Applicant Name		[redacted]
Organization Name		DiscoverE
Contact Email		[redacted]
Contact Phone		[redacted]
Program Website		www.FutureCity.org
501(c)(3)		Yes
School/Educational Institution		No
Copyright Release		Yes
Legal Release		Yes
State / Province		VA
Audience Description		Founded over 20 years ago, the Future City Competition set out to reach underserved students in middle school with an engineering educational experience. • 40,000 students participated in the 2014-15 competition year • 43% are girls and 45% are boys (11% did not report their gender). • 13% are in 6th grade, 28% are in 7th grade and 48% are in 8th grade (11% did not report a grade). • 63% are white, 16% are Asian American, 9% are Hispanic, and 5% are Black or African-American (The percentages do not add up to 100% as students were allowed to select more than one option.) • 33% of participating schools report that 50% or more of their students are enrolled in the reduced or fee lunch program, and 21% have 75% or more enrolled.
Audience Size		Future City currently serves over: 40,000 students, 2,000 educators, 2,000 mentors (STEM professionals), 6,000 volunteers
Annual Operating Budget (USD or CAN)		[redacted]
Budget Type - for program or organization?		program
Budget Type - Please describe if your budget is another type		
Images - URL or location		https://www.dropbox.com/sh/rquc40wjv98v6rh/AADLIQb2e4IRvutisBs-mwtLa?dl=0
Videos - URL or location		https://www.dropbox.com/sh/rquc40wjv98v6rh/AADLIQb2e4IRvutisBs-mwtLa?dl=0
Project Name		The Future City Competition
Short Description of Project		Future City is a national, project-based learning program where teams made up of middle school students, an educator, and a STEM mentor imagine, research, design, and build cities of the future. Keeping the

engineering design process and project management front and center, students ask and answer an authentic, real-world question:

How can we make the world a better place?

Students involved in Future City spend approximately four months creating cities that exist at least 100 years in the future. Each city must incorporate the team's solution to a citywide sustainability issue that changes each year. This past year's challenge—Feeding Future Cities—asked students to design an urban farm that can produce enough of one vegetable crop and one protein crop within the city limits to feed their city's population. (Previous year's challenges addressed issues such as storm water management, green energy, and transportation. Next year's challenge: solid waste.)
To create their cities students follow the same engineering design process that engineers utilize:

- Identify the problem—Students establish an understanding of the scope of the challenge and build their background knowledge about cities and how they function.
- Learn the Specs—Students learn the competition requirements, deliverables and assessment rubrics.
- Brainstorm Solutions—Students steep themselves in research and brainstorm various solutions.
- Design It—Students synthesize their work and design a futuristic city that addresses the annual citywide sustainability issue.
- Build It; Test It & Improve It—Students create the competition's deliverables: a 1,500 word city description, a table-top model, a map of their virtual city (designed using SimCity), and a 15 minute presentation.
- Share It—Students present their work to a panel of STEM professionals.

Future City's cross-curricular structure allows students to take the knowledge they've gained in their classes (i.e., English-language arts, math, social studies, science, and art) and apply it to their city. Through this application of knowledge students begin to value and understand the importance of studying these subjects. A recent program evaluation found 84% of students reported that participating in Future City made them realize the importance of math and science to their future and 48% said Future City helped them in non-STEM subjects like ELA, social studies, and history.

Transformational is perhaps the best word to describe Future City. It is the word we hear most often from parents talking about their child's experience. It the reason teachers devote so much time to a project that is not on any state or federally mandated test. And it's why

		engineers volunteer their time. But it is our alumni that showcase the innovative and long-standing impact of Future City. Michael Irwin works in Columbus, Ohio as a Water Resources Engineer. He participated in Future City in 7th and 8th grade where he discovered his passion and future career. Michael didn't end his Future City experience in 8th grade, he served as a competition judge throughout college and is now mentoring a team at the Graham Expeditionary Middle School.
Main Criterion #1: Describe how your program or organization uses environmental education to advance STEM learning through research and investigative activities for your service population.		During 2011-2012 and 2013-2014, Concord Evaluation Group (CEG) conducted independent evaluations of Future City. All evaluation data reported here is from those two reports. As part of this research, CEG collected many wonderful quotes, however they promised all participants that they would not attach any names or identifying information. Therefore quotes from these reports simply identify the type of respondent: student, teacher, parent, or mentor. Quotes from other sources identify the speaker. #1 Future City enables hands-on, experiential learning via a collaborative research-based process. Future City asks students to design and build a city one hundred years in the future. As part of this effort, they must also address an annual challenge, like the 2011-2012 competition year's challenge of Fuel Your Future: Imagine new ways to meet our energy needs and maintain a healthy planet. Not only do students need to learn how today's engineers and city planners are dealing with citywide sustainability issues like green energy, they need to research and understand cutting edge technologies and imagine and design a plausible and futuristic solution that can exist 100 years in the future. Research options include consulting with their STEM mentor and educator, conducting their research in the library and online, going on field trips, participating in guest lectures organized by their educators and Future City regional and national offices, and more. The year our challenge centered on stormwater management (2012-2013), we received this email from [redacted]: "We have now had three different Jnr. High Groups (from Colorado, Washington and New York State) reach out to us about helping them with Stormwater design projects in the last two months. We thought it was funny the first time, then weird the second time. It was the third group who finally told us about the Future City Challenge." Teachers who participated in the 2011-2012 evaluation reported:

