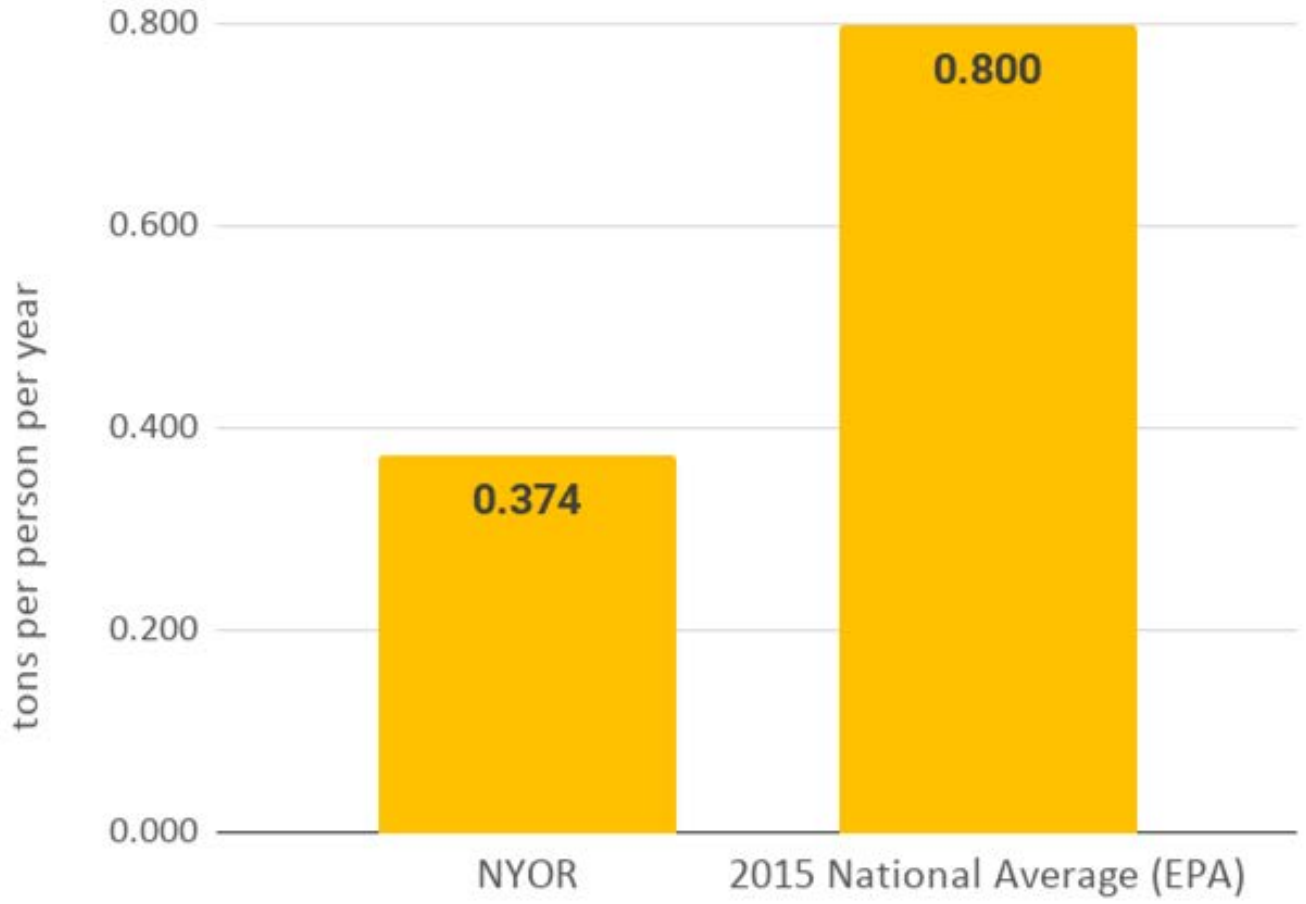
Water

2. Water Consumption

- North Elba: 36,811 gallons/year/person
  - National average: 36,500
- Separate metrics for ORDA facilities
- Challenges
  - Limited municipal data
  - Private wells not metered
- Significance in sustainability efforts
  - Increase in water usage
  - Need for management

