



Pagebrook Property Solar Power Initiative



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Proposals for UR Sustainability Strategic Plan

Abstract

The University of Richmond has established an ambitious goal of carbon neutrality by the year 2050 (Office for Sustainability 2015). The University's current emissions reductions are at 18 percent from 2009 baseline levels; in order to achieve the last 82 percent of the reductions by 2050, the University must take aggressive action (R. Andrejewski, personal communication, March 1, 2018). The University owns land off campus, including the Pagebrook Property, which is around a 15-minute drive from campus and has 47 acres of flat, clear cut land that is currently unused (Love & Owens, 2014). This land would be an ideal location to begin construction of a one-megawatt University-owned solar array to begin to account for some of the University's scope two emissions in order to work towards meeting the 2050 goal of carbon neutrality, as well as earning more points to improve the University's current silver-level ranking in the Association for the Advancement of Sustainability in Higher Education's (AASHE) Sustainability Tracking, Assessment & Rating System (STARS). This project, although a substantial economic investment for the University, would provide educational and recreational opportunities for students and community members, would eventually save the University money on energy costs, and would set the school apart as a leader in sustainability among other four year liberal arts universities. The University is already committed to one power purchase agreement and is under negotiation over a second, but at present, it remains unclear if owning or leasing the panels would be the more profitable option, so by utilizing both alternatives, the University would be able to study each type and determine which is better for large-scale adoption in the future.

Global Climate Change and Fossil Fuels Reliance

In the coming decades, the impacts of global climate change will certainly have widespread and detrimental impacts throughout the world. Since the start of the Industrial Revolution, countries around the globe have been emitting unprecedented levels of carbon dioxide and other greenhouse gasses into the atmosphere, which has led to the present threat of global climate change. The negative environmental, political, social, and economic impacts of the phenomenon — such as increased intensity and frequency of major weather events, global sea level rise and ocean acidification, extreme temperatures, and increased resource conflict — will only increase in the future (Shaftel, 2017). At present, it is still difficult to predict the magnitude of global climate change because there is too much uncertainty, and its consequences will depend on the mitigation actions taken, or not taken, and how sensitive the Earth's systems are to these emissions (Shaftel, 2017). At present, most energy systems are heavily reliant on fossil fuels and the University of Richmond is no different, but the burning of fossil fuels is a large contributor to global carbon dioxide emissions, which has vast environmental consequences (Jacobson & Delucchi, 2011). The need for a shift to renewable and sustainable energy practices has become increasingly clear.

In 2011 AASHE reported that, "installed solar capacity [at both universities and private homes/businesses] has grown 450 percent over the last three years... as institutions have taken advantage of dropping solar prices, state and federal incentives and innovative financing mechanisms" (Hummel, 2011). It is clear that the trend among universities is to continually increase the capacity for solar and other renewable energy sources to reduce reliance on fossil fuels, and University of Richmond should not lag behind in this respect. In the coming years, it is imperative that the University comes up with alternate energy plans that are environmentally sustainable for the future, can meet the needs of present and future students, and enables the University to meet its own sustainability commitment of carbon neutrality by 2050.

Pagebrook Solar Power Project Proposal

In 2001, the University purchased the Pagebrook Property (See Figure 1), as a site for unspecified future development. In 2005, around 47 acres were clear-cut, to be used a dumping site for dirt by the Virginia Department of Transportation, but in the years since, the land has remained idle, with little intervention from the University (UR Office of Financial Planning and Budget, personal communication April 11, 2018). The construction of a one-megawatt solar array would enable the



Figure 2. Pagebrook Property, Clear Cut Area
Source: Google Earth

University to put the area to good use that would further the interests of the administration in moving towards the adoption of more renewable energy. The proposed solar array has the potential to produce approximately 1,458,333 kwh (See Figure 2), an energy value of \$161,000, annually (B. Stanley, personal communication, April 9, 2018). The proposed solar array would not account for the entirety of the school's energy budget, but it would be a step in the right direction towards sustainability and the achievement of carbon neutrality by 2050.

Estimated Costs

This project would require anywhere between 7.5 to 10 acres of land, which would qualify this as utility scale solar. At present, for utility scale solar, the going rate is anywhere from \$1.40 to \$1.50 per watt. Bernie Stanley, the President of Shockoe Solar, LLC, who has worked with the University on previous solar projects, predicts that this type of project would cost around \$1.50 per watt, which would bring the installation of the solar panels to a \$1.5 million project for the University (B. Stanley, personal communication, April 9, 2018). There is some room for error in this estimate, as it could be slightly cheaper or more expensive depending on the proximity to the necessary electrical transformers to connect the produced solar energy into the grid. There is the potential for the University begin seeing returns on this investment within the next decade if the solar market continues on its current trend.

Incentives

This project would allow the University of Richmond to:

- Make strides towards meeting its public sustainability commitments and pledge of carbon neutrality by 2050
- Increase the Universities STARS rating, which is currently only at a silver, as the university only has 1.44 out of 10.00 for energy and 3.80 out of 10.00 for greenhouse gas emissions
- Not only keep up with comparable liberal arts colleges in solar power investment, but to become a leader in renewable energy

Figures



Figure 2. Pagebrook Property.
Source: Goochland County GIS.

