Secondary Cities Project
Porto Alegre, Brazil

September 2017

1. Cover Sheet

Title	Secondary Cities Project Proposal for Porto Alegre, Brazil	
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Requested Budget amount		$200,000
Length of Project		12 months

2. Project Description

Background

Porto Alegre is the 10º largest city in Brazil, with a population of approximately 1,485,000, and the Porto Alegre Sustainable Innovation Zone (ZISPOA) aims to become the most sustainable and innovative region in Latin America by 2030. The centrally located ZISPOA area blends together all or part of 10 different neighborhoods in Porto Alegre -- Azenha, Bom Fim, Centro Historico, Cidade Baixa, Farroupilha, Floresta, Independencia, Rio Branco, Santa Cecilia, and Santana -- including the city's largest public park, Redencao; two federal university campuses - the Federal University of Rio Grande do Sul (UFRGS) and the Federal University of Health Sciences of Porto Alegre (UFCSPA), and six major hospitals. This part of Porto Alegre is a longtime leader in sustainability, creativity, citizen action, and cultural change. The historic 4th District is a large and partially deteriorated mixed-use industrial, commercial, and residential area and multimodal transportation corridor that currently is the focus for the Porto Alegre City Government's efforts to promote sustainable economic and community development, including through Porto Alegre Resiliente (supported by the Rockefeller Foundation's 100 Resilient Cities initiative). One of Porto Alegre Resiliente's main goals is to promote solar power and energy efficiency in Porto Alegre, starting with public buildings, schools, and street lights, with technical assistance from international organizations including 100RC, ICLEI-Local Governments for Sustainability, World Resources Institute (WRI Brasil), and the Global Covenant of Mayors for Climate and Energy.

Based on Porto Alegre's strategic importance, the USG opened a Consulate in the city on June 27, 2017. The ZISPOA area and the 4th District are expected to undergo substantial transformation over the next decade and beyond. They represent a potential prototype for how cities in developing countries can expand prosperity and enhance quality of life, with accelerated growth of businesses, jobs, and incomes, and improved infrastructure and services, through conserving, reusing, and renewing resources much more efficiently. Using geospatial data more effectively with engaged citizen and community participation can achieve significant advances in large-scale decentralized investments in solar power generation and distribution, and extensive renovation and construction of both existing and new energy-efficient buildings. Although the Porto Alegre City Government possesses some technical capacity and resources to use geospatial data for urban planning, this project will substantially strengthen and expand its geospatial data tools and open processes. Through ObservaPOA, the City Government is implementing Brazil's national law on public access to information (Lei No. 12.527/2011).

Goals and Objectives

The proposed thematic focus of the project is Economy, specifically expanding renewable energy and energy efficiency capacity and promoting market-oriented sustainable innovation economic activity centers. A second thematic focus is Land Use, especially regarding future changes in land and building uses in ZISPOA and the 4th District fostered by their sustainable energy transformation. This proposed 2C project aims at using open source digital geospatial information technologies for educating and empowering people to make effective progress towards solarizing ZISPOA and enabling it to become an urban model for sustainable energy.

To achieve these goals, the project has the following objectives:

1) Strengthen the implementation and dissemination of collaborative tools for sustainable community development planning and geographic knowledge in an inclusive and participatory process currently being organized by ZISPOA.
2) Implement open-source geographic databases containing initial demographic, infrastructure, energy, and resources information about ZISPOA and the 4th District.
3) Integrate advanced geospatial information methods and tools for solar energy initiatives and projects.
4) Develop initial diagnostics, indicators, and baseline scenarios for the renewable energy and energy efficiency transformation of ZISPOA and the 4th District through decentralized solar electric power generation and distribution.

Specifically, the project will engage in the following activities:

1. actively involving local partners and communities for collaboratively framing, planning and conducting research activities, analyzing data, sharing the findings and lessons learned, building capacity, and taking practical action to forward the community, policy, and business agenda;
2. mapping solar energy resource potential based on secondary sources of information on average daily solar irradiance in Brazil, including from SunData (CRESESB) and other tools supporting the design of photovoltaic systems;
3. adapting the data to local site-specific characteristics;
4. mapping demand based on primary information from surveys and other research, including socio-economic profiles of the area's population, classified by land-use type, energy demand intensity, and investment capacity;
5. publishing reference material on decentralized solar power adoption for public policy and decision-making for community, industry, and university stakeholders.

