

EPA’s Village Green Project: New Directions

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Introduction

Local decision-makers and community leaders have expressed a need for technologies that would provide information to engage the community in a conversation about their local air quality. Continuous air pollution measurements in communities has been largely limited due to cost and logistical issues. EPA’s Village Green Project (VGP) seeks to address this technology gap by designing a proof-of-concept air monitor that is solar-powered, low maintenance, and accessible to communities.

Village Green Project: Vision and design

In 2012-2013, a team of engineers, scientists, designers, communications specialists, and educational outreach experts came together to design a new air monitoring technology that would meet the following demands:

- **Low cost to install and run** – Goal of a sustainable, self-powered system, minimal maintenance required.
- **Provides real-time data** – Active air and meteorological monitoring technologies, automated quality checks allowing readings to be shared immediately.
- **Engages the community** – Designed to blend in seamlessly in a community environment.
- **Accessible data and information** – Data are publically available on a website that is engaging and informative.

System features – VGP prototype

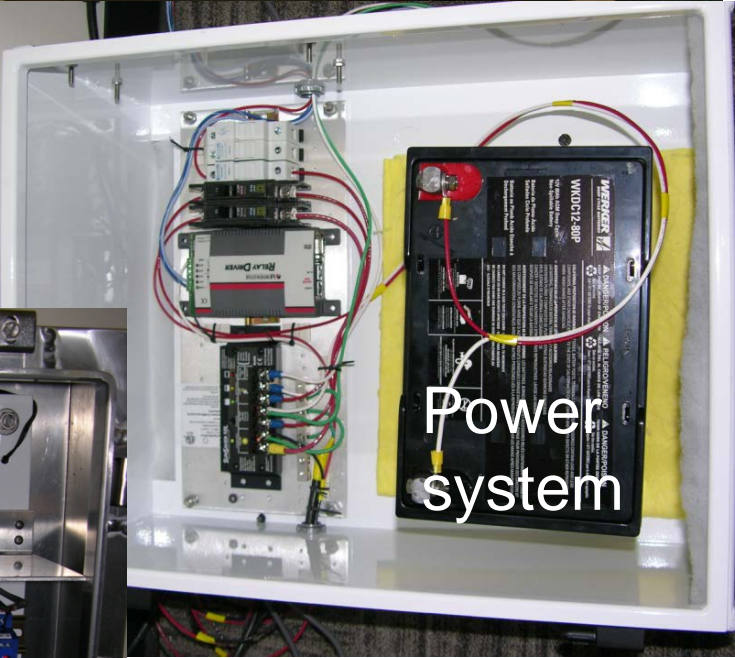
Measurements: ozone (UV absorbance-based measurement), fine particles (optical measurement), wind speed/direction, temperature, humidity
Data rate: one minute
Power system: solar with rechargeable battery
System controller: Arduino microprocessor
Structure materials: recycled plastic, metal for solar panels and wind sensor pole
Communications: Cellular modem
Location: Outside public library in Durham, NC



