open source ecology

Annual Report

2012

open source ecology

Annual Report

How Open Source Ecology Was Born

"Open licensing allows others to replicate, reuse, adapt, improve, adopt, bring to scale, write about, talk about, remix, translate, digitize, redistribute and build upon what we have done."

The Shuttleworth Foundation

Marcin Jakubowski was born in Poland. His grandfather led actions in the Polish underground derailing German trains in WWII. His grandmother lived through a concentration camp. When he was 10, tanks rolled down the streets of his neighborhood, and it wasn't a parade. These were times of martial law behind the Iron Curtain — a clear state of material scarcity. Marcin and his family waited in line for staples like butter and meat. His life would be transformed when his family left for America, but he never forgot the terrible things that happen when resources are scarce and people fight over opportunity.

He began to think that the most essential type of freedom starts with an individual's ability to use natural resources to free oneself from material constraints. Marcin thrived in the United States graduating with honors from Princeton University and earning his Ph.D. in fusion physics from the University of Wisconsin, Madison. Yet, he felt increasingly useless, as his studies were distancing him further from solving pressing world issues.

So, Marcin started a farm in rural Missouri. He learned about the economics of farming. He bought a tractor — then it broke. He paid to get it repaired — then it broke again. Then, soon enough, he was broke too. He realized that the truly appropriate, low-cost tools that he needed to build a sustainable farm and settlement just didn't exist yet. He needed tools that were robust, modular, highly efficient, low cost, made from local or recycled materials, and that were designed for a lifetime — not obsolescence. He realized that he'd have to build them himself. So he did just that, and he tested them. He found that industrial productivity can be achieved on a small scale. So then, he posted all the designs, schematics, instructional videos, and budgets on a wiki, and contributors from all over the world began showing up to prototype new machines during dedicated project visits. As such, the tractor, the brick press, and a number of other machines were created.

Open Source Ecology was born.

Wherever material scarcity exists in the world, we see impoverished, isolated beings powerless to take care of themselves and live the healthy, productive lives they desire. Open Source Ecology (OSE) is building a solution where information flows freely and openly, so that everyone has access to information on how to process raw materials into the life-stuff of modern civilization. We believe that everyone should have access to material security, efficient production, and autonomy.

"A human being should be able to change a diaper, plan an invasion, butcher a hog, conn a ship, design a building, write a sonnet, balance accounts, build a wall, set a bone, comfort the dying, take orders, give orders, cooperate, act alone, solve equations, analyze a new problem, pitch manure, program a computer, cook a tasty meal, fight efficiently, die gallantly. Specialization is for insects. "

- Robert A. Heinlein

At OSE, we find it paradoxical that many of the populations living in poverty are surrounded by the absolute abundance of natural resources (sunlight, rocks, plants, soil, water) from which all the wealth of the economy is built. We are convinced that the big challenge to producing true freedom is bypassing the artificial roadblocks of scarcity: to give as many people as possible access to know-how and the right tools, so they can convert their environment's abundant raw resources into personal good and freedom.

OSE's current project is the Global Village Construction Set (GVCS) — an open platform of the 50 different industrial machines that it takes to build a small civilization with modern comforts. The GVCS provides open solutions for food, energy, housing, transportation, and industrial manufacturing: everything needed to build vibrant, sustainable economies. This is freedom. This is progress. Lowering barriers to efficient production means going forward into a richer, more just and sustainable future. We're excited to build a bright, new, more equitable and abundant world, and we're grateful for your support.

TED Fellows

SHUTTLEWORTH FUNDED

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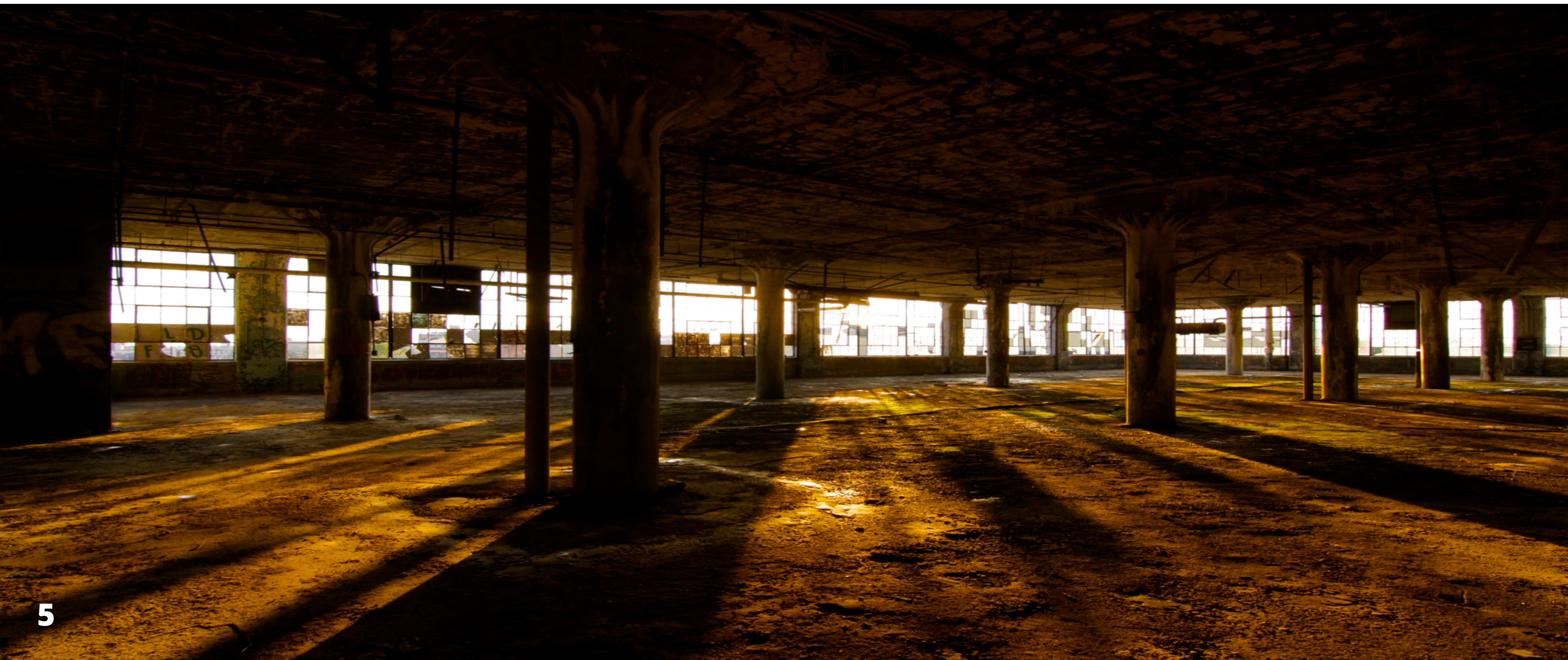


