A Sustainable Economic Development, Renewable Energy Water Project in Ethiopia

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(1) University of the District of Columbia; (2) Skybuilt Power LLC; (3) Hope2020

1. **Summary**. This paper describes a unique collaboration between an indigenous Ethiopian non-governmental organization (NGO), Hope 2020; an American university, the University of the District of Columbia; and a private American renewable energy systems integration company, Skybuilt Power; for the planning and implementation of a water resource development Project in Tole and Sadden Soddo, in the southwestern zone of Ethiopia. This Project is designed to help to provide Sustainable Economic Development for villages in the area.

2. **Participants.** The participants in this Project (the Project Team) were:

- The University of the District of Columbia (UDC):
  - Dr. Ben Latigo, Dean of Department of Engineering and Applied Sciences, blatigo@udc.edu
  - Dr. Samuel Lakeou, Department Chair of Electrical Engineering, slakeou@udc.edu

    School of Engineering and Applied Sciences
    The University of the District of Columbia
    4200 Connecticut Avenue, NW
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  - Mr. Samson Girma, Electrical Engineering graduate and coordinator of program[1]

- Mr. David J. Muchow, President and CEO of SkyBuilt Power, the renewable energy systems integrator (technical design, specification and purchase of system components):

  4449 N. 38 St., Arlington, VA, 22207, dmuchow@skybuilt.com

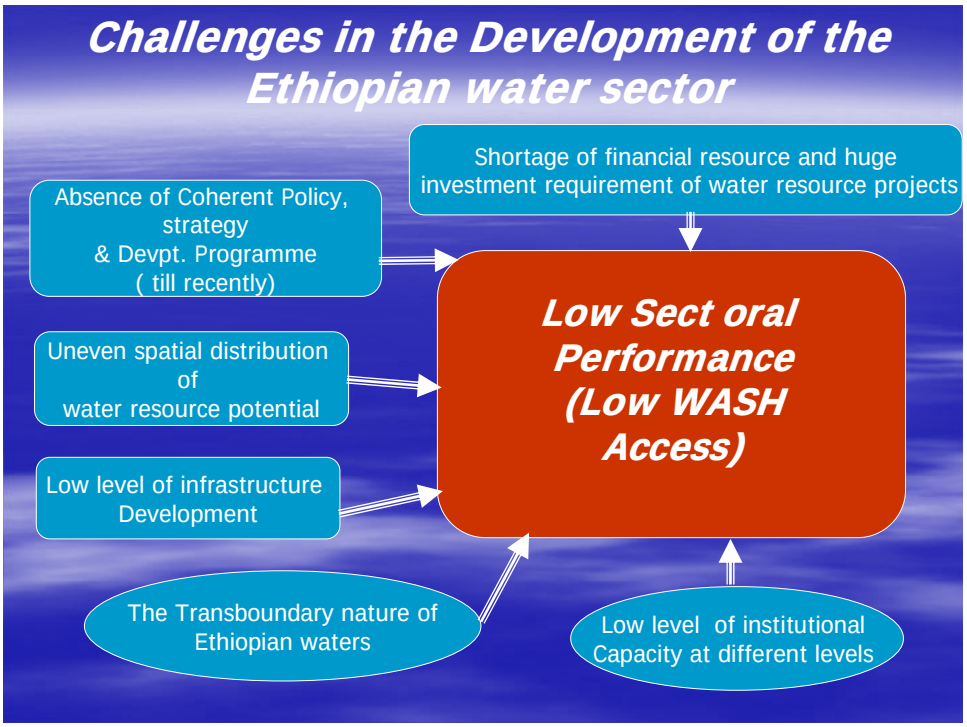
- NGO:

[1] Mr. Girma, who was so instrumental in this Program, died in 2006. The members of the Project Team will forever be grateful for his helping to make this Project successful.