Outreach at the library



Air monitor and communications



Power system

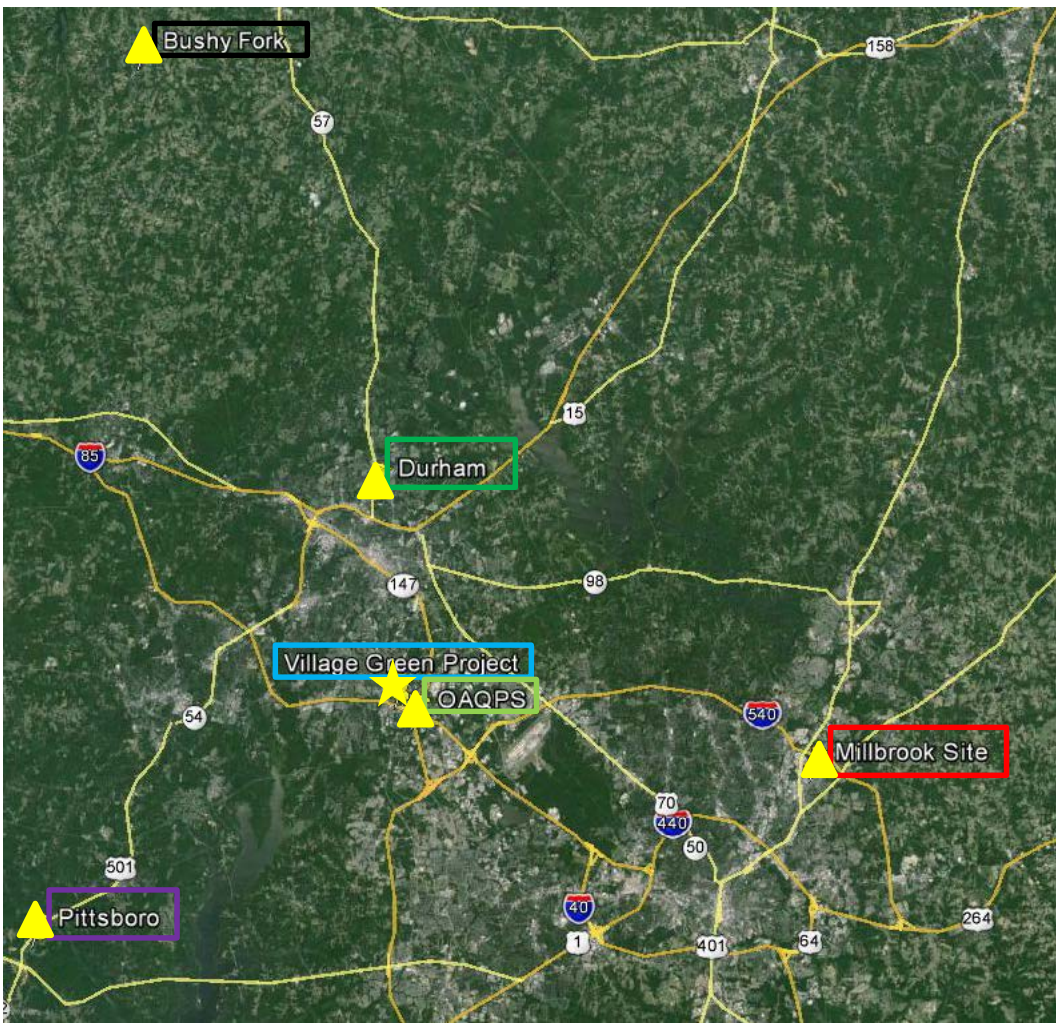
Prototype field performance

Power system:

