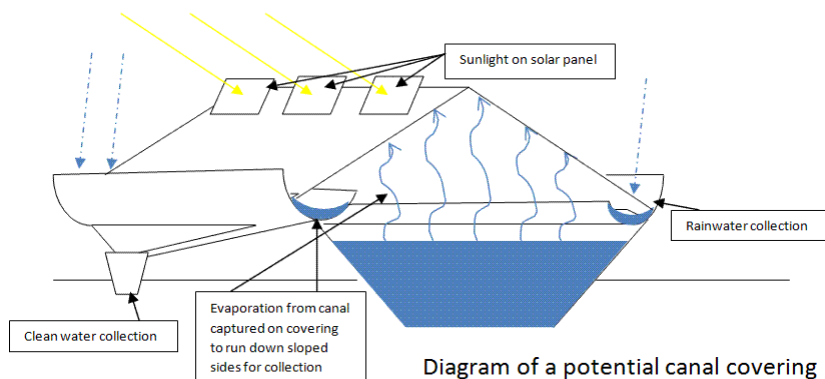


***Aquosus Potentia*: Reclaiming Water Vapor and Networking Solar Energy for Global Renewal**

Throughout the world, **water is a major concern**. It is frequently transported via canals 100s and even 1000s of miles from mountain sources to where it is needed for drinking and irrigation. The canal delivery method can result in evaporative/seepage losses as high as 20 million liters a month per kilometer!* This is an enormous problem, but it also presents an enormous opportunity. **Canals are an ideal and highly standardized right of way. Enclosing them with modular coverings can inexpensively transform the canals into simple and effective water reclamation systems.** These systems can also facilitate solar energy production and host hydroponic and algae farms:

- **Reducing water loss**
- **Purifying water**
- **Generating energy**
- **Producing food**
- **Creating jobs**

Aquosus Potentia is a student-led, global R&D program to leverage the canal system to address multiple areas of international concern: water, energy, food production, and jobs. Headed by **Intel Science Talent Search Finalist Nicholas M. Christensen**, this project envisions capping/lining irrigation canals in order to capture water vapor for resource conservation, producing a byproduct of distilled, potable water and, potentially, hydroponic greenhouses as well. Another component is concomitant algae farms, which can be used to recycle sewage while producing oil. Additionally, “smart” solar panels will be installed to take advantage of the abundance of sunlight in arid desert areas.



In an academic quest (AQUO), AP is recruiting college student talent to work collaboratively, designing and developing a comprehensive solution. By engaging in government and industry partnerships, AP will put the design into production and operation by 2015.

“The challenge today is to employ renewable sources of energy, making them inexpensive and practical....Potable water is a world-wide concern. Over a billion people are without safe drinking water” (N. Christensen, ***1 Sun + 8 Bits = H₂O***, 2010).

Aquosus means “abundance of water,” and ***potentia*** means “power.” A team of young international experts is currently being recruited to work synergistically on a complex and **far-reaching conservation and energy-production project to change canals into reclamation systems.**

This project is dedicated to **generating networked, optimized solar power** while maximizing the potential of water canals to **grow food** and gain **purified water**, along with algae ponds that can **recycle sewage and produce oil for fuel.**

- ***Improved irrigation***
- ***Water conservation and purification***
- ***Optimized solar energy added to grid***
- ***Hydroponic food***
- ***Sewage recycling***
- ***Oil production***
- ***Experience for students***
- ***Job formation***
- ***Global cooperation***

Academic Quest Unifying Organization Project Phases:
www.aquopotent.net

1) Build an International Team 2011

- a) Recruit college students with demonstrated expertise in all aspects needed for this venture
- b) Seek advisory team of industry experts and academic leaders

2) Obtain Funding & Facilities 2011-12

- a) University programs
- b) Government grants/student programs
- c) Corporate sponsorship

3) Collaborative Design Effort (R&D) 2012-13

- a) Establish using on-line collaboration system
- b) Research and design in small “focus” teams
- c) Hold formal program meetings, starting in 2012 during college breaks (funding and facilities currently being coordinated)
- d) Select most promising designs for refinement