Waste

3. Municipal Solid Waste Generated



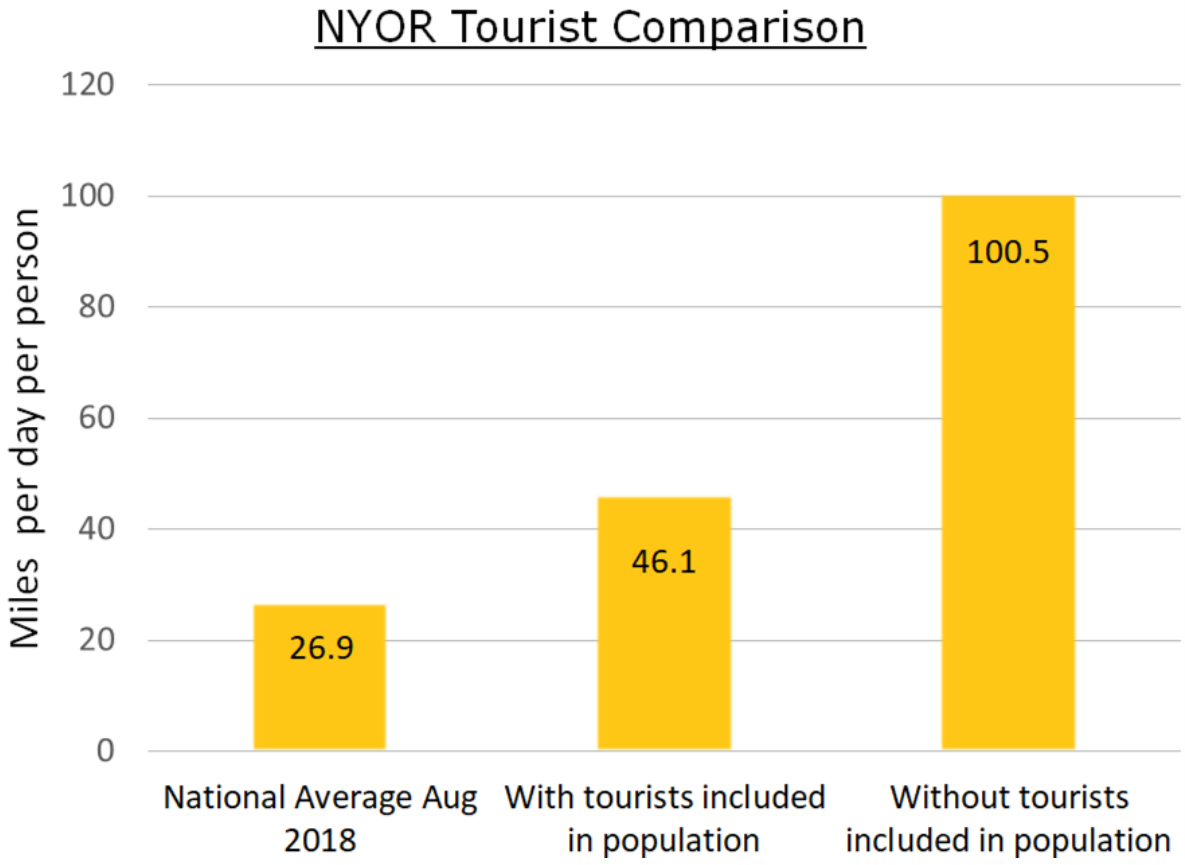
4. Municipal Solid Waste Diverted From Landfill

- Ratio of municipal solid waste diverted from landfill of the total waste stream
- Casella provided Zero Sort recycling data
- North Elba Transfer Station recycling data
- NYOR - 16.70%

Transportation

5. Distance Traveled in Individual Vehicles Daily

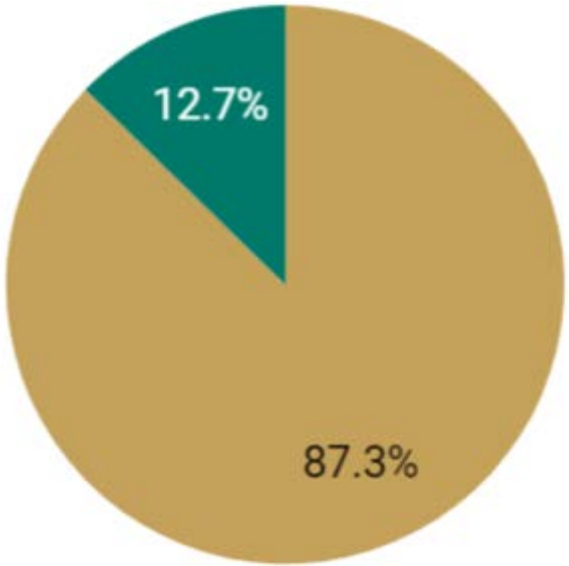
- Contributes to climate change
- Impacts human health
- Investing in infrastructure