Executive Director's Statement: toward an efficient economy

Open, collaborative development promises to revolutionize the way the economy operates today. It allows companies to innovate faster via access to prior work and crowd-based contributions. It fosters the emergence of a greater number of producers, resulting in a broader and more diverse ecosystem. It lets us (re)shape the artifacts we use and in this way shape our own experiences. Open Source Ecology is working on mechanisms by which this can happen in practice — in our lives and in our work. How can we participate in a more meaningful, ecological, and satisfying system of production? How does open development lead to a more efficient economy: one in which nobody is left behind?

First, there was social enterprise. Now, we are introducing *Distributive Enterprise*. This means that we commit to sharing not only our machine designs - but also our enterprise plans. We believe that in an increasingly efficient economy — collaboration means survival. We design our products in a different way. Our designs are simple and modular -- like LEGO blocks for life-size machines. They are crafted for a lifetime of service, and our goal is for people to gain full control over their technology.

Currently, we are in a phase of organizational development. Our goal for 2013 is to stabilize Open Source Ecology by developing a solid executive team and attaining a full organizational framework as a humanitarian organization. We also aim to streamline our radically collaborative development and production techniques so that we can go into high gear. We aim to continue machine development, as we deploy pilot projects worldwide to test feasibility under the most diverse and demanding conditions.

In 2014–2015, we intend to enter a high-velocity development phase for the remaining machines of the Global Village Construction Set (GVCS). We intend to finish all 50 machines of the GVCS - including full documentation - by the end of 2015.

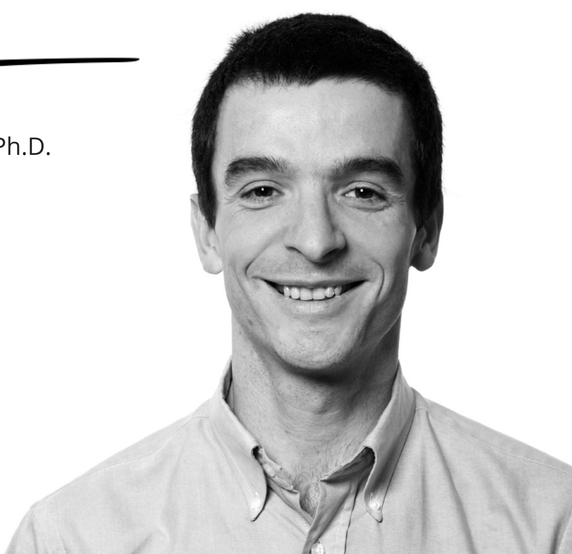
This is our Apollo Project for a regenerative economy. From 2016 to 2021, we intend to enter the replication phase, where we build 144 facilities worldwide. These facilities are the OSE Incubators — model enterprise hubs and incubators disseminating best practices of open enterprise — to play our part in creating an efficient economy. Our focus is to generate a collaborative, open source product development pipeline where collaboration becomes the option chosen instead of competitive waste. Our goal is to help unleash innovation worldwide: to regenerate the modern economy.

What began a couple of decades ago as the open source movement is now extending into open source hardware, open product development, and open enterprise. What lessons can we learn from these collaborative trends as we enter the next step in the evolution of today's economy? Do we have the courage to take the opportunity - to disrupt manufacturing, stabilize economies, restore ecology, unleash productivity everywhere, leapfrog through old problems, and leave nobody behind?

If we do, then we may be entering the next phase of human evolution...

Forward,

Marcin Jakubowski, Ph.D.



Mission

The mission of Open Source Ecology (OSE) is to create the Open Source Economy.

An Open Source Economy is an efficient economy that increases innovation by open collaboration.

