

CleanTech Investment Opportunity and Focus of American River Ventures

The Investment Opportunity:

The world faces a major challenge. According to the International Energy Agency, demand for energy is expected to grow by over 50% from 2005 to 2030 to approximately 17 billion tons of oil equivalent (BTOE). Meeting these needs will require the investment of over \$20 trillion (in \$2005). Even with massive investment in sustainable energy sources such as bio-fuels, photovoltaics, wind, geothermal, hydroelectric, and nuclear power, these sustainable energy sources will only provide one-third of this growth. The remainder will have to be met by conventional energy sources – coal, oil, and natural gas – with resulting negative impact on CO₂ emissions and global warming. California and the entire US are running out of generation and distribution capacity and it is difficult and expensive to bring new capacity on line.

If advanced technology could reduce the world's demand for power in 2030 by 10% it would reduce the investment required in energy production by over \$5 trillion. We believe this creates a substantial business opportunity in developing technologies which will contribute to reducing the growth in demand for energy through energy efficiency, energy intelligence, and advanced materials. Energy Efficiency solutions promise to provide improved output for the same level of energy consumption. Given the size of energy markets globally, we believe the investment opportunity size is quite large.

Further focus and insight into the investment opportunity is provided by examining the trends in energy consumption by end-use market. In the 2006 report of the Energy Information Administration (“EIA”) entitled “International Energy Outlook 2006”, the end-use markets were defined as Residential, Commercial (or Institutional Services), Industrial and Transportation. The Industrial segment, according to the EIA, is the largest energy consumer of the four. By 2003 this segment accounted for 50 percent of delivered energy consumed worldwide and was the fastest growing. Industrial energy consumption growth was projected at 2.4% from 2003 to 2030, over twice the rate of growth of the world's population. Industrial energy consumption increases in all countries and regions during this period – at an even higher rate in the rapidly developing nations such as China and India.

This huge and critical business opportunity is the American River Ventures fund investment focus. We will invest in early-stage technology companies that develop products which reduce energy consumption primarily for the Industrial segment. We will be California centric in our investments, as we believe the combination of state government incentives and policies, early adopting customers, utility emerging technology programs, entrepreneurial talent and experience, research universities and co-investor resources make it ideal place to focus.

American River Ventures, Located in California's Capital:

A critical foundation of our investment approach is our location in Sacramento, the capital of the world's sixth largest economy and a world leader in energy efficiency initiatives. Within a few miles of our offices are the headquarters for dozens of agencies, departments, organizations, and research centers that are sources of deal flow, and deal evaluation, and provide valuable assistance to our firm and our portfolio companies.

Through our Advisory Board of local experts and thought leaders, we benefit in identification of business needs or gaps where new technology solutions are needed, as well as deal evaluation. From our relationships with the California based utilities, state agencies and the University of California Davis – a leading energy efficiency research institution – we receive investment deal flow. And in all cases our advantaged access to

the unique Sacramento ecosystem benefits our companies in their ability to meet market needs, obtain energy efficiency pilot customers, incentives and grants and to rapidly scale.

At ARV we invest first and foremost in great people, with the passion to win and the experience to make it happen. We take an active role with the entrepreneurs we invest in, partnering to build great businesses. We put our entire team and our energy, vision and relationships with thought leaders and decision makers in corporate, university and government sectors to work for every company we support. After all, building a great business requires more than just capital.

We are members of the Sacramento Angels, North Bay Angels, and Sierra Angels, and see their deal flow before they formally take the companies out to VCs. We look forward to working with the Coachella Valley Angel Network in the future as a source of investment opportunities and expertise.

Representative Investment Segments of Interest to American River Ventures:

We provide the following brief descriptions of some of the market segments we believe offer attractive investment opportunities, and our current portfolio companies who are active in Energy Efficiency segments.

Campus Energy Management

There are tens of thousands of large government, corporate, and college campuses in the U.S. that are major consumers of electricity. While most large buildings constructed over the past ten years have building energy management systems, there is still substantial room for improvement.

One of ARV's portfolio companies, Incuity, is a supplier of business intelligence software that provides substantial benefit in campus energy management. One of Incuity's customers – Rice University. Rice's goal was to optimize the energy consumption and environmental systems across a 50 building, 285 acre campus, shape-shifting their power consumption to reduce expensive peak demand. Their facilities management department used Incuity's product to integrate the "islands of information" from their various HVAC and building control systems, water treatment plant, cogeneration facilities, and weather forecasts to build weather-normalized building models with near real time data to allow them to better manage both total energy demand and the "shape" of that demand over time. The Incuity system also allowed them to better manage their cogeneration facility to reduce high peak power costs. A \$250,000 investment in Incuity software saved Rice over \$2,000,000 per year in energy costs – a two month payback.

Energy Efficient Consumer Electronics

There are 280,000,000 televisions in the U.S. that consume over 46 billion kilowatt hours of electricity per year (KWH/year), at a cost of over \$4 billion. Due to the increasing demand for larger screen size HDTVs this is projected to grow to 70 B KWH/year by 2010. Bonneville Dam produces about 4 B KWH/year, so current demand is equivalent to nearly 12 Bonneville Dams, and just to meet the growth in demand for televisions would require constructing 6 more similarly sized dams during the next three years.