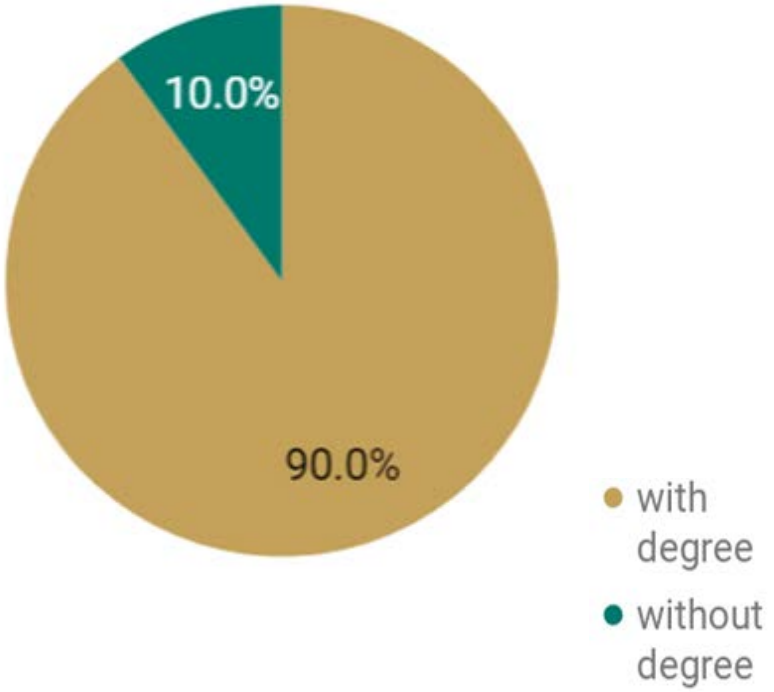
Human Experience

6. Population over the age of 25 with (at least) a High School Degree

United States in 2017

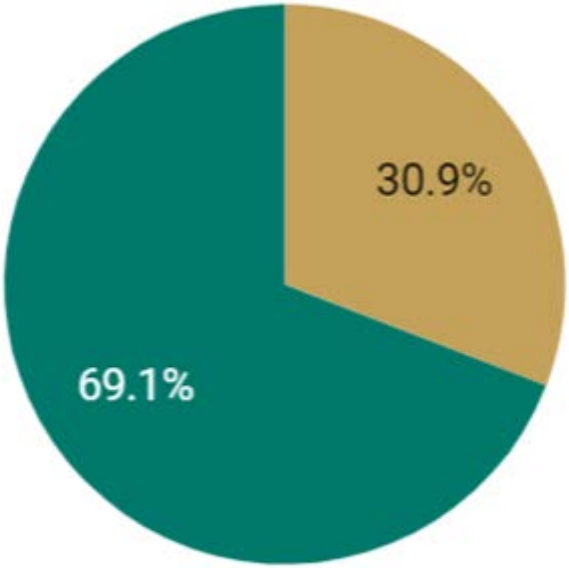


NYOR in 2017

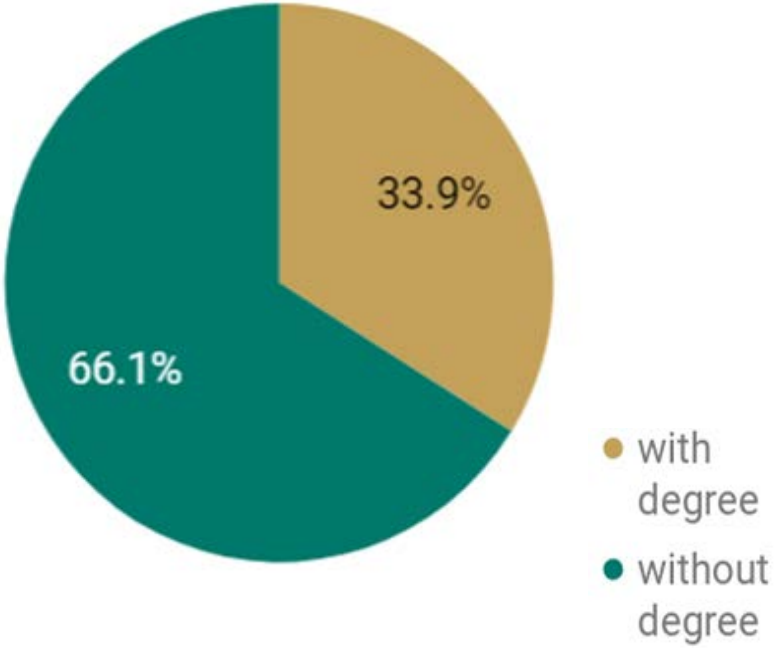