Distributive Enterprise

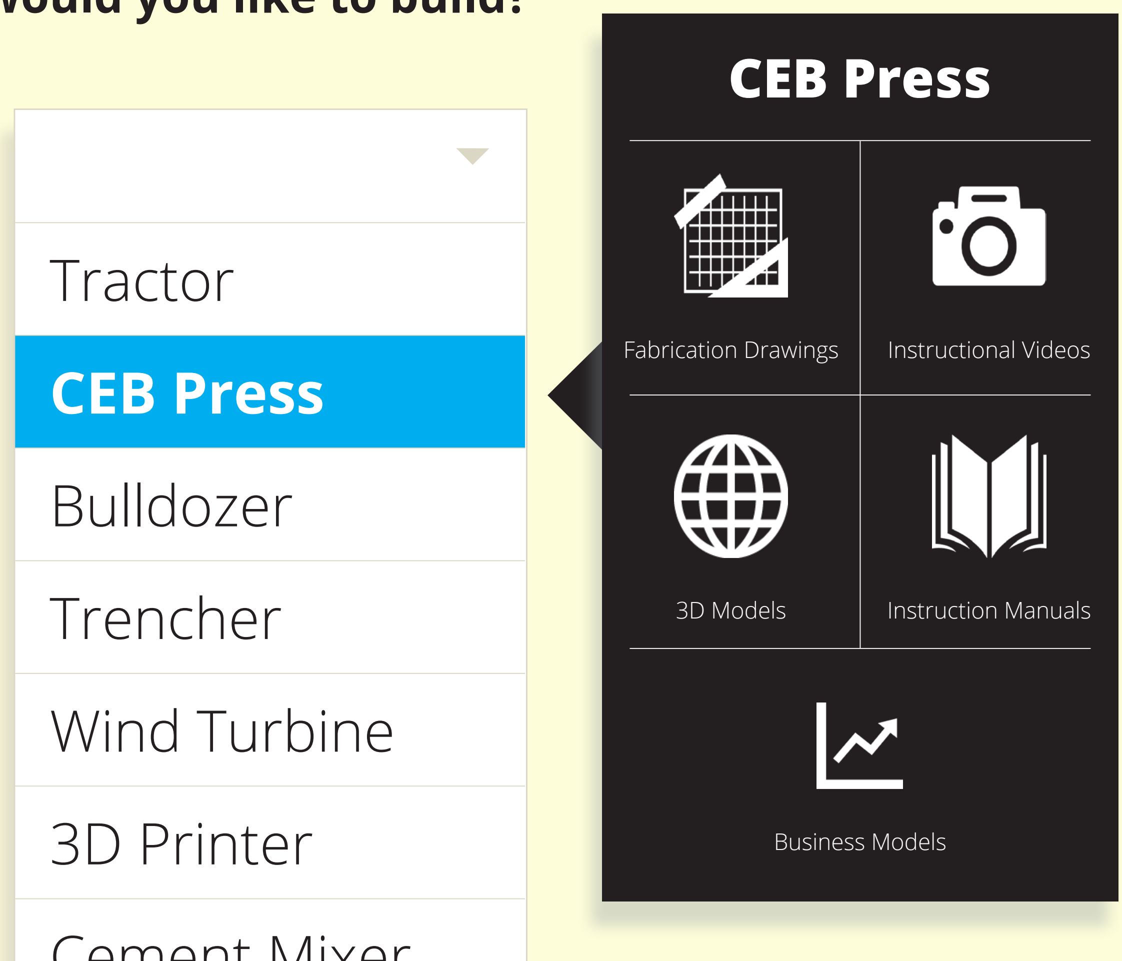
An enterprise that (1) harnesses open collaboration to increase innovation, and (2) that documents its business models so that others can use and improve them.

Programs

We are engaged in four main charitable activities:

- Designing and field-testing the 50 Global Village Construction Set (GVCS) machines
- Creating training materials for each machine
- Conducting local, hands-on training
- Promoting entrepreneurship through *Distributive Enterprise*

What would you like to build?



The
Global Village Construction Set (GVCS)

The GVCS is an open source platform of the 50 industrial machines that it takes to build a small civilization with modern comforts - from abundant natural resources. Each machine is designed for low cost without sacrificing performance. This is accomplished via a global effort of open collaboration.

Sectors:

Transportation
- car
- truck
- electric motor

Agriculture
- tractor
- combine
- plow

...

Energy
- wind turbine
- solar concentrator
- biomass

...

Manufacturing
- induction furnace
- robotic arm
- welder

...

Housing
- ceb press
- sawmill
- concrete mixer

...

what we built in 2012 →

2012 prototypes

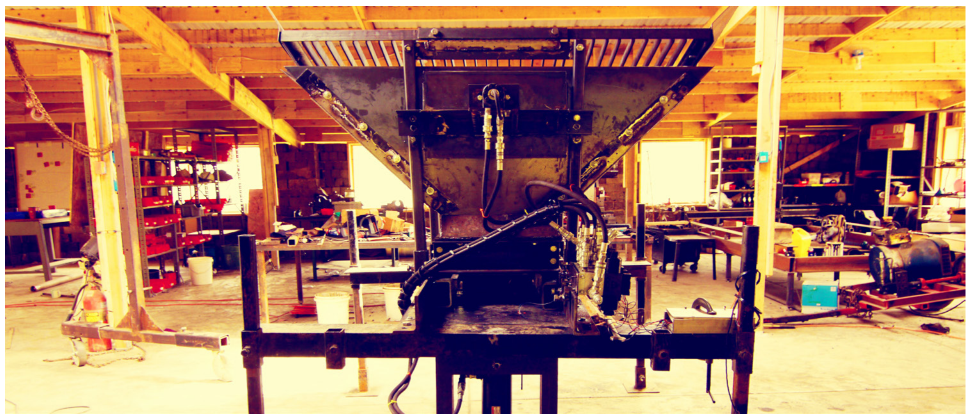
Tractor
the LifeTrac

The humble tractor is the backbone of modern agricultural practices. This versatile piece of equipment can be equipped with numerous attachments that expand its range of use for everything from well drilling and hauling to trenching and tilling. For many people, even entry-level commercial tractors are prohibitively expensive to use and maintain, so we're hard at work engineering an affordable design that will be more accessible. In a single season of use, this technology can drastically improve living standards for families and communities all over the world.

OSE Tractor ($6,000 in materials) *vs* **John Deere 4320 Compact Utility Tractor** ($29,700)

Compressed Earth Brick Press
the Liberator

Housing is expensive, yet we have proven that we can make 5,000 bricks in a single day using almost universally accessible mixtures of sand and clay. Last year, we built the next prototype of our brick press technology, and for $4,000 in materials, anyone with access to the most basic fabrication tools and skills can be well on their way to liberating themselves from one of the most significant costs of living.