– Mr. Tekabe Getachew, Eng., Hope 2020, Bole Sub city, Kebele 03, House No. 2003, Addis Ababa, Ethiopia

- Addis Ababa University, Addis Ababa, Ethiopia

3. **Challenges in the Development of the Ethiopian Water Sector.** The Project was designed to meet a number of significant challenges in the development of the Ethiopian water sector as shown in the following slide:



4. **Adopted Basic Definition of Water Supply and Sanitation.** These challenges then were further focused on the region's specific water supply and sanitation needs:

5. **Implementation Strategy.** An implementation strategy then was developed with the following steps:

6. **Sanitation and Hygiene.** In the sanitation and hygiene areas, a profile of the situation in the Project areas was then developed. This showed, among other things, the number of latrines to be built and their cost.

Sanitation and Hygiene

Latrine Access 2005	Targeted latrine Access 2020	Number of Latrines to be constructed	Estimated Financial Requirement/ fund for Sanitation (USD)	Estimated Amount required for hygiene Education (USD)
0%	100%	30,000	$1,106,946	$300,040,66

7. **Water Supply in the Tole and Sadden Sado Districts of Southwestern Districts of Ethiopia.** An overview of the water supply situation in the Tole and Sadden Sado Districts was developed and the funds necessary to meet the targeted goals were projected:

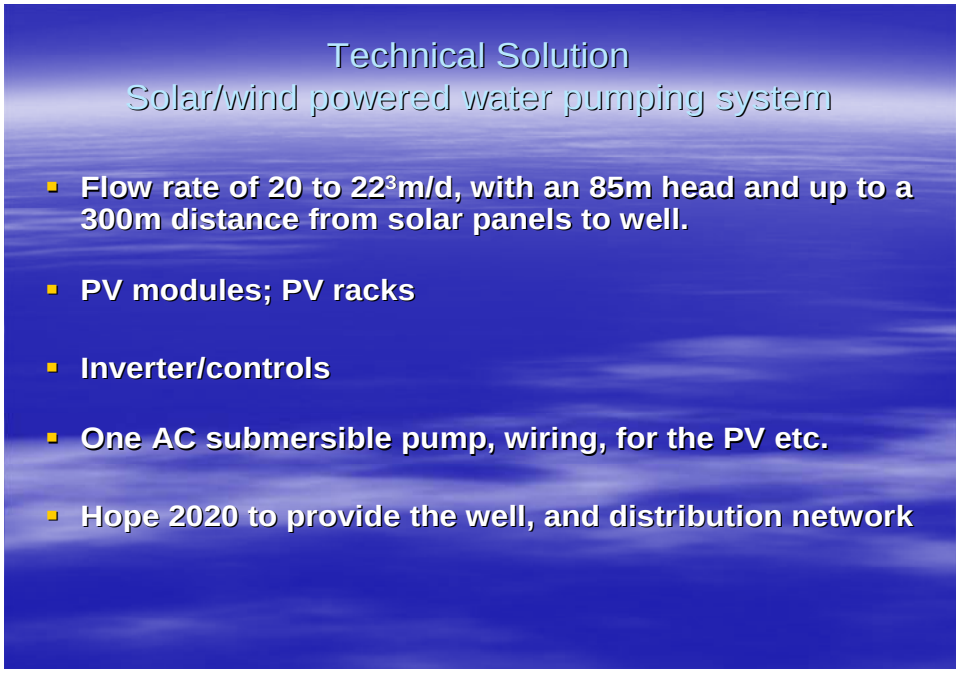
Water Supply Tole and Sadden Sado Districts

Currently used in 2005	Targeted Access 2010	Number of new Projects to be constructed	Number of Projects to be rehabilitated	Estimated Financial Requirement (USD)
4%	98%	23	2	4,500,000