7. Population over the age of 25 with (at least) a Bachelor's Degree

United States in 2017

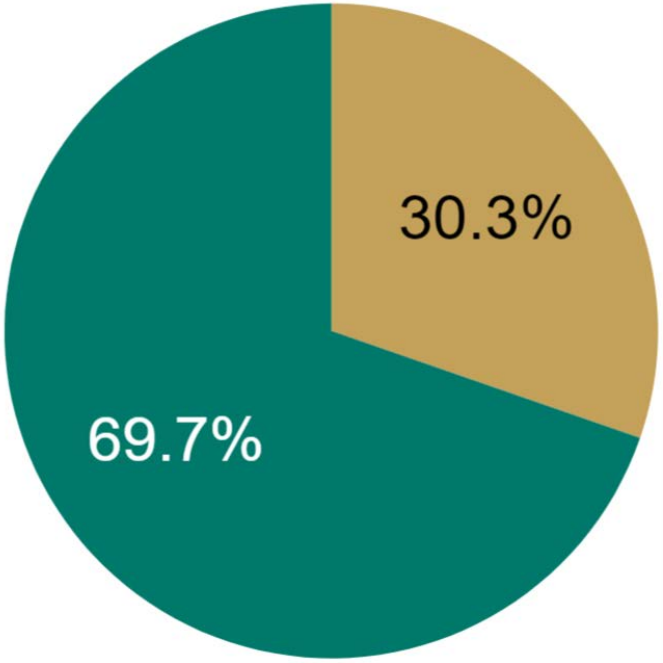


NYOR in 2017

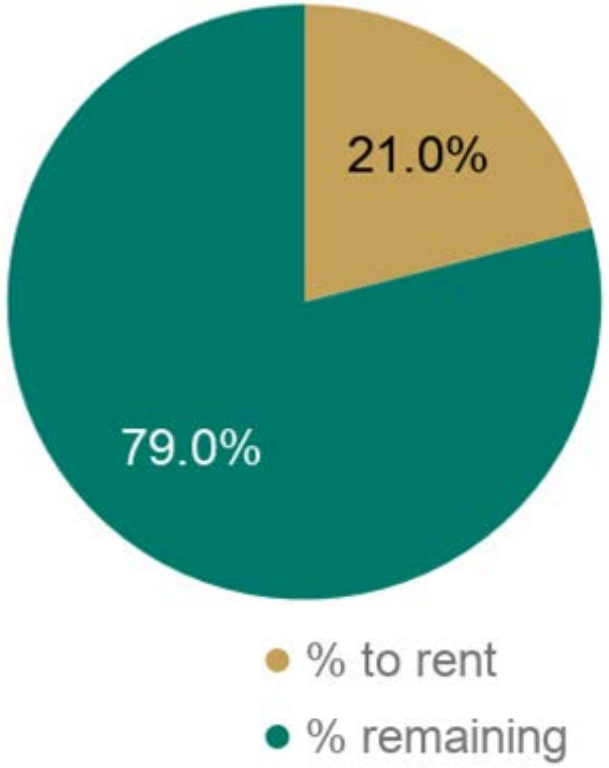


8. Median Gross Rent as % of Household Income

United States in 2017