OSE Brick Press ($4,000 in materials) *vs* **Powell & Sons PGA-600-12** ($52,500)

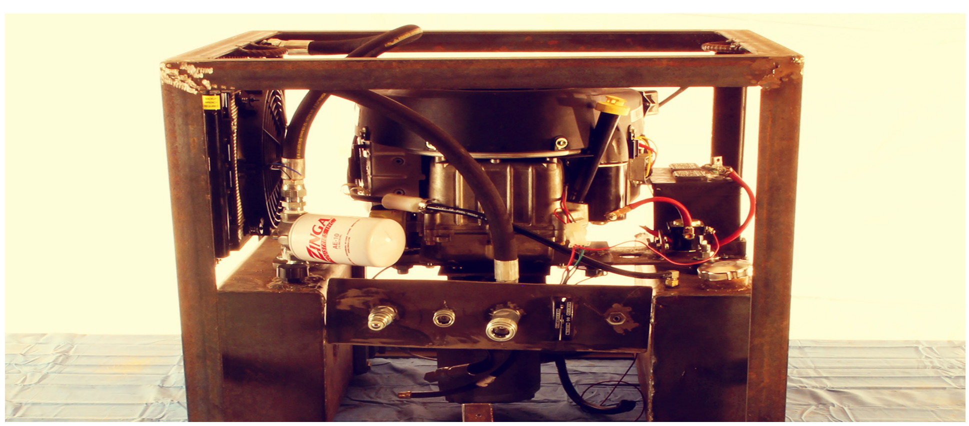
Dimensional Saw Mill

We believe that people are more responsible when caring for the natural resources in their own backyard than when raw materials are sourced from elsewhere in the world. We built a prototype dimensional sawmill, because wood is a vital resource that is useful for housing as well as a number of other industries. So far, our technology costs $25,000 less than some of the lowest-priced commercial alternatives, and we look forward to refining the design's efficiency making it even more accessible to entrepreneurs and communities throughout the world.

OSE Sawmill ($8,000 in materials) *vs* **Mobile Manufacturing Mobile Dimension Saw** ($34,250)

Modular Hydraulic Power Unit
the Power Cube

This year, we built the seventh iteration of our modular hydraulic power unit. The engine is a mobile power source that can be mounted on multiple machines. This allows us to minimize redundancy and lowers costs because it prevents us from having to engineer a unique power supply for each machine.



OSE Power Cube ($2,000 in materials) *vs* **27hp Portable Hydraulic Generator** ($8,000)

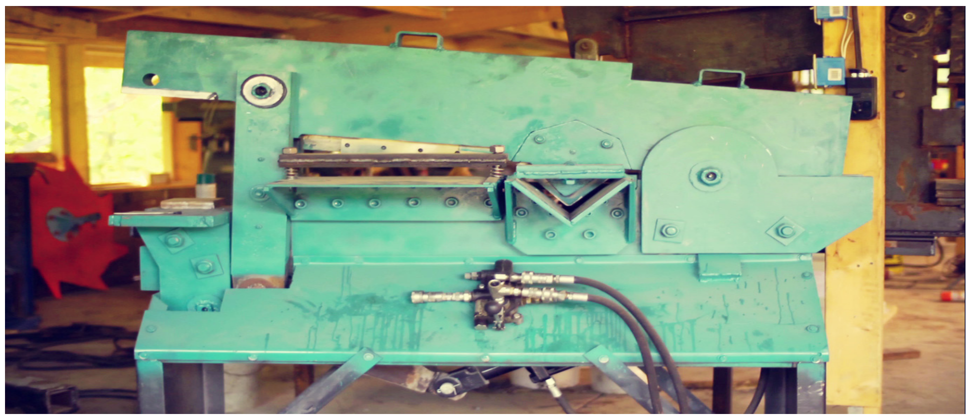
Cold Saw

The cold saw is a cutting machine that produces rapid, precise, dust-free, burr-free cuts and leaves the material cool to the touch. It's a versatile tool for any metal fabrication shop and is an alternative to other cutting technologies such as the bandsaw, abrasive saw, and oxyacetylene torch.

OSE Cold Saw ($1,600 in materials) *vs* **Jet Equipment 414227 - CS-315 Manual Cold Saw** ($2,350)

Ironworker

The ironworker is useful for general metal fabrication, such as shearing or punching holes in metal. The advantage of this machine over related methods is that operations that would otherwise take minutes, when drilling with a handheld power tool for example, can be done in seconds and with a fair degree of precision that leaves a smooth, clean edge.



OSE Ironworker ($6,500 in materials) *vs* **Edwards EDWIW120-02** ($20,926)

Trencher

A trencher is a piece of construction equipment that attaches to the tractor and is used to dig trenches, especially for laying pipes or cables. We tested three prototypes this year.

OSE Trencher ($600 in materials) *vs* **Power Trac Wheel Trencher** ($2,300)

Backhoe

A backhoe is a piece of excavating equipment consisting of a digging bucket on the end of a two-part articulated arm. Our prototype design can be mounted to our tractor, and we conducted extensive field tests this year laying water lines at our headquarters. The next design is being developed for field-testing in 2013.

OSE Backhoe ($2,000 in materials) *vs* **John Deere BH11** ($12,692)

Affordability

Modularity

We use modular/interchangeable components so that machines can share them. This cuts costs and streamlines the repair process.

Example: The Power Cube

We use a modular power unit that can connect to any of the hydraulically-powered GVCS machines. This reduces the cost of the platform by tens of thousands of dollars because it eliminates the need for unique engines for each piece of technology.