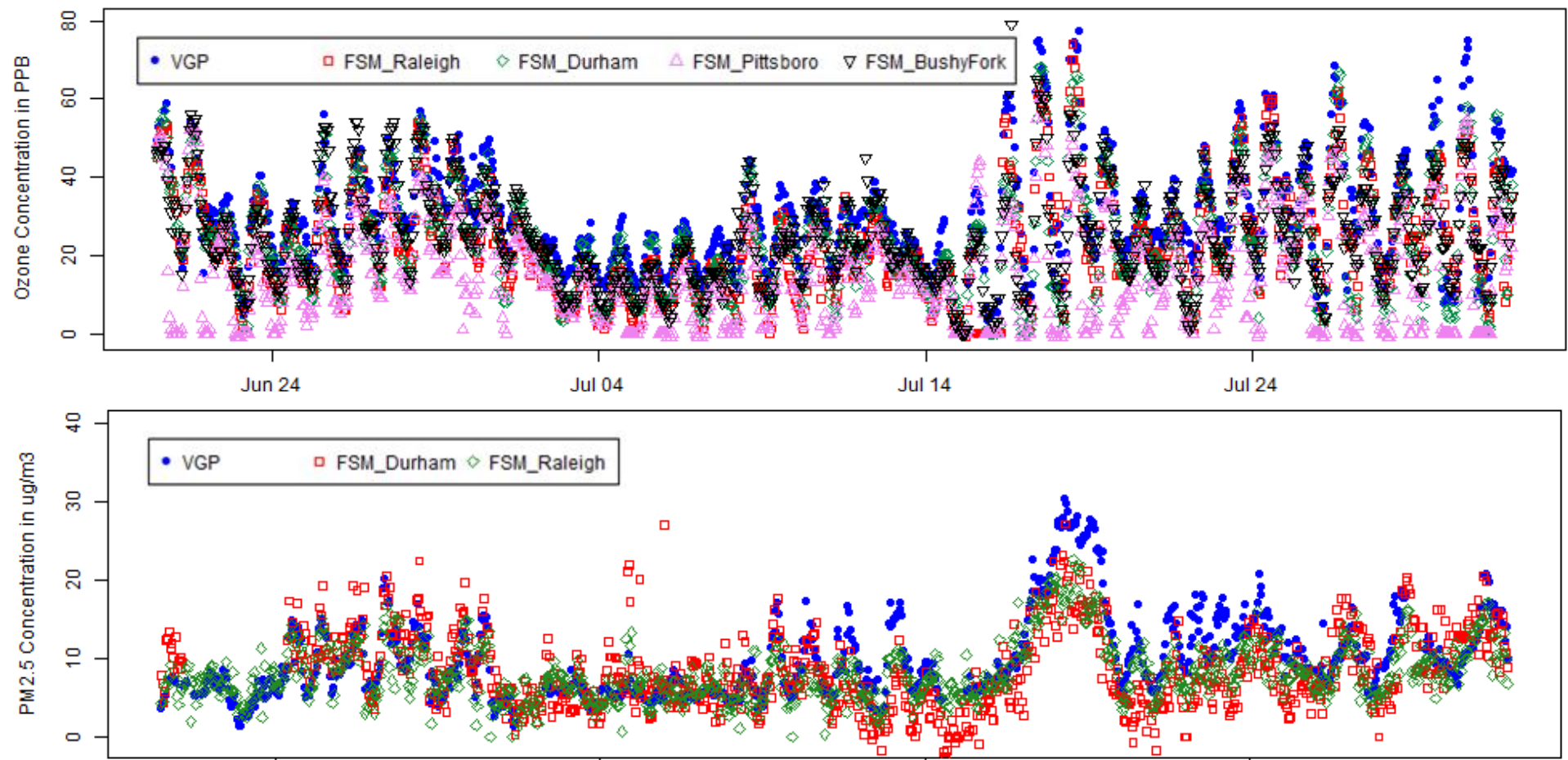
Solar power system provided sufficient power for operation 94.5% of the time over 10 months. No apparent degradation over time.

Comparison of VGP data against nearby reference monitors operated by North Carolina Dept. of Environment and Natural Resources (NCDENR) and EPA