ARV I invested in two companies – Agoura Technologies and Clairvoyante – whose products each can reduce the power consumption of an LCD TV by approximately 40 %, and if used in combination could result in over 60 % reduction in LCD power consumption. If either of these technologies were implemented in TVs that replaced all of the TVs in the U.S., it would reduce power demand from 70 to 42 B KWH/year, or 6 B KWH/year less than current consumption.

Other opportunities in this space include more efficient power supplies, and reducing the power consumption of devices when they are in “standby” mode.

Energy Efficient Data Centers

Data centers currently consume 20 to 30 billion kilowatt hours of electricity annually, roughly equal to the electricity consumption of Utah. Nationwide, data center electric bills are now roughly \$3 billion every year. The continued shift of business and entertainment transactions to the web is driving annual growth rates in the installed base of servers in the US of 40 to 50 percent annually over the next four years. Today, according to analyst firm IDC, roughly 50 cents is spent on energy for every dollar of computer hardware. This is expected to increase by 54 percent to 71 cents over the next four years. For every dollar spent to power equipment, another dollar is spent on cooling. This is such a large problem that operators of mega data centers are making location decisions for new facilities based primarily on the availability of low cost electricity.

The industry is looking for solutions to these problems. Our portfolio company, SynapSense – a wireless sensor network company – enables data center managers to monitor and control their power usage. We have significant deal flow in other technologies that reduce data center power consumption in the software and storage industries where we are seeking opportunities that are 10X more power efficient than the incumbent technologies.

Industrial Efficiency Technologies

Manufacturing companies are under increasing pressure to increase efficiency, improve yield, reduce energy consumption, reduce raw material consumption, reduce water usage, reduce toxic waste production, and comply with ever increasing regulatory requirements. This applies to a broad range of companies and government agencies in consumer and industrial product manufacturing, water and wastewater treatment, electricity generation a distribution, oil and gas production, refining, and distribution, food processing. There are many technologies that can be used to improve the efficiency of these processes.

Lighting

While significant progress has been made in the development of energy efficient lighting products, commercial and consumer adoption is lagging, in part due to the characteristics of the products. We believe there is substantial room for innovation in developing new lighting products that will be more readily adopted and will be more efficient than existing technologies. Lighting is a major energy consuming application accounting for 22% of the energy consumed in the US, 16% for China. Within the industrial and commercial segments, rising energy costs are driving companies to find practical ways to lower energy consumption, without affecting day to day operations. One of the major lighting technologies is High Intensity Discharge (HID), these lamps were introduced in the 1930's and today deliver 6 times more light per watt and last 15 times longer than incandescent light technology. HID lights are preferred lighting for large area illumination such as streetlights, airports, warehouses, stadium, retail parking lots and parking garages.

Our last investment in ARV I is in a developer of energy efficient lighting solutions based on HID lamps which requires 25%-50% less energy to operate and lasts up to 30% longer than traditional HID lights.

Energy Storage and Materials for Energy Efficient Fuel Cells

The world increasingly runs on portable devices whose performance is limited by their energy sources. Recent advances in nanotechnology offer the potential for significant improvement in the performance of batteries and ultra-capacitors used in these devices. Advanced thermoelectric materials, and other energy harvesting technologies using piezoelectric or MEMS technologies create the possibility of powering these

devices by capturing waste heat or motion and converting it to electricity. These technologies can also be used to improve the efficiency of fuel cells by capturing the waste heat they produce.

Demand Response and Smart Grid Technologies

Demand response is a strategy for avoiding the construction and running of expensive peaking generation plants that remain idle for all but a couple of hundred hours a year. In one swift stroke, it turns on its head the resource planning process that has been in place for more than a century in the electricity industry.

Traditionally, utilities have planned their systems around a forecast of future customer demand. Since electricity cannot be stored economically in large quantities, customer demand has to be met instantaneously or brownouts and blackouts would ensue. In most parts of the country, hot weather drives customer demand. Often, the hottest hundred hours of the year account for as much as 10 percent of the annual maximum demand. Serving this load is very costly, as combustion turbines designed to meet it are gas fired and run for a very short amount of time.

Ironically, customers never see this higher cost of meeting their peak demand under conventional pricing practices that average power costs over all hours of the year. Thus, they have no incentive to lower their demand during such critical periods. Dynamic pricing provides a remedy. It sends the right price signal to the customer, higher during peak periods and lower during off-peak periods. However, before this remedy can be implemented, it is necessary to upgrade the meters, grid and real time data communication network on customer premises.

Global leading demand response research is being done in the Sacramento ecosystem by the State of California and UC Davis.

Water and Waste Water Energy Efficiency

Much of the energy in the state of California is used to move water around, up to 19% of the total energy consumed according to the California Energy Commission. Energy is used in the transportation of water throughout the state and in water treatment facilities. ARV has had significant deal flow to date in efficiency technology solutions including motors, pumps and drying technologies which can be applied both in the transporting of water as well in the treatment of water and waste water. In addition there are interesting technologies in the agriculture and manufacturing end user segments which can provide savings in both energy use and contribute to water conservation such as new irrigation techniques and desalination processes.