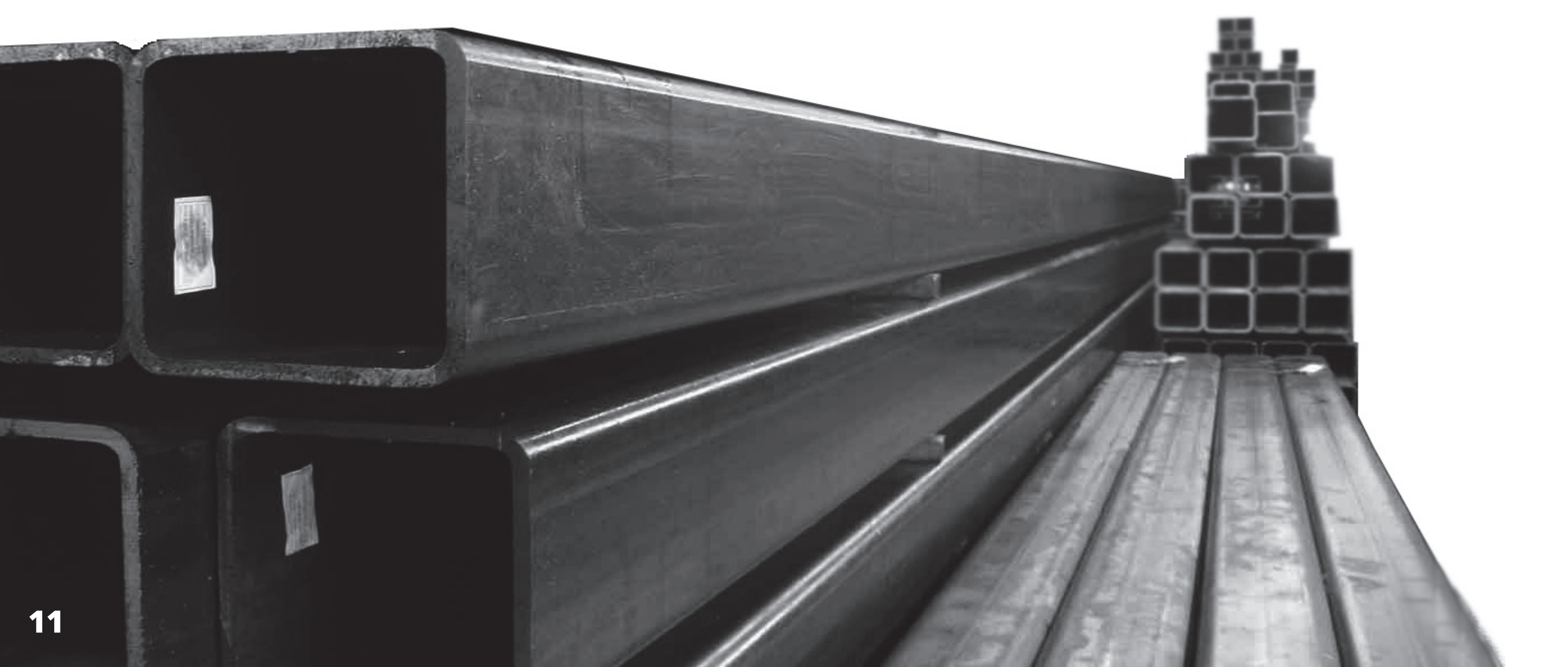
Design for Fabrication

Dimensional steel comes in standard sizes and is available in every metropolitan area. We design for fabrication by using standard material sizes because of their widespread availability and affordability.

The Price of Steel

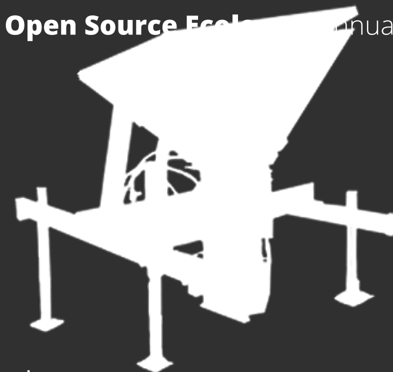
(Prices vary according to market conditions and location)

Type	Price
Square Tube	
2″ x 2″ x 1/4″ x 24′	$139.90
Angle Iron	
2″ x 2″ x 1/4″ x 20′	$50.66
Angle Iron	
4″ x 4″ x 1/4″ x 20′	$113.39
Flat Bar	
2″ x 1/4″ x 20′	$29.21
Sheet	
4′ x 8′ x 0.16″	$78.12



Backhoe

John Deere BH11	$12,692
OSE	$2,000
Cost Savings	**$10,692**



Earth Brick Press

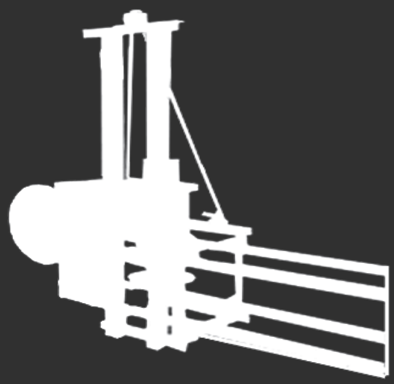
Powell & Sons PGA-600-12	$52,500
OSE	$4,000
Cost Savings	**$48,500**

Cold Saw

Jet Equipment 414227	$2,350
OSE	$1,600
Cost Savings	**$750**

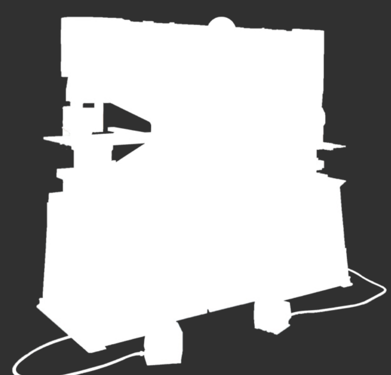
Tractor

John Deere 4320	$29,700
OSE	$6,000
Cost Savings	**$23,700**



Sawmill

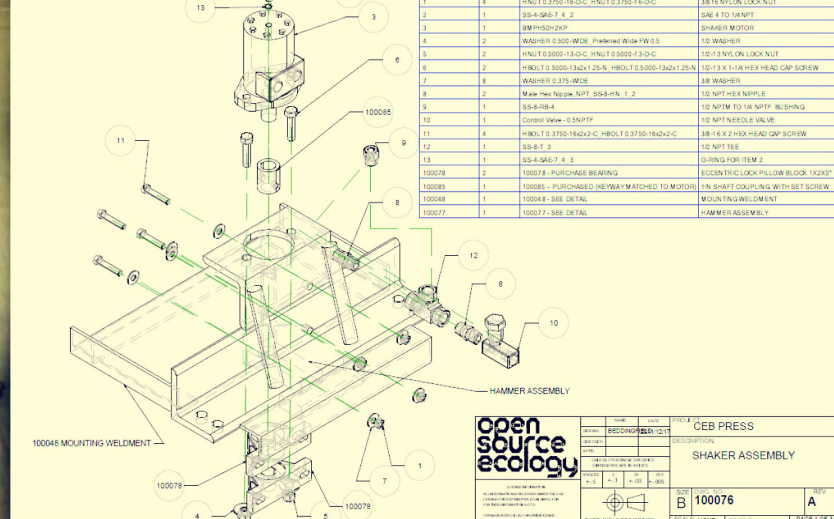
Mobile Manufacturing	$34,250
OSE	$8,000
Cost Savings	**$26,250**