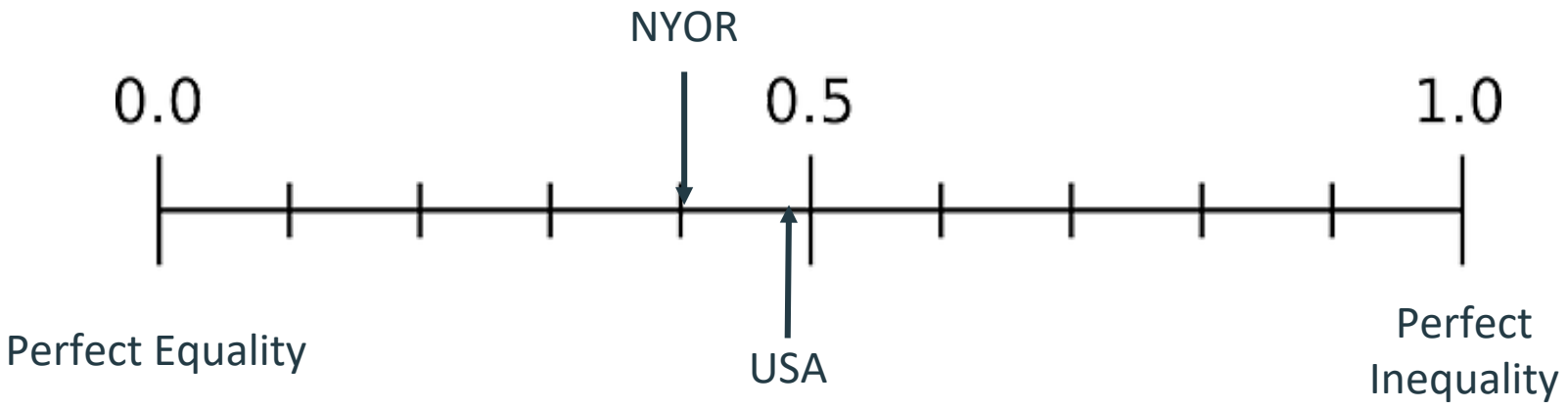
NYOR in 2017



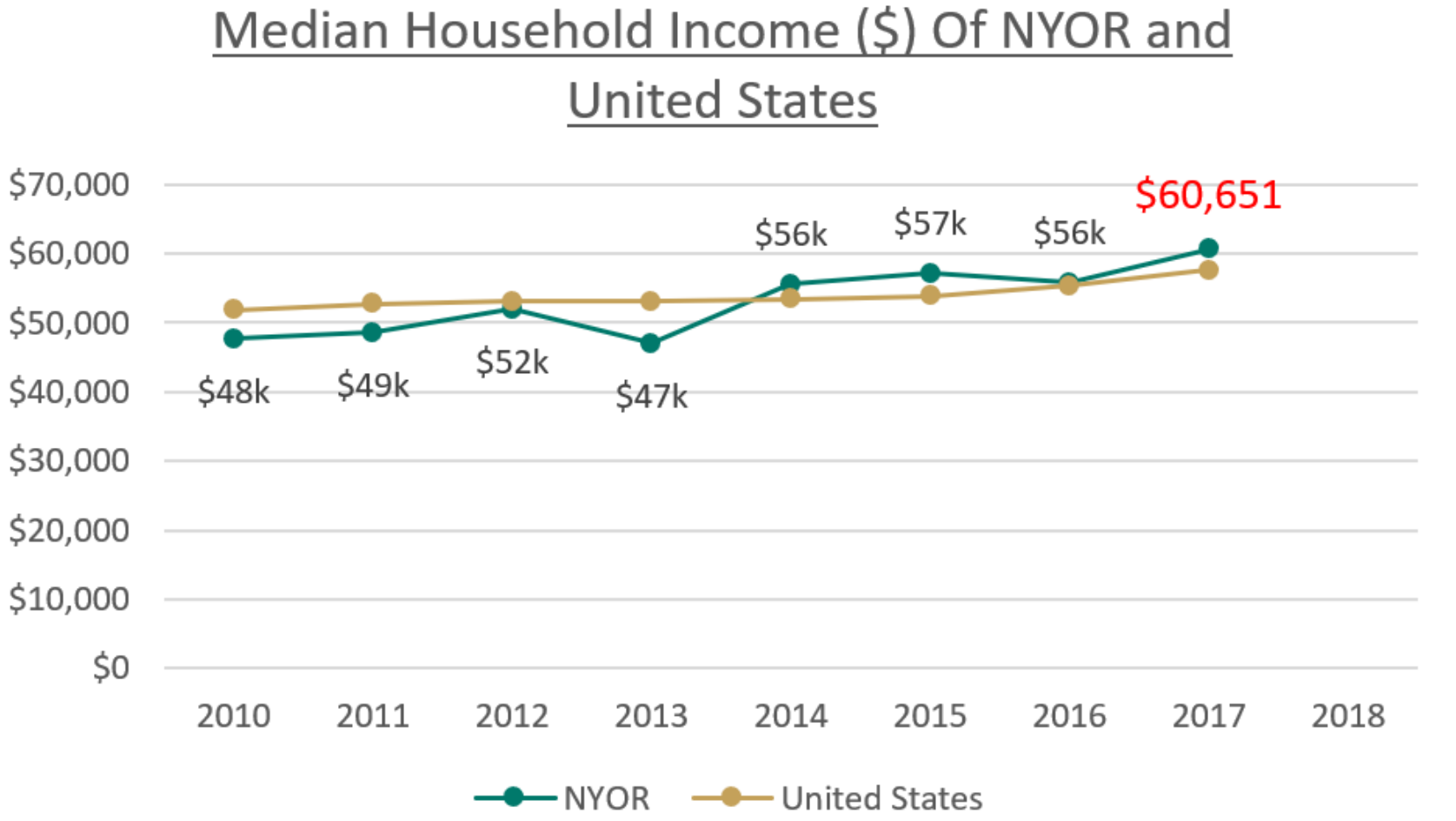
9. Gini Coefficient

- Measure of income distribution of a population

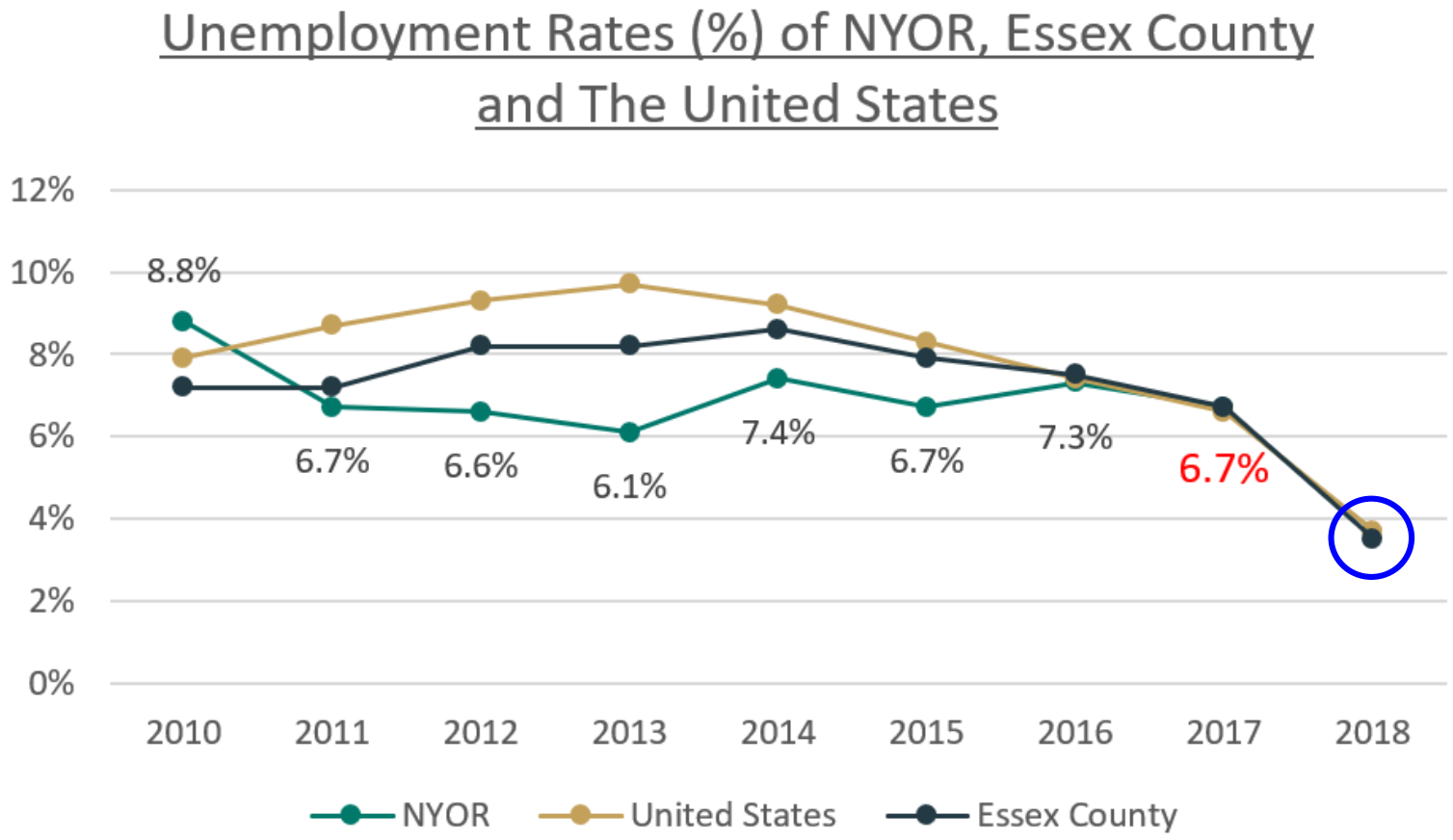
- Gini Coefficients in 2017
  - NYOR: 0.4017
  - United States: 0.4822