		"Future City is a tremendous learning experience for the students. They learn about working as a team, researching, organizing, planning, time management, etc. They see a long-term project start to finish. They do not always like the process, but they are so proud when they finish!" "Students had to learn how to collaborate to improve the design through research. Initially I served as facilitator and mediator but after a time students mediated themselves and grew to work in collaboration with respect and tendency to hear others' ideas and suggestions." – Teacher #2 Future City helps students learn valuable 21st century skills. The 2013-14 CEG study found Future City is delivering on its educational promise: • 95% of educators reported that Future City helped their students improve their ability to work with a team. • 95% said their students improved their public speaking skills. • 88% said their students felt more comfortable working in a self-directed manner. • 88% said their students learned about the engineering design process. • 84% reported an improvement in their time students' management skills. Supplementing these statistics are quotes from Future City parents and teachers: "Future City better develops teaming skills, reinforces communication skills, and all the soft skills our business world is seeking in future workers." – teacher "The Future City program brings together analytical and problem solving skills combined with engineering." –Parent "I love that the students learn about science, engineering, the design process, research, writing, communicating and presenting. But beyond those basics, the students learn how to make mistakes and try again." – Teacher #3 Future City scaffolds participants' ability to access and select relevant E-STEM information and resources. In the 2011-2012 CEG study, the second most frequently mentioned skill that students reported learning from Future City was how to apply science concepts (specifically related to energy, which was the basis of

		that year's Future City theme) to the challenge of creating a city. (The number one skill mentioned by students was learning to work in teams.) Students commented: • I learned how different renewable energy sources work and how they can be used in a city. • I liked creating the city with my teammates and discovering the potential of science and how science can change the city. • I liked building the model and learning about the different types of energy sources. It actually helped me out a lot in science class. 92% of educators reported that their students learned how to apply math and science to real world problems. Teacher comments: • Future City is a real-life connection to our science, math, social studies, and ELA curriculum. The Future City competition allows students to explore science and math in a way they don't have the time in the classroom. The research, and infrastructure information, engineering basics, mathematical scales and math in understanding methane energy potential (for example) is something I could facilitate for every student in grade seven. • It provided opportunities for the students to be challenged by something out of the ordinary and allowed them to work with their hands and to solve problems in a team based environment. #4 Future City provides an outlet for students' creativity One goal of Future City and its parent organization, DiscoverE, is to showcase how creative engineering can be. Centering Future City around engineering and environmental issues and asking students to dream up a city of the future has shown students not only how creative they are, but how creative engineers are. Findings from 2011-2012 include: Students reported that Future City provided them with an outlet for their creativity and imagination (79%), boosted their self-confidence (67%), and gave them a place where they "fit in" (65%).
Main Criterion #2: Describe how the organization or program you are submitting for this award promotes citizenship and social		#1 Future City teaches students about city planning and enhances their civic engagement. Future City was founded in 1993 as a way to engage middle school students in engineering and encourage them to consider a career in engineering. An unanticipated benefit of framing the program around designing a city of the future was the opportunity to also teach them

responsibility.		city planning and enhance their civic engagement. The 2011-2012 CEG study included site visits to 19 schools in five different states. The evaluator reported that one of the things that students most commonly discussed was how much they were learning about how municipalities work. At each school, students described how they took what they were learning in Future City and applied it to local issues related to taxes, transportation, zoning, planning, and the like. Almost all students (85%) in our national sample reported that Future City helped them to learn and appreciate everything that goes into planning and maintaining a city. Teachers told us: "During the project, I had students continuously coming to me with concerns about their own neighborhoods as a whole with regards to emergency service proximity to their homes, zoning, and traffic issues. In addition to the improvements covered in the survey, participating students greatly improved their understanding of societal needs and possible consequences for failing to meet these needs." "The Future City Competition teaches students the importance of various jobs needed to build and run a city. The students discover the importance of engineering, from planning reliable transportation, to building structures to withstand natural disasters." #2 Future City uses an innovative approach to teaching students about civic issues like voting and taxes = SimCity. To be successful at Future City students begin by learning and understanding all of the aspects that go into creating and maintaining a city. Students develop this background knowledge through an innovative and active investigation process—they design a virtual city using SimCity software. Not only are students introduced to concepts like zoning, taxes, infrastructure, transportation, water, sewer, and electricity they make decisions about each of these issues and see the consequences (good and bad) of their decision. "Students learn the importance of funding fire protection, police protection, health care, and education. Students also learn the importance of regulating taxes. I heard comments such as, "you need to lower taxes so that more residents will move in," and "raise taxes for dirty industry so that they will go to another city."- Teacher The 2013 - 2014 study found that 63% of students reported that Future City made them more aware of civics issues like politics and taxes. #3 Future City engages students under represented in STEM and supports at-risk youth.