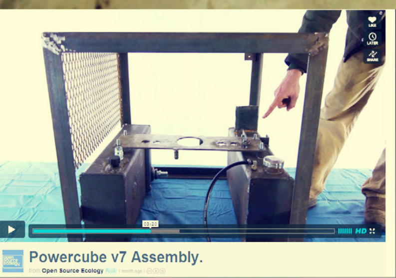


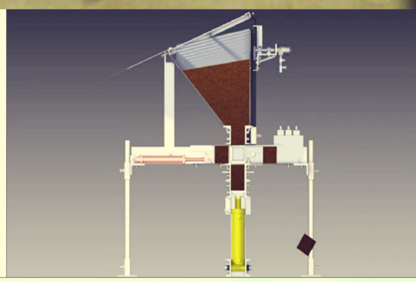
Ironworker

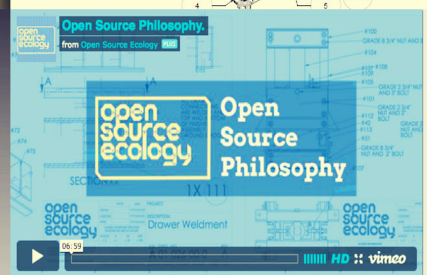
Edwards EDWIWI120-02	$20,926
OSE	$6,500
Cost Savings	**$14,426**

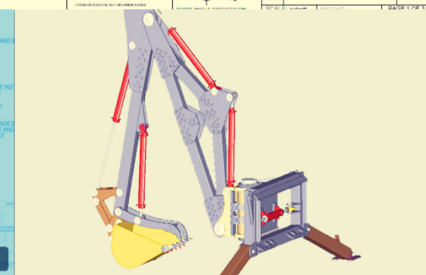

Liberator CEB Press v4 Assembly.
from Open Source Ecology PLUS
The Liberator CEB Press
v4
Assembly Video
09:37
HD vimeo


HAMMER ASSEMBLY
100048 MOUNTING WELDMENT
open source ecology
CEB PRESS
SHAKER ASSEMBLY
B 100076 A


Powercube v7 Assembly.




Open Source Philosophy.
from Open Source Ecology PLUS
open source ecology
Open Source Philosophy
Drawer Weldment
06:59
HD vimeo




Open Source Keyline Plow.
from Open Source Ecology PLUS
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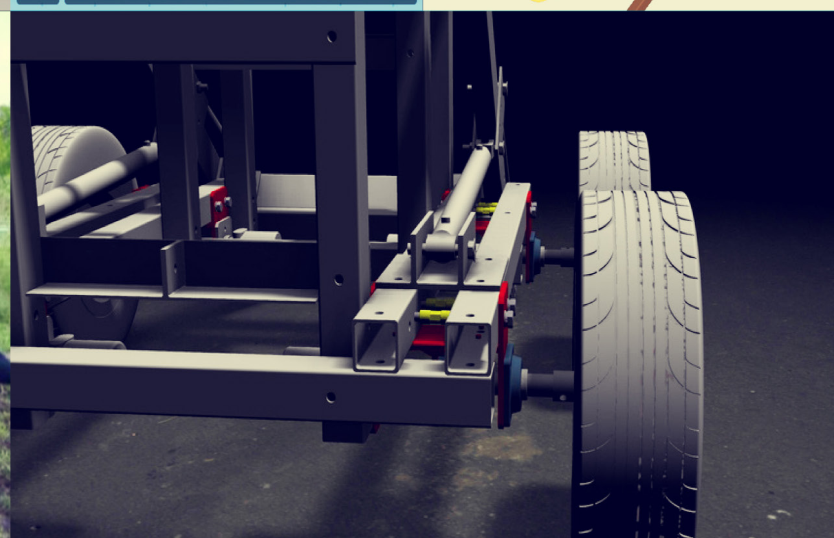
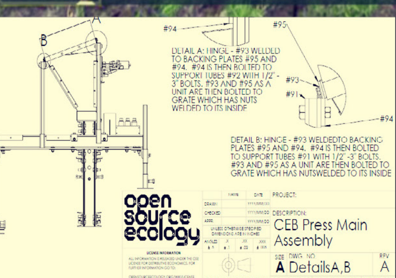
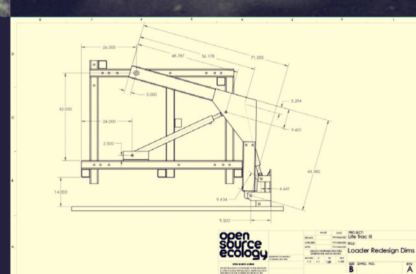
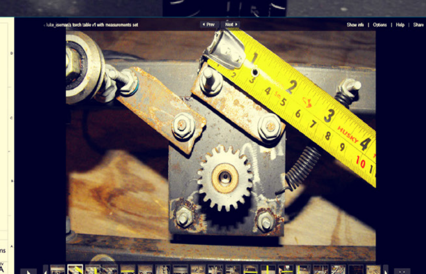
HD vimeo