10. Median Household Income



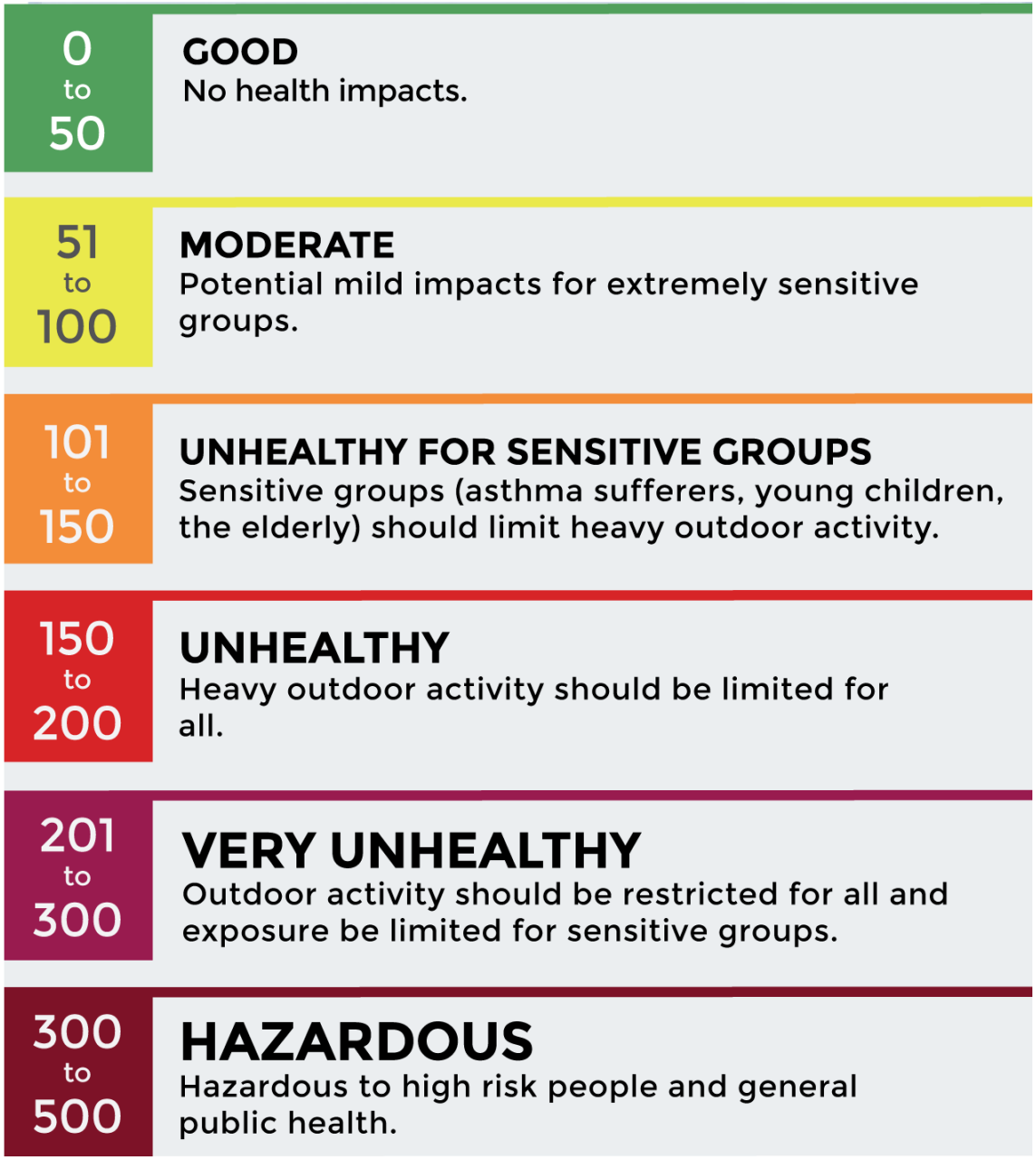
11. Unemployment Rate



Sourced from The Bureau of Labor Statistics and the NYS Department of Labor

12. Median Air Quality Index (AQI)

- EPA data from Whiteface base air monitoring station
- Ozone
  - Forms at ground level in sunny weather
- Small particulate matter
  - Airborne particles with diameter less than 2.5 microns


0 to 50
GOOD
No health impacts.
51 to 100
MODERATE
Potential mild impacts for extremely sensitive groups.
101 to 150
UNHEALTHY FOR SENSITIVE GROUPS
Sensitive groups (asthma sufferers, young children, the elderly) should limit heavy outdoor activity.
150 to 200
UNHEALTHY
Heavy outdoor activity should be limited for all.
201 to 300
VERY UNHEALTHY
Outdoor activity should be restricted for all and exposure be limited for sensitive groups.
300 to 500
HAZARDOUS
Hazardous to high risk people and general public health.

13. Air Quality Days Unhealthy for Sensitive Groups

	Ozone (O_3)	Particulate Matter ($PM_{2.5}$)
People with Lung Diseases	x	x
People with Heart Diseases		x
Older Adults	x	x
Children	x	x
Active People	x	

Health Risks for Airborne Pollutants

Ozone

- Respiratory irritation
- Reduced lung function
- Lung infection susceptibility
- Aggravated asthma & chronic lung diseases
- Permanent lung damage

Small Particle Pollution

- Additional ER visits
- Chest pains, palpitations
- Death
- Coughing, shortness of breath
- Respiratory infection susceptibility

2017 EPA Air Quality Data

AQI median: 39

AQI maximum: 90

0 to 50	312 days
51 to 100	53 days
101 to 150	0 days
150 to 200	0 days
201 to 300	0 days
300 to 500	0 days