		• 46% of the students who participate in Future City are girls. • 33% of the schools that participate in Future City have 50% or more of their student population enrolled in the reduced or free lunch program, with 21% enrolling 75% or more of their student population enrolled in the reduced or free lunch program. Teachers tell us that Future City helps students who might not otherwise have these experiences succeed: "We had a Latino student a couple years ago who was high ability but low achieving. He did Future City and he blossomed. He became a team leader to everyone's surprise. He started to turn in his homework on time and started paying more attention to his schoolwork. This was a student that no one ever thought would succeed, and he was succeeding. After doing Future City, he decided he wanted to be an engineer." –Teacher "There was a young man who lived with his three sisters and father after his mother's passing who was struggling to find his groove in middle school. He needed a bit of direction and found his way into Future City. The program had such an impact on him that he applied to a technical high school which is founded on project based learning and high tech opportunities. The young man graduated last year and is off to college." – Regional Coordinator #3 Thousands of STEM professionals volunteer as Future City mentors. Future City is a team model made up of middle school students, educators (in schools and in out-of-school time programs) and mentors. Mentors serve as the team advisors providing valuable input and technical assistance. The mentor makes connections to real-life engineering experiences, serves as a coach, and helps students translate the academic to the real world of engineering. People who work in the engineering community—including engineers, technical professionals, architects, city or urban planners—serve as mentors. The 2011-2013 CEG study asked mentors what motivated them to volunteer. The most common reason given is that mentors wanted to encourage students' interest in STEM, while the second most cited reason was because they were asked. The study went on to find that mentors demonstrated a significant commitment to Future City, often working full- time as professional engineers while still making the time to support one or more local Future City programs. The mentors in our sample reported that they spent an average of 40.60 hours working on Future City. The impact of the mentors can not be understated: 53% of students reported that their mentors helped them to see themselves as

		engineers someday, 81% reported that their mentors helped them understand what engineers do in their careers, and 79% reported that their mentors were important in guiding them on the Future City projects.
Main Criterion #3: Describe how your program or organization tackles real challenges in the environment.		#1 Future City's central challenge asks students to a design solution to a citywide sustainability issue Over Future City's 20+ year history, students have designed futuristic solutions to some of today's most pressing environmental challenges—clean energy, healthcare, housing, transportation, urban agriculture, stormwater, clean water, and solid waste. The students then present their solutions and the vision of their future city in their 1,500 word city description; a scale model of their city (built with recycled materials and featuring at least one moving part); and in their 15 minute presentation and Q&A session with a panel of STEM professionals. To assess the students' learning, Future City has developed extensive rubrics for all program deliverables. The rubrics look at such things as how well did the teams define the problem and describe their solution in their city description; what infrastructure was included in their scale model; how innovative were their model building materials; did they discuss tradeoffs in their presentation and were they clear and organized in their presentation? [redacted] told a reporter from the local Time Warner Cable News Program why it is important for kids to be doing this: "We need kids like us to come up with ideas for sustainable energy sources and food and water in the future because we're the ones who are going to be running the future." An outcome of this integrated learning approach is an increase in students' problem-solving abilities. In the 2011-2012 CEG evaluation, most parents (86%), mentors (86%), and teachers (84%) reported that they observed improvements in students' ability to use their problem-solving skills after participating in Future City. While comments included: "Future City made my daughter aware of whole systems thinking and applying that to solve problems that happen every day." –Parent "I didn't really gain knowledge, but I learned how to improve my problem solving skills through engineering". –Student "I loved combing building and problem solving to make something." –Student #2 Future City Builds Skills for Communicating about E-STEM