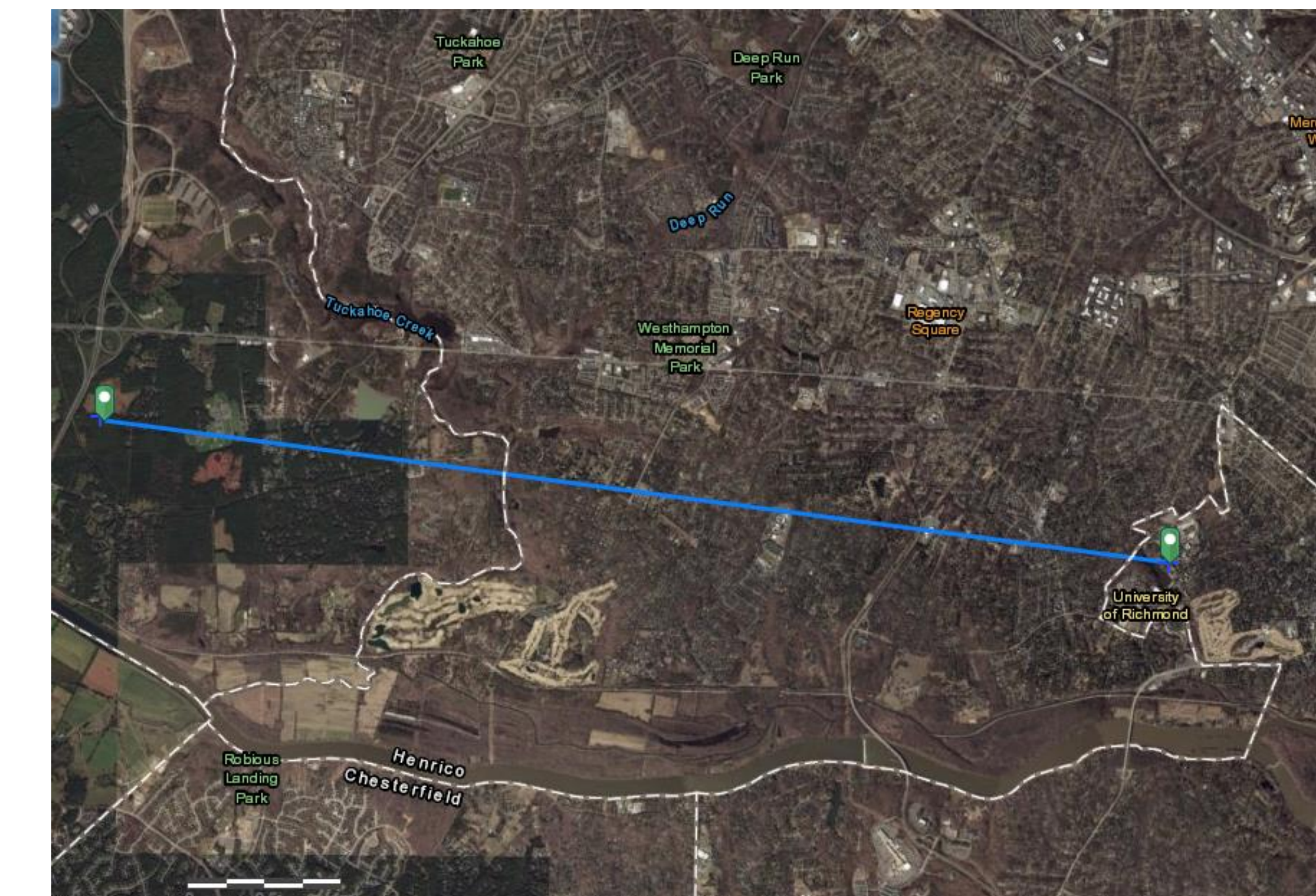


Figure 3. Distance from the University of Richmond to the Pagebrook Property: 7 miles. Source: EJSCEEN

University Name	Middlebury College	Dickinson College	University of Virginia	University of Richmond
School Type	Private	Private	Public	Private
Location	Middlebury, VT	Carlisle, PA	Charlottesville, VA	Richmond, VA
Number of Students	2,561	2,382	16,655	2,999
Campus Size (acres)	350	144	1,682	350
Endowment	\$1.074 billion	\$381 million	\$8.621 billion	\$2.19 billion
AASHE STARS' Rating	Gold	Gold	Gold	Silver
University Owned Solar	Yes, 1.5 acres	None	None	None
Solar Power Purchase Agreements (PPA)	PPA totaling 1.1 MW	Negotiating a PPA for 3 MW	2 rooftop arrays, 25 year PPA totaling 32 MW	2 rooftop arrays totaling 206.8 kWh, negotiating a third PPA

Figure 4. Comparison to AASHE Gold Rated Liberal Arts Universities
Sources: AASHE, Middlebury College, Dickinson College, University of Virginia, University of Richmond

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