14. Violent Crime

Four Offenses

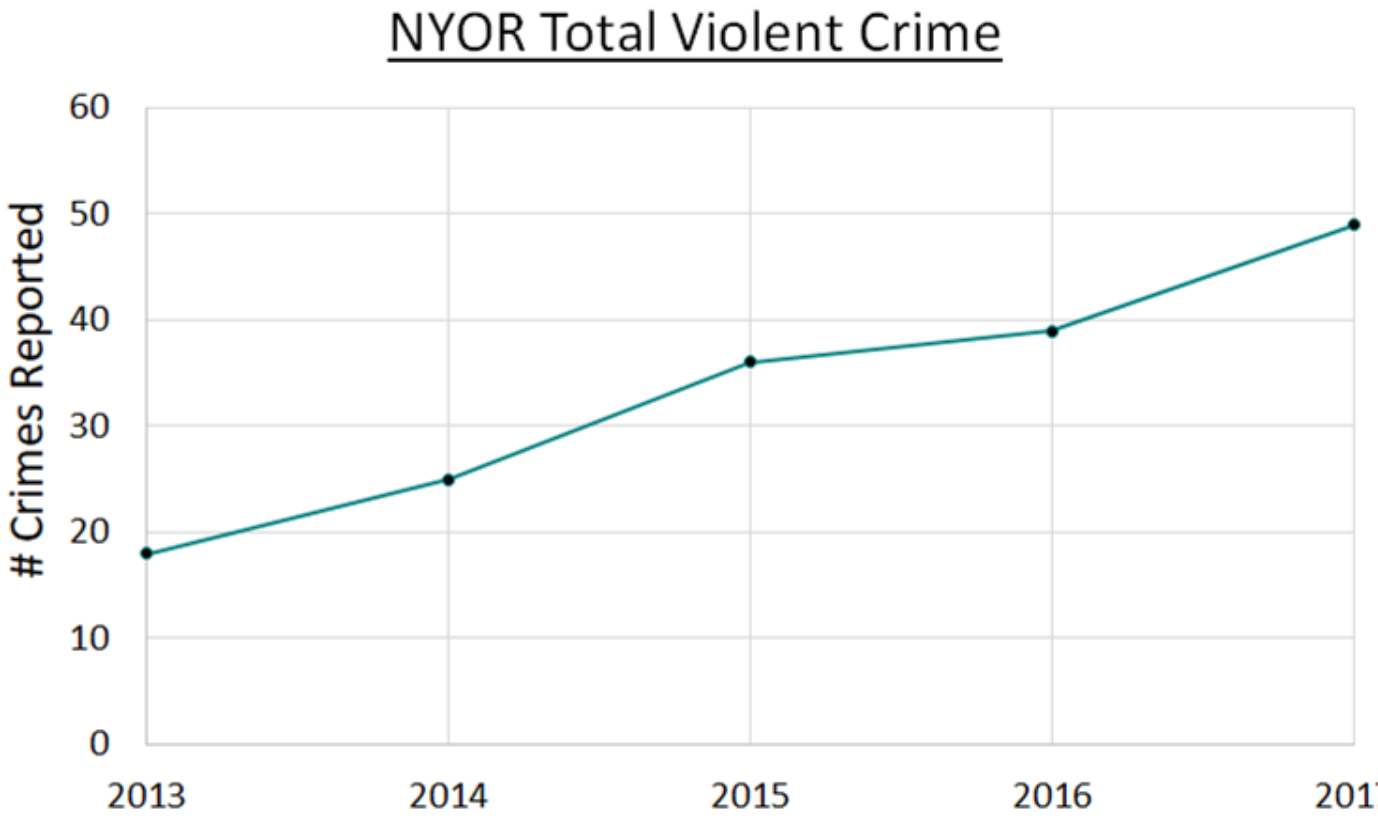
1. Murder / Manslaughter
2. Rape
3. Robbery
4. Aggravated Assault