4) Proof of Concept (all disciplines) 2013

- a) Begin pilot retrofit of selected canals with coverings/linings (ideally using recycled materials) to demonstrate and quantify water conservation
- b) Configure containment zones for distilled water reclamation.
- c) Fabricate and deploy a modular solar panel framework to quantify energy production
- d) Configure and validate hydroponic crop production
- e) Create algae production sites for yield determination → coordinate with biofuel programs
- f) Implement data collection and control infrastructure

5) Refine Designs and Launch Pilot Implementations 2014-15

6) Scale Implementation

7) Global Deployment

Benefits:

Drawing on the philanthropic enthusiasm and expertise of youth, this project promotes a **worldwide, cross-discipline exchange of ideas**. The prefabricated coverings will be lightweight and cost effective for global use. At the least, the covers will **conserve water and provide drinking water in arid locales**. By using “smart technology,” they can also lead to **food, oil and solar power production, creating a new industry**, which will provide many jobs as well as excellent resume experience for students.

Project mentors:

John H. Jacobs, JouleNet LLC

Tom Chao, Department of Agriculture

Libby J. Christensen, South University Montgomery

Robert W. Christensen, USAF Doctrine Development

Jimmy Chang, Citrix Corporation

* Cornejo, C. (2003). Use of an evapotranspiration model and a geographic information system (GIS) to estimate the irrigation potential of the trasvase system in The Santa Elena Peninsula, Guayas, Ecuador. Thesis presented to the graduate school of the University of Florida.

AQUO Project Description:

Nicholas M. Christensen's national-prize-winning "blue technology" (*1 Sun + 8 Bits = H₂O*, 2010) uses inexpensive, radio-linked microprocessors to monitor the maximum power point, optimizing solar power that can be fed to the electric grid. Working with JouleNet LLC, Christensen is already making plans to network power nodes and sensors. He also applied his optimized solar energy to power a Peltier device and promote water evaporation, producing potable water out of swamp water. Continuing his own research in water reclamation and photovoltaics, and employing the combined expertise of young scientists, he is drawing on the latest scientific applications, using simulation, data capture, and the information technology grid to revolutionize the canal structure and provide maximized use of natural resources while using a negative carbon footprint. In a novel academic venture, his website, www.aquopotent.net, is already becoming a repository of information as he publishes research and bibliographies on related disciplines. Students who contribute will be considered for funded positions.

Students with expertise in the following areas will be included in the team:

Accounting —management of funding and grants	Agricultural science —hydroponics testing
Business —marketing, fiscal analysis, and mgmt	Chemistry —water purification studies
Civil engineering —structural and foundation integrity	Computer science —simulation & programming
Economics —national/international financial impact	Electrical engineering —solar controller, sensors
Environmental engineering —environmental impact	Information technology —data processing
Materials science —recycled plastic coverings	Mathematics —process modeling
Mechanical engineering —framework design	Meteorology —weather data analysis
Network communications —managing website	Physics —feasibility calculations
Photovoltaics —solar panel optimization	Political science —governmental development
Safety —review of equipment and procedures	Systems engineering —cross-discipline integration

(Other areas of expertise will be included as necessary)

Each area will have a leader and at least one other team member. Participants will be expected to contribute to more than one area and be available for a percentage of on-line and on-ground meetings. All applicants will submit a resume and brief paper, to be screened by a review committee.

We anticipate paid summer/college break positions and funded travel for serious contributors.

Basic requirements:

- Enrolled in college full time
- Demonstrable skill in some of the needed disciplines
- Availability to meet on line and during college breaks
- Willingness to make a multi-year commitment

Team leaders for paid positions will be chosen from the most dedicated contributors.

Submissions will be made online to the project website, www.aquopotent.net .

***AQUOsus Potentia* is in process of being registered as a non-profit organization in Alabama.**

For more information, contact nchristensen@aquopotent.net .