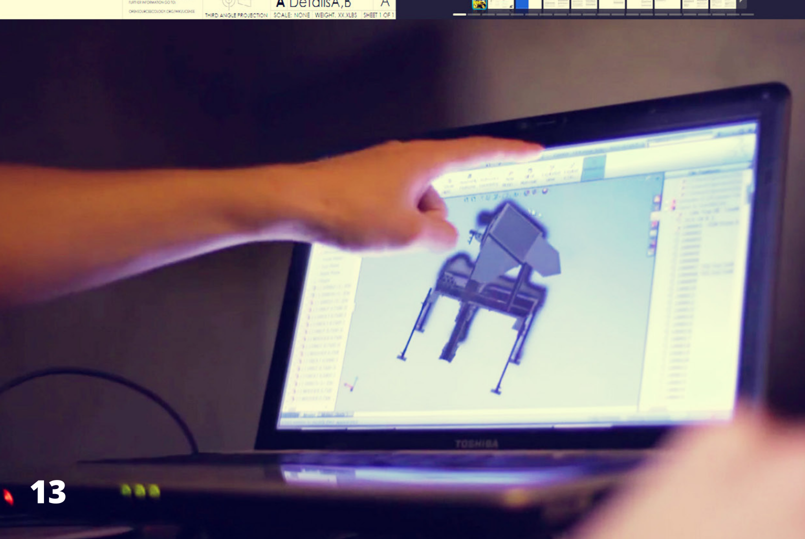


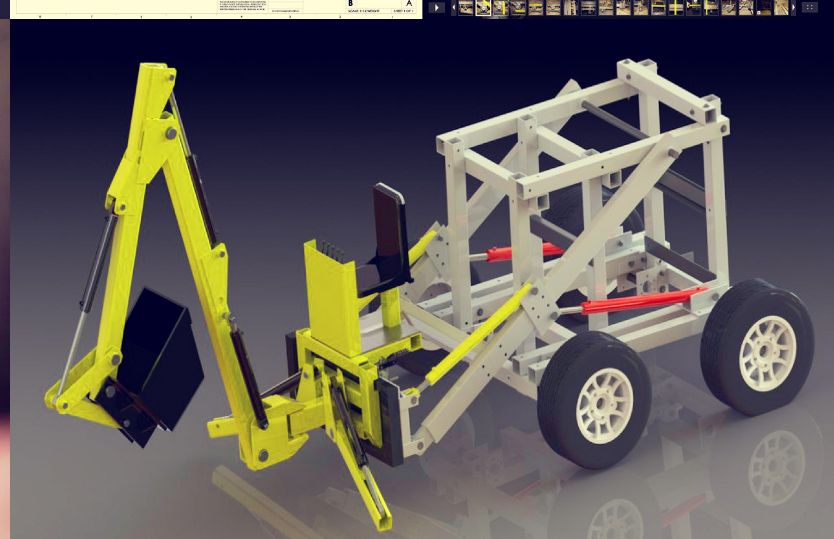

open source ecology
CEB Press Main Assembly
A DetailsA,B


Global
Village
Construction
Set
Civilization Starter Kit
.01


open source ecology
Loader Redesign Dims




TOSHIBA



We create open source documentation to help people adopt and improve our designs.

Fabrication Drawings

Fabrication drawings explain manufacturing procedures in a hand-held, visual format that can be referenced in the shop during production. The images contain precise dimensions and detailed instructions providing builders with the information required to fabricate each machine.

Instructional Videos

Instructional videos demonstrate the complete fabrication and assembly procedures. Narration reveals insights on the build, operation, and repair of machines.

3D Models

3D models allow independent replicators the ability to study each design in-depth from any angle or zoom level. Such transparency helps builders understand the machines and prevent costly mistakes.

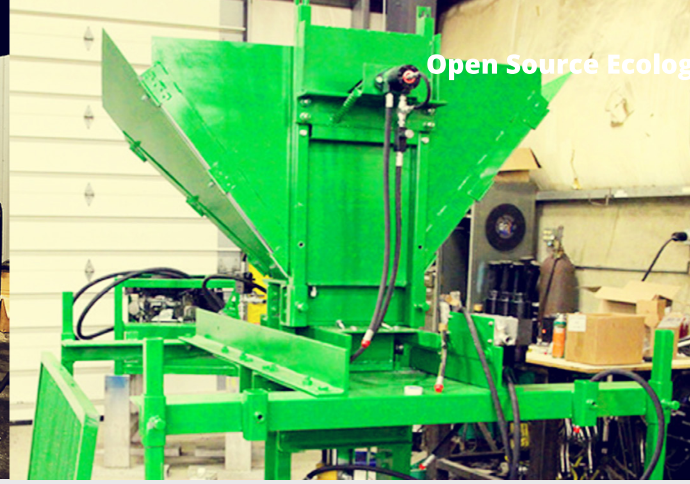
Fabrication Instruction Manuals

Fabrication instruction manuals walk independent replicators through the build process in a step-by-step fashion. Annotated images provide in-depth explanations.

Open Source Hardware Association Statement of Principles 1.0

"Open source hardware is hardware whose design is made publicly available so that anyone can study, modify, distribute, make, and sell the design or hardware based on that design. The hardware's source, the design from which it is made, is available in the preferred format for making modifications to it. Ideally, open source hardware uses readily-available components and materials, standard processes, open infrastructure, unrestricted content, and open-source design tools to maximize the ability of individuals to make and use the hardware. Open source hardware gives people the freedom to control their technology while sharing knowledge and encouraging commerce through the open exchange of designs."