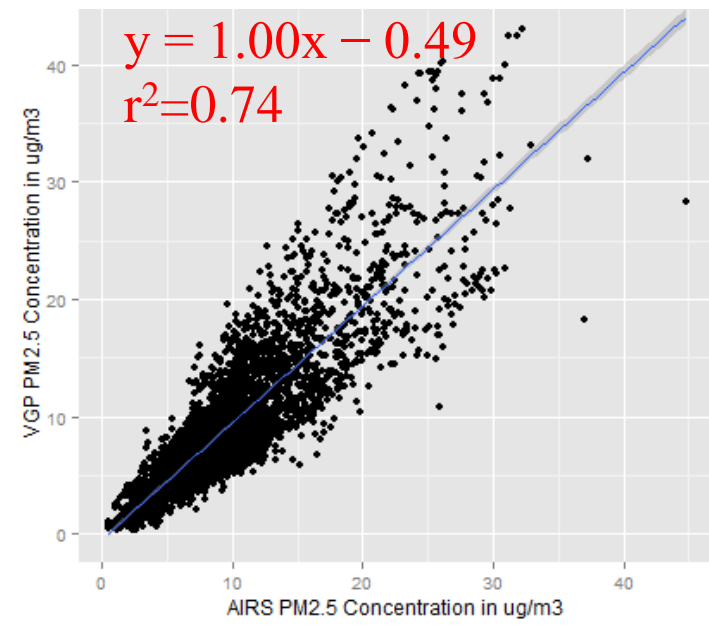
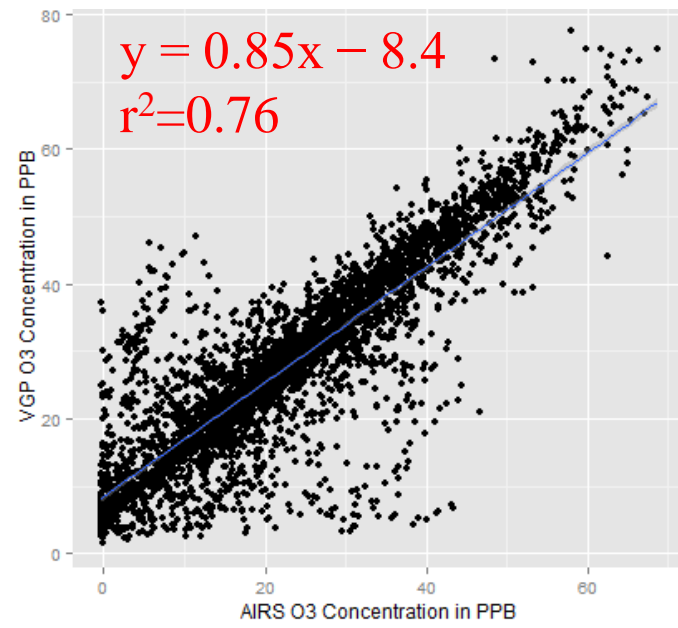
Location (Data owner)	Measurement	Instrument(s)
Village Green Project site (EPA ORD)	Ozone	2B Technologies, OEM-106
	PM _{2.5}	Thermo Scientific, MIE pDR-1500
EPA-RTP campus (EPA OAQPS)	Ozone	Teledyne T265
	PM _{2.5}	GRIMM180
Millbrook (NC DENR)	Ozone	Thermo Environmental 49C
	PM _{2.5}	MetOne BAM 1020
Durham (NC DENR)	Ozone	Thermo Environmental 49C
	PM _{2.5}	R&P TEOM 1400AB
Pittsboro (NC DENR)	Ozone	Thermo Environmental 49C
Bushy Fork (NC DENR)	Ozone	Thermo Environmental 49C