Roles of Proposed Partners

The U.S. Consulate in Porto Alegre is providing vision and leadership to organize and implement the Secondary Cities project. Aline Vecchia, Assistant for Economic and Political Affairs, will serve as the liaison between the local project partners, U.S. Consulate Porto Alegre Principal Officer Julia Harlan, Director of the U.S. Regional Environment, Science, Technology and Health Office Patrick Fischer, and the Secondary Cities Principal Investigator Melinda Laituri.

Global Urban Development (GUD), founder and coordinator of the Porto Alegre Sustainable Innovation Zone (ZISPOA), also coordinates the ZISPOA Project in the School of Engineering at the Federal University of Rio Grande do Sul (UFRGS). GUD will serve as the Project Lead, with Dr. Marc Weiss, GUD Chairman and CEO, and International Visiting Professor at UFRGS, as the Project's Coordinator, and Alexandre Pereira Santos, GUD Fellow and Partner of 3C Architecture and Urbanism and Casa das CIdades, as the Deputy Coordinator. Nancy Sedmak-Weiss, GUD Secretary-Treasurer and Chief Legal Officer, will serve as the Project's Manager. Together they will be the "local champions." GUD is a non-profit international policy organization and professional network of more than 700 leaders and experts in 60 countries. In 2015 GUD produced the World Bank-funded Leapfrog Economic Strategy for Porto Alegre and the State of Rio Grande do Sul to become the most sustainable and innovation region in Latin America by 2030.

ZISPOA is an independent civil society and private sector movement to help transform 10 Porto Alegre communities into the most sustainable and innovative place in Latin America by 2030. ZISPOA is organized by GUD in partnership with many sustainable and innovative entrepreneurs and sustainable development organizations, UFRGS, Porto Alegre City Government, and the Rio Grande do Sul (RS) State Government. ZISPOA Faculty Advisers (ZISProf) involves more than 150 professors from 15 local universities. ZISPOA combines six key elements: Innovation and Technology, Entrepreneurship and Startups, Sustainability and Resource Efficiency, Creativity and Collaboration, Participatory Community Management, and Business-Friendly Environment. It emphasizes five major goals: to become the most solar-powered, energy efficient, bike-friendly, digitally connected, and renewable technology-friendly (circular economy) place in Latin America. Encouraging solar energy has been and continues to be among ZISPOA's highest priorities. Working through ZISProf (ZISPOA Faculty Advisers) and a companion student group, ZUNI (ZISPOA at Universities), many university classes and research labs have worked on a variety of solar-related research and action projects for ZISPOA. Another ZISPOA group, POA Solar, conducts extensive outreach to Porto Alegre's sustainable energy startup entrepreneurs, businesses, and investors, and to industry organizations and associations.

The Porto Alegre City Government will serve as the Project's Local Partner, coordinated by Rodrigo Corradi, Director of Institutional Articulation and Deputy Chief Resilience Officer. The Porto Alegre City Government will share its data resources with the 2C project through ObservaPOA, including open data from the national Brazilian Institute of Geography and Statistics (IBGE) and the RS state Foundation for Economics and Statistics (FEE). With assistance from the 2C project, the City Government will a develop a "one stop-shop" to use geospatial information to create a much faster, cheaper, and easier permitting process for private property owners' and investors' installation of solar photovoltaic panels, solar water heaters, energy-efficient insulation, and other sustainable energy investments and building retrofits.

Additional research support and expertise will come from UFRGS, particularly through its Schools of Engineering, Administration, and Architecture, focusing on state-of-the-art uses of geospatial data, and on

business models and advanced technologies for sustainable energy. The international GeoSUMR Partnership, of which GUD is a partner, will help with technical and regional expertise. Specifically, GeoSUMR partner Esri will provide technical assistance for its ArcGIS software and other tools, both directly and through Imagem, their distributor in Brazil.

Facilities and equipment description

The CIty Government, through Porto Alegre Resiliente's participation in 100RC, already has several software licenses from Esri. Additionally, UFRGS can provide some equipment and facilities through the ZISPOA Project located at GRID. However, we will need to rent modest office space for our 2C Project team, and also purchase 4 or 5 personal computers and necessary software, basic office equipment (for example: printer and scanner, modem and router), plus telecommunications devices including mobile phones and/or telephone sim cards for digital community surveyors and geospatial data collectors.