California, United States

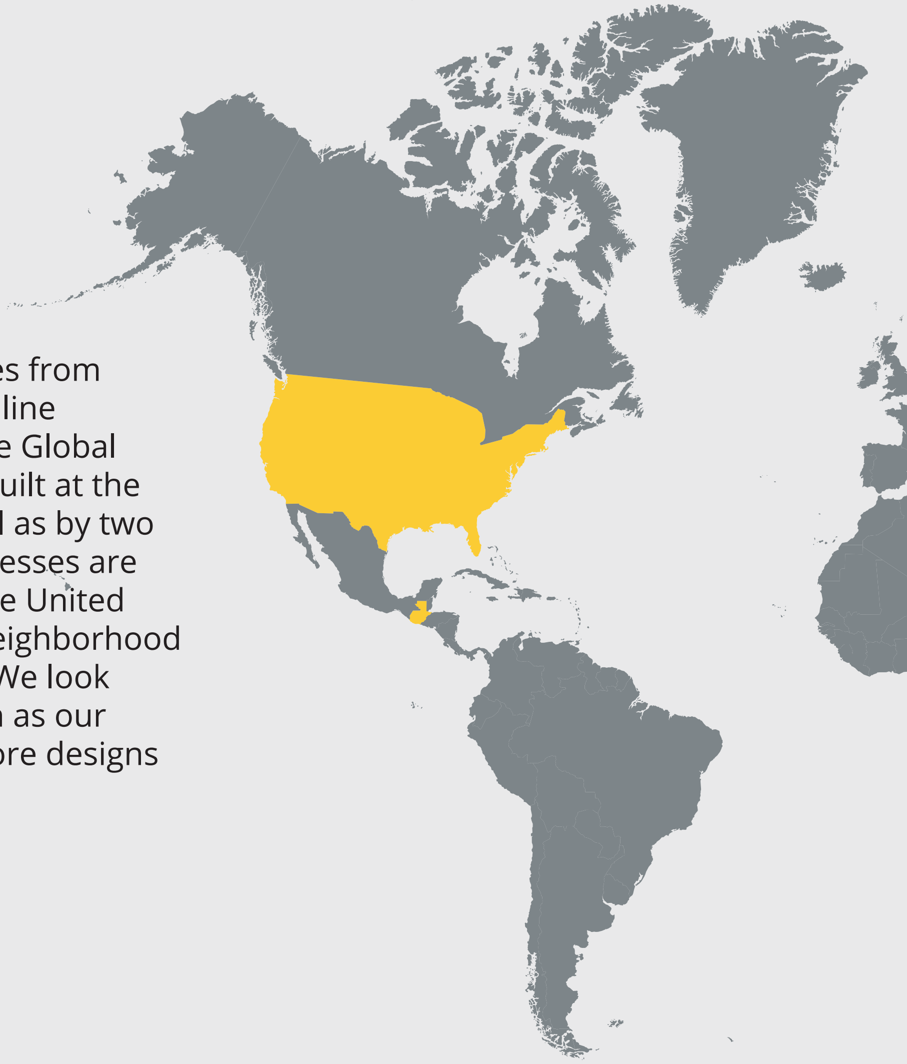


Idaho, United States

Global Replication

Throughout 2012, we began hearing stories from people around the world who used our online documentation to build machines from the Global Village Construction Set. The tractor was built at the largest sugar refinery in Guatemala as well as by two high school students in California. Brick presses are being built in China, Europe, and across the United States, where a young man is building a neighborhood of homes for a sustainable development. We look forward to an accelerated rate of adoption as our training materials improve in 2013 and more designs come online.

Guatemala



Texas, United States

Indiana, United States

Italy

China

Texas, United States

Maryland, United States

Turkey

Collaborative Production

Collaborative Production is a manufacturing system that people all over the world, even with basic skills and minimal facilities, can use to quickly produce high-value machinery for themselves or to sell on the market. The keys to this system are module-based design and the availability of high-quality instructional documentation.

Module-based design allows groups to break into teams that build parts of the machine in parallel, after which the components are assembled. This enables rapid fabrication, where production runs typically last only a single day. There is, in principle, no limit to the complexity of the machines thus produced, such as building a car or tractor in one day, as long as:

- modules are designed to be built independently
- modules are easy to connect to one another
- a sufficient team and space are available for production
- clear instructions are provided for fabrication such as IKEA-style fabrication diagrams

Initial Results - *September*

In September, it took us four days to produce a complete Compressed Earth Brick (CEB) Press, with a mix of seven unskilled and skilled people working together. Although this first test run had many inefficiencies, the 240 human hours that it took for the build still netted us an equivalent of $20 per hour per person for the entire team. This is based on our selling price after materials and supplies are considered. This datum indicates a viable, economically significant route to Distributed Production in the realm of physical infrastructure machinery.

Production in a Single Day - *December*

In December, we streamlined production down to a single day. This achievement was largely made possible by computer-aided manufacturing files that allowed for the pre-cutting of the material and newly issued IKEA-style assembly diagram reducing much of the fabrication process to mere assembly. A one-day production run implies significant economic potential and is a major step closer to the efficient, Open Source Economy.

Goals for 2013–2015

Stabilize Organization

We have grown rapidly since our emergence on the world stage in 2011. We went through significant growing pains in 2012. Our main goal for this year is to stabilize the organization. This means recruiting a solid executive team and attaining the structure that qualifies us for multi-million dollar funding in 2014. We are demonstrating how our techniques will be used in practice at Factor e Farm in the Kansas City area, and we are setting up a design branch for OSE in New York City. We aim to develop standards for OSE chapters worldwide.

Streamline Open Source Hardware Development Processes

Along with the development of documentation standards, we will also streamline our process for designing and developing Global Village Construction Set machines. We are defining new standards of Collaborative Design and Collaborative Production. By defining specific techniques for achieving rapid, collaborative development, we will scale this process within our own organization. We intend to scale our rate of product development via novel techniques for rapid, collaborative development. We aim to disseminate these techniques openly so that others can use them and improve upon them. We are pioneering a generalized methodology for open, collaborative development - to transition the world to an efficient economy.

Develop Open Source Hardware Documentation Standards

We are pioneers of open source economic development within the open source hardware community. We intend to develop a collaborative platform where both OSE and other groups are encouraged to contribute to a common pool of human knowledge. This begins with an Open Source Hardware Documentation Platform. This allows the open source hardware community to collaborate more effectively, to build on prior work, to accelerate innovation, and to realize the promise of the Open Source Economy.

Accelerate Machine Prototyping