Example time series comparison between Village Green Project and NCDENR data



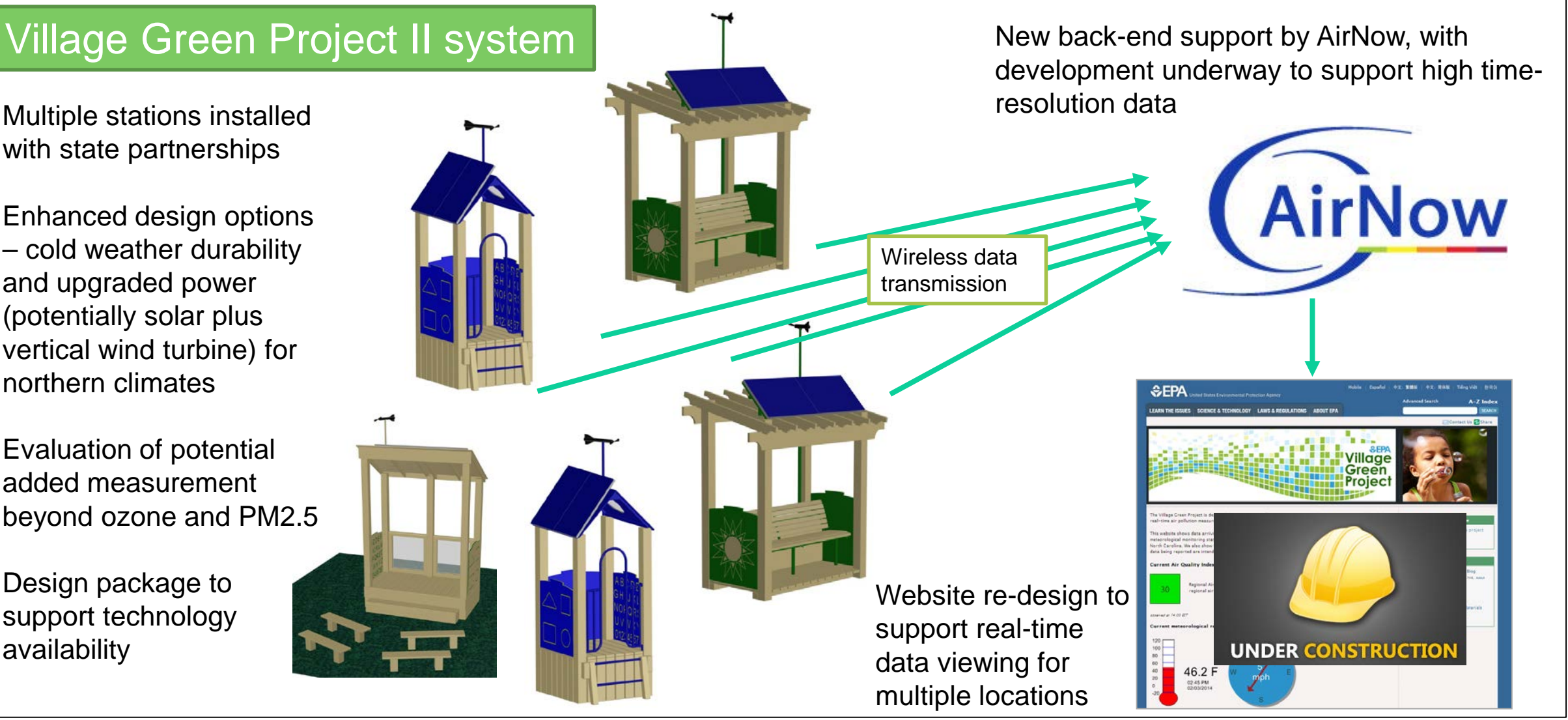
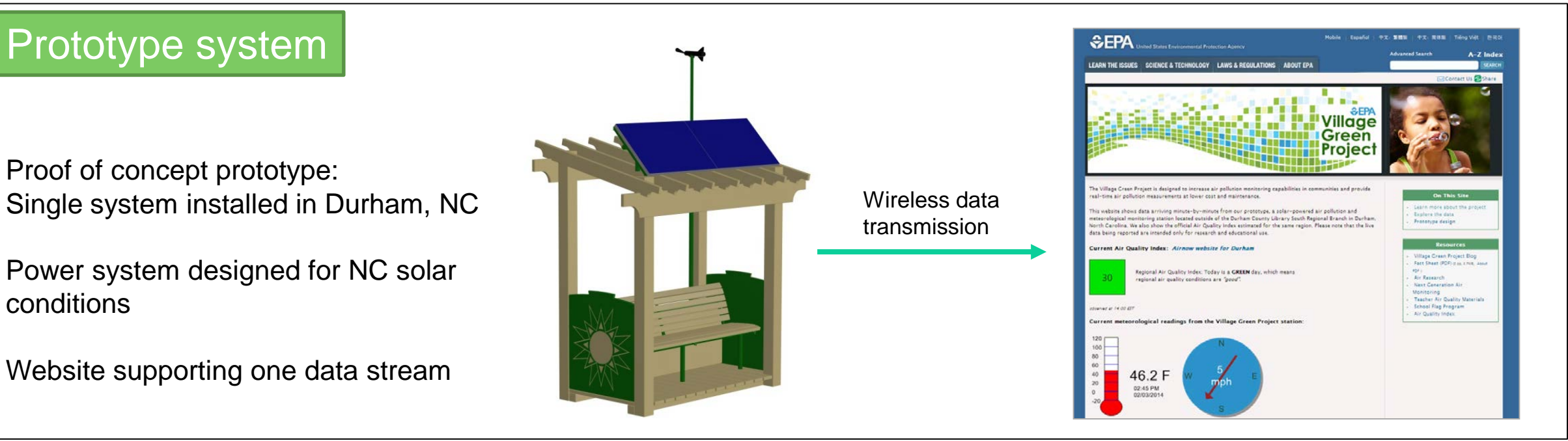
Comparison of Village Green Project data (6 months of data) EPA-RTP campus reference monitors located one mile away



New Directions: Village Green Project II

VGP II Goals:

- Expand on prototype for increased system capability and additional sensors.
- Partner with states and communities.
- Increase transparency through public access to real time data from multiple data sets.
- Utilize AirNow and share IT services with increased data capacity.
- Flexibility for long term expansion – platform design with capability to supplement and flexible to allow for interchangeable parts.



Acknowledgements

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