Jurisdiction	Total Violent Crimes Reported Per Capita In 2017
NYOR	0.00578

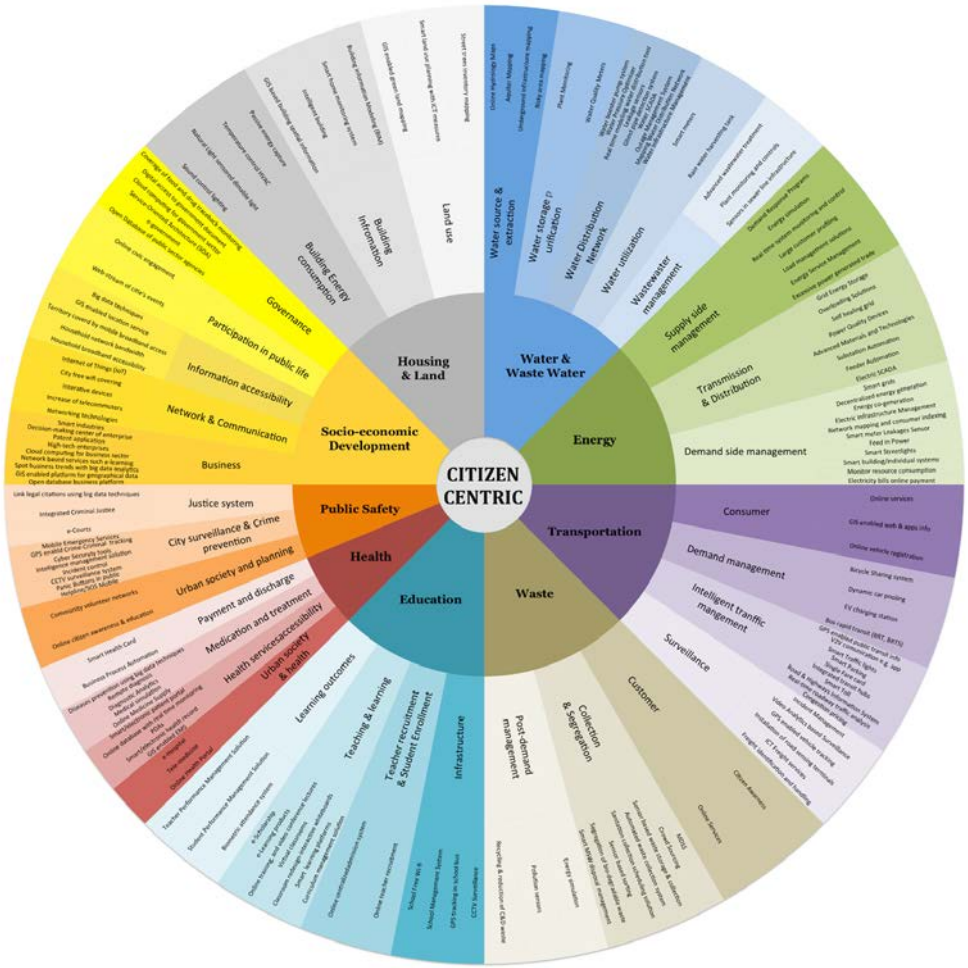
National Comparison

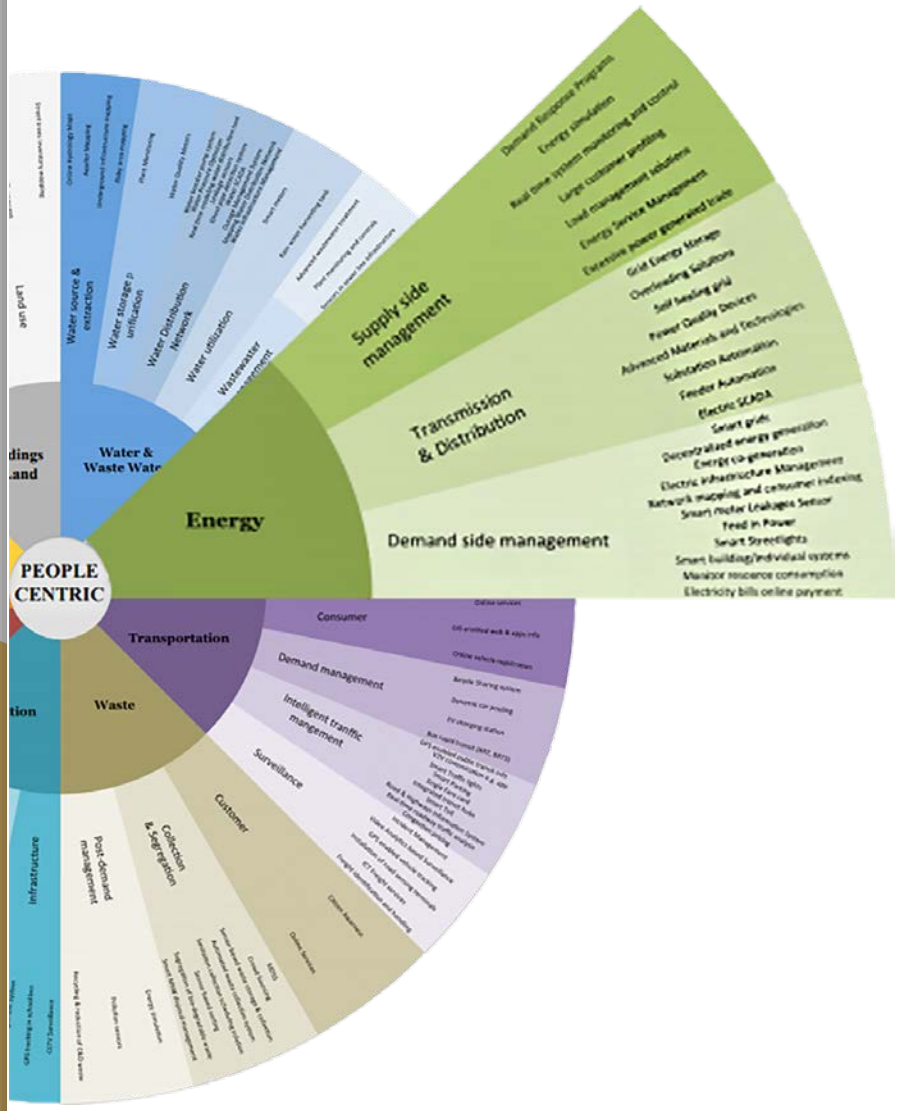
- Average offenses per 100,000 inhabitants

NYOR (w/o tourists): 577.6	NYOR (w/ tourists): 265.09	United States: 382.9



Community Metrics - USGBC





200+ Recommended

- Total residential energy use
- Total commercial energy use
- Percent energy consumed from renewables

Community Metrics in NYOR

01	Human Experience	• Community Engagement and Satisfaction • Connectivity • Health and Accessibility • Sustainable Recreation • Affordable Housing and Prosperity
02	Energy	• Energy Consumption • Renewable and Alternative Energy • Electricity • Building Efficiency
03	Waste	• Recycling • Waste Management
04	Water	• Water Monitoring • Water Sources

Community Metrics in NYOR

- Cost of living
- Miles *transportation* bike infrastructure per square mile
- Miles *recreational* bike infrastructure per square mile
- Pump efficiency
- Voter turnout
- Miles maintained Nordic ski trails

Future Steps: Data Collection and Input

- LPCSD
  - AP Environmental Science Class and Club
    - Student Projects
    - Track data for larger community
  - Data management
- Community Metrics
  - Assigned a stakeholder as lead for each metric
- Comprehensive Plan
- Clarkson University
  - Memorandum of Understanding

Future Goals

- ORDA
  - Increase efficiency of snowmaking
- LPCSD
  - Implement composting
- Town of North Elba/Village of Lake Placid
  - Improve community connectivity
  - Create Universal Access/ADA compliant trails

Recommendations

- Pilot program
  - Metrics not flexible
- NYOR
  - Easier data tracking and access
  - Local organizations and stakeholders collecting data
  - Public website
  - Public involvement
- ORDA
  - Vail Ski Resort's Epic Promise campaign
    - Emissions, waste, forest impact, community


UPSTATE

Clarkson Adirondack Semester Students

Environmental Engineering:

Chloe Gatulik
Daniel Melgar
Laryssa Terleckyj
Lindsay Clark
Lucas Fudo
Paul Barber
Pranav Singh
Sarah Chase

Environmental and Civil Engineering:

Adam Meyer

Civil Engineering:

Benjamin Buck

Engineering and Management:

Louisa Ulrich-Verderber

Environmental Science and Policy:

Adeline Danyla

Psychology and Political Science:

Megan Flory

Innovation and Entrepreneurship:

Benjamin Vondrak