Statement of Data needs

The Secondary Cities Project will include the development of three main datasets:

1. Base dataset:

The dataset will include data from the local and national geospatial information infrastructure. This data is available from ObservaPOA, FEE, IBGE, the National Institute of Space Research (INPE), and other public agencies through the National Spatial Data Infrastructure (INDE). The data will serve as the base reference vector and raster datasets for the 2C project. Data needs include:

a) urbanization features, such as administrative boundaries; assessed land property values; land cover and zoning; building footprints; neighborhoods/districts;
b) infrastructure features, including locations of substations, switching stations, and transformers; locations of generating stations by energy source and capacity; networks of electricity transmission and distribution networks with operating voltage;
c) demographic data from the national census, such as population size and density, household income, education, employment and occupations.

2. Energy supply potential dataset

This dataset will include irradiation and atmospheric interference data from the national SunData dataset. This contextual data will be adapted to appropriate research scales and validated with site-specific data collected in and around ZISPOA. Data needs include:

a) irradiation features: global horizontal irradiation, diffuse irradiation and inclined plane irradiation;
b) atmospheric data: cloud cover and atmospheric water vapor, trace gases, and aerosols;
c) sunlight and shading, land plot and building roof sizes.

3. Energy demand profile dataset

This dataset will be developed through original research conducted by the 2C Project. Initial base mapping will provide research data on consumers by land use types, average energy consumption, and investment capacity. The dataset will be developed through field surveys with sampling of the population in targeted areas. Data needs include:

a) consumption profiles (by energy use, application/activity, and time) from residential, commercial, industrial, and public land uses;
b) average residential monthly energy usage per capita (kWh/year);
c) annual energy consumption of public buildings (kWh/m2);
d) annual energy consumption of industrial buildings (kWh/m2);
e) annual energy consumption of commercial and services buildings (kWh/m2);
f) local business revenues, capital spending, and debt service ratios;
g) average per capita household income.

3. Expected Results

Data generation

The proposed 2C project plans to compile datasets around three main themes: base dataset, energy supply potential, and energy demand profile. These datasets will support data analysis and communications activities involving the local population and key public, private, and academic stakeholders, and will serve as the foundation for various training workshops and webinars. These activities will result in online publication of data results, including story-maps, thematic maps, and infographics that also will be presented at various public events to targeted audiences.

These datasets also will be included in the Porto Alegre Geonode that will serve as the basis for advancing the open data policy of the City Government. The 2C project team will therefore strengthen its ongoing partnership with the municipality, especially with ObservaPOA, the agency responsible for open data technical infrastructure and policy implementation.

Capacity building

The 2C project will focus its capacity building on using two main 5-day training workshops combined with additional custom-designed workshops, seminars, and webinars, involving both international and local experts, to expand technical skills, substantive knowledge, and cutting-edge best practices for community residents and entrepreneurs, university faculty and students, sustainable energy businesses, and government officials. Specifically, the project will help build and strengthen geospatial data utilization capacity for:

1. Communities such as potential solar consumers, area residents, and ZISPOA members. Proposed activities include dissemination of information through workshops with training practice elements, setting research questions and conducting survey research, analyzing data, sharing findings, and taking practical actions.
2. Higher Education and Research Institutions as sources for strategic advisers, teachers/trainers, and workshop participants. University professors and researchers from ZISPOA Faculty Advisers will help provide technical knowledge and expertise on sustainable energy by advising and guiding research, analysis, and action. University students, including from ZUNI, will participate in the workshops along with community members. Students experienced with GIS and/or sustainable energy may be recruited as project interns to take part in project-based learning activities.
3. Sustainable Energy Businesses, including participants in POA Solar, will act as advisers for the 2C project. Current engagement of the solar industry by ZISPOA will be strengthened through geospatial information and technical training.
4. The Porto Alegre City Government. Porto Alegre Resiliente will coordinate local government involvement, including environmental quality, economic development, and urban planning agencies. The 2C project will support implementation of the city's Resilience Strategy, focusing on the 4th District as a laboratory for sustainable innovation policy development including expedited permitting processes, solar power and energy efficiency for public buildings and lighting, and targeted incentives for solar energy expansion. Also, the 2C project will collaborate with ObservaPOA to strengthen its capacity to assemble and publicly share open data, including through a training workshop specially designed for this purpose.

Data sharing metrics

The datasets should be made available for download (as shapefile/kml/raster) as well as for visualization (on layout formats like JPG, PDF and such).

Data and metadata standards need to be made compatible with national and Geonode standards. This should necessarily consider: Geographic Vector Data Structure (ET-ADGV 2.1.3/ET-EDGV 3.0) and Acquisition (ET-ADGV 2.1.3/AT-EDGV 3.0) standards (from the Brazilian Army and National Cartographic Commision - CONCAR); ISO 37120; and Geonode and 2C Geonode metadata standards, especially focusing on data quality.

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