The Industries of the Future - West Virginia
Monthly Update

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MPTV – Designing Energy for the Future

David Mather, CEO and President of MTPV, gave an excellent presentation at TransTech 2012 describing the 15-year journey that brought MTPV from an idea in a MIT research lab to a successful start-up company today with customers and contracted sales. Some of their decision points along the way are highlighted below. His complete presentation may be accessed at http://transtechenergy.org; under Previous Conferences click on 2012.

MTPV makes semiconductor chips that convert heat directly to electricity. Much like a solar panel will convert sunlight to electricity MTPV chips can convert any source of heat to electricity.

How do you get funding to prove and validate your basic idea?

It is difficult to raise money at the idea stage especially if your science has not been proven. In those situations universities, national labs, and strategic partners (companies that like your idea and might have a vested interest in it) could partner with you and are great sources of funding. You may also consider friends and family, government grants, and or angel investors at this very early stage of your company.

MTPV partnered with Draper Laboratory. It took about $500,000 to a million dollars to build a physics experiment to prove the science behind the basic idea.

The next question you need to answer is – can you build one?

Don't invest in materials, plants, or facilities, as you still have a long way to go. Leverage the existing world. Use incubators that have shared facilities such as labs, foundries, and tools. Find local machine shops and design shops that can help you build a prototype. You might also get the attention of an early-stage venture capitalist at this point, but it's a very risky proposition because you haven't yet proven you can build one let alone sell one.

MTPV still partnered with Draper Labs through this phase. This phase was approximately a $5 million effort and the venture community didn't believe we could build one therefore we continued to leverage government and federal grants to build our first device.

Now that you built one, can you build one to scale for use in a commercial environment?

This is where you might start thinking about plants, property, and equipment to move forward to commercialization. At this point you will attract the attention of venture capitalists. That said, although they like your idea, all the risk is in the journey. You will need to have a believable plan on how you plan to commercialize, not simply the ability to sell them on your idea.

At this point we moved from Draper to an incubator in Boston University's Photonics Center. We used their semiconductor foundry, labs, and other very expensive tools that would have cost us $30 to $40 million. Instead this was about a $4 million effort for us. We also had several angels and a family investment firm that invested in our company at this time.

Now that you are at scale can you build many of them cost effectively and put them into the market?

This is where most ventures fail. It works in the lab, you get great results, but you can't package it cost-effectively and therefore you cannot sell it.

A big decision for entrepreneurs at this point is deciding what kind of company are you going to be? Are you going to be an integrated company, which means that you're in charge of your entire value chain and make every component that you need in your product? Are you going to be dis-aggregated, which just means you will leverage everything else in the marketplace? These are very difficult decisions because they affect how much money you need to raise.

This is the stage we attracted Applied Materials, the largest semiconductor equipment and software supplier in the world, to become a strategic investor in MTPV.

Can you sell one? Can you sell many?

Will you sell directly, or will you have an indirect sales model using value-added resellers, dealers, or distributors? Are you going to license your technology, or

Register Today for two Upcoming Workshops

Compressed Air Systems Training: April 22-23, 2013 at the WVU NRCCE, Morgantown, WV

Introduction to ISO 50001/Superior Energy Performance Webinar: April 29, 2013

To register and for more information visit

http://iofwv.nrcce.edu

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sell your company? General and late-stage VCs may be very interested in your company at this stage.

We chose to stay as a disaggregated company, selling our products indirectly. Value-added resellers will sell the capital equipment or electricity directly to large customers and users of these products. This is how we can have the larger reach of a major corporation without the investment.

We will also license our technology. We can't be experts in all fields. We're starting in the high-temperature waste heat market -- glass plants, cement plants, steel plants, which have high amounts of free energy (waste heat) to convert to electricity. But we'll also license our IP into other markets such as automotive, consumer electronics and many more.

The last piece of the story is - now go do it all over again!

Where's your second generation, next-best product? What's in the pipeline? It's going to be the same value chain and decision process starts all over again!

We've been able to raise money in one of the most difficult times for a risky venture. A major venture firm called MTPV a "Google play," but they haven't invested in us yet. So the idea is big, it's brilliant, it can change the world, but the journey is where the risk is so be prepared for the journey!

2013 IOF-WV, Innovation & Entrepeneurship Day at the Capitol Award Winners

2013 Governor's Award for Advanced Green Manufacturing presented to Charlotte Weber, Director & CEO, Robert C. Byrd Institute for Advanced Flexible Manufacturing

2013 Governor's Award for Excellence in Industrial Energy Efficiency prented to Beri Fox, President, Marble King, Inc.

Co-Funding Opportunities for IOF-WV Research Teams

Announcement	*Due Dates*	*Funding*
U.S. DOE Bench- and Pilot-Scale Applications for Research and Development of Post-Combustion and Pre-Combustion Carbon Dioxide Capture Technologies for Coal-Fired Power Plants (2013-NIST-MSAM-01) **www.fedconncect.net**	Request for Proposals: Now Open **Proposals Due**: May 2, 2013	Approximately $80,000,000 in Federal funds is expected to be available for Post-combustion new awards under this FOA. Approximately $20,000,000 in Federal funds is expected to be available for Pre-combustion new awards under this FOA.
NIST Measurement Science for Advanced Manufacturing (MSAM) Cooperative Agreement Program (CAP) (2013-NIST-MSAM-01) **http://www.manufacturing.gov/docs/msam_ffo.pdf**	**Request for Proposals**: Now Open **Notice of Intent:** April 12, 2013 **Proposals Due**: May 7, 2013	Approximately $5,000,000 may be available in FY 2013 (FY 13) funds, to fund one or more award(s) with project periods of up to two years.
NSF Partnership for Innovation: Accelerating Innovation Research (PFI-AIR) www.nsf.gov	**Request for Proposals**: Now Open **Letter of Intent Due:** March 13, 2013 **Proposals Due:** May 15, 2013	$14,250,000 for new awards in 2013
U.S. DOE Combined Heat and Power Technical Assistance Partnerships) (DE-FOA-0000876) **https://eere-exchange.energy.gov**	**Request for Proposals**: Now Open **Proposals Due**: March 22, 2013	Approximately $ 1,500,000 is expected to be available for new awards in FY2013
IRS/U.S. DOE 48C-0002013: 48C Phase II Program https://eere-exchange.energy.gov	Request for Proposals: Now Open Concept Paper Due: April 9, 2013 Proposals Due: July 23, 2013	Section 48C of the Internal Revenue Code provides for the qualifying advanced energy property project program and authorizes $2.3 billion of credits ("the § 48C Phase I program" and "the § 48C Phase I credit").