		Parents, teachers, and mentors all reported that Future City had a positive impact on students' abilities to communicate and manage their time. Three- quarters of teachers (75%) reported observing an improvement in students' oral presentation skills, while roughly the same proportion (74%) reported observing an improvement in students' project management skills as a result of participating in Future City. More than two-thirds (71%) of teachers reported that their students were more comfortable working independently after participating in Future City and two-thirds (66%) reported seeing an improvement in students' research and writing skills. Parents also reported that Future City helped to enhance their children's research and writing skills (79%), oral presentation skills (80%), and project management skills (83%). Moreover, most parents (84%) also reported that their children became more confident working in a self-directed manner after participating in Future City. Comments from teachers and parents include: "One student was very excited to be involved because of the video game and the essay and research, but not excited about the model and the presentation. He really prefers to work alone and is not very crafty or good with speaking. In fact, he has some speech issues. In the end, he helped quite a bit on the model and overcame his fears enough to do his part of the presentation. His mom was very pleased that the project motivated him to stretch outside his comfort zone and do things he would not normally seek out on his own." –Teacher "A student that I selected to represent the team and be a presenter was having a hard time at school. She was feeling like she didn't belong and was down. Her mother emailed me after the competition and said that being a Future City presenter gave her confidence, increased her enthusiasm for school and gave her a true a sense of accomplishment. Her mother thanked us again for the tremendous opportunity Future City provides and I have personally seen the change in her outlook and class involvement. "–Teacher "My daughter did not want to present, but she stepped up and presented with confidence. Now she's not scared to present in front of people." – Parent #3 Future City asks students to follow the engineering design process as they create their cities of the future. imagination into realistic designs and plans. --Student In the 2011-2012 Site Visit schools only, CEG assessed students' ability to apply engineering- related problem-solving skills to real-world problems before they started Future City (fall 2011) and at the end (late winter 2012). Students had the potential to earn 0 to 7 total points on

		the pre-test and on the post-test. CEG compared students' scores on the pre-test and post-test surveys at the end of the study. CEG found a statistically significant improvement in students' ability to apply engineering design process skills to real-world problems after participating in Future City (controlling for intra-class correlations). The average score on the pre-test was 4.83 (se = .118) while the average score on the post-test was 5.42 (se = .133). This finding illustrates the positive educational impact of the Future City experience on students' ability to apply the design process. #4 Students in Future City most surprised by the quality of their work. There is no question that Future City places high expectations on students in terms of writing, presenting and meeting deadlines and students are surprising themselves as they rise to the occasion. When CEG asked students in 2011-2012 what surprised them the most about Future City, two of the most common responses were (1) that it was difficult, and (2) that it required a lot of time. However, students also reported that they were surprised at the quality of their own work, their own abilities and how much fun they had working with a team. This quote sums up the Future City experience: "I like Future City. It makes my brain sweat." – Student
Describe how you might you use these funds to advance your work.		Future City costs $25.00 per organization. Schools can register 1 team or 100 under that single fee. Registered organizations receive free access to the SimCity platform, a program handbook, detailed assessment rubrics, access to in-person and online training opportunities, and the opportunity to compete in the nearest regional competition. Teams that take top place in their regional competition win a trip to compete at Finals in Washington, DC., including the team's airfare, hotel, ground transportation and most meals. At $25.00 per organization and a little over 1,350 organizations participating, Future City would only take in $33,750 annually. That's if all 37 regional committees that host a regional competition charged the registration fee. Most do not. This means that DiscoverE (Future City's parent organization) and our local regions support this valuable program via foundation grants and corporate sponsorships. The national program has an annual [redacted] Regional budgets range from [redacted] depending on the number of teams they serve. Financial support for Future City is highly leveraged through volunteer engagement as skilled volunteers donate more than 150,000 hours to the program each year. A $100,000 grant from UL would be used to support both the National program and five regions. [redacted] would go to support the National

		program. This support would be used to increase our recruitment efforts. Current efforts include creating an annual brochure, maintaining a robust website (with over 250,000 unique visitors a year) and sending out html postcards. National staff would like to enhance these efforts and host a Future City exhibit at the annual NAAEE conference and the National Science Teacher Association (NSTA) conference. Financial support would also be used to produce the 2016-2017 citywide sustainability challenge, corresponding program materials, and updating the website. Additional money would be used to cover the costs of bringing teams to the national competition and hosting over 1,000 competitors, volunteer judges, family and friends and leaders in the engineering community over the course of the five-day competition. The national Future City office is staffed by [redacted]. A portion of this grant would also go to supporting the efforts of this dedicated and efficient staff. At the regional level, we would like to use [redacted] to provide five regions a [redacted] grant. These grant would be used as stipends for one to two people in each of the five regions. These positions would be responsible for recruiting new educators, specifically educators who work with either a high minority population or an economically challenged community. They would also be responsible for supporting these educators as they move through the competition. Over the last twenty years, we found new teachers need ongoing support as they learn the competition and determine the best way to incorporate it into their class or offer it as an after-school program. Because many of our regions are organized by volunteers having a dedicated person fill this role would allow us to both grow the program and retain teachers from year to year.
Application Feedback		[redacted]