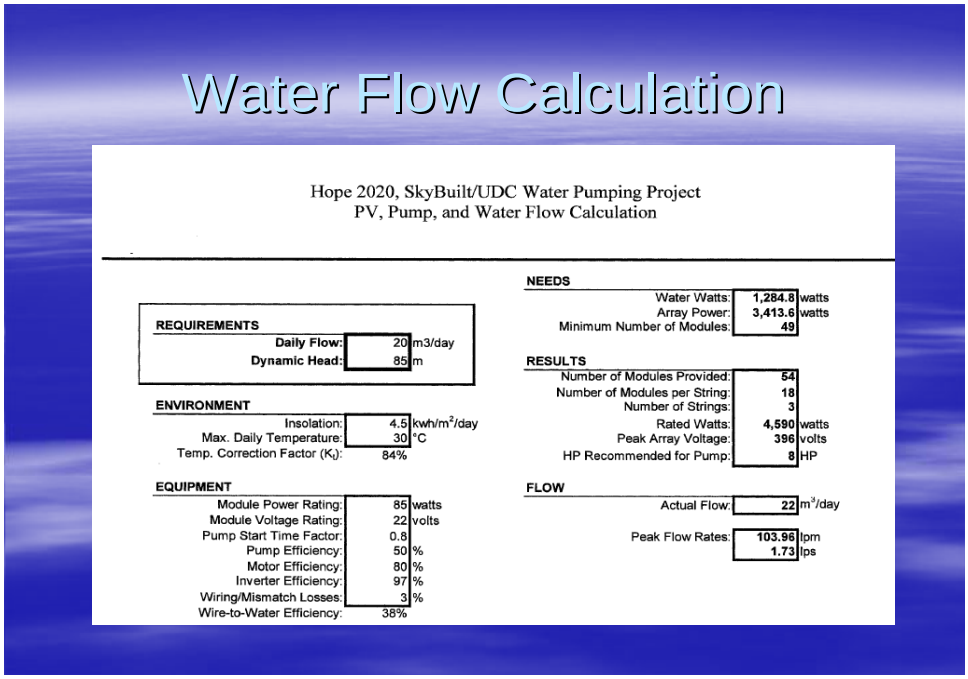
- Committed and expected finance - USD 520,000.00
- Gap to be filled by Hope 2020 and Support Organizations - USD 3,980,000.00

8. **Goals.** The renewable energy water pumping system then was developed to meet the following goals:

9. **Technical Solution for the Solar (and Optional Wind) Powered Water Pumping System.** The technical solution to meet these goals was developed by the Project Team with assistance from SkyBuilt Power, a renewable energy systems integration company.



10. **Water Flow Calculation.** Water flow calculations were then made and yielded the following results:



11. **Structure for Sustainable Economic Development – Holistic Approach.** Once the technical solution was developed, the Team then turned to the management structure for the Project. This was carefully designed to provide a holistic support mechanism for the long term success of the Project. This includes:

- **Hope 2020's Project Management.** Hope 2020 will provide overall Project management for the Project.
- **Low Cost, Low Maintenance, High Reliability, Solar Power System.** The system was designed by SkyBuilt Power with solar panels as the power source. These have no moving parts with many years of useful power.
- **Expandable, Future Options.** The system can easily be expanded by providing more solar panels or other power sources, such as wind turbines or diesel as future water needs grow. Electric power generation also could be added for some or all of the Villages.
- **Village Ownership.** The Village will own, manage and maintain the system.
- **Training.** Team Member UDC, in affiliation with others as appropriate, such as Addis Ababa University, will work with Hope 2020 and the Village on training programs to train villagers in the maintenance of the system, sound business practices, etc.
- **Technical Support.** SkyBuilt Power, working with UDC, will continue to provide technical support to the Project to help keep the system running smoothly and lengthen its life through sound maintenance practices.

- **Viable Financial Model for Sustainable Economic Development.** The Team will develop a Sustainable Economic Model to provide a source of income for the Village from this Project. These funds could be used to pay those in the Village to support the management, maintenance and continued technical support by SkyBuilt and training by UDC for the Project. For example:
  - A small use fee, based on the amount of water consumed, could provide funds for this purpose.
  - In addition, this would provide a real-life example of a Village-owned business model that could be adapted for other businesses in the Village to help it create meaningful jobs and achieve Sustainable Economic Development.
  - Finally, consistent with sound economic models, having a fee that is based on real time, actual use, would avoid waste, promote conservation of the valuable water supply and thus benefit the entire community.

The structure for this model can be shown graphically as follows:

12. **Current Status and Future Plans.** Funding for the Project is being obtained from a private donor and discussions are under way with USAID and other donors for further funding. Construction on the first of the village water pumping Projects is expected to begin in the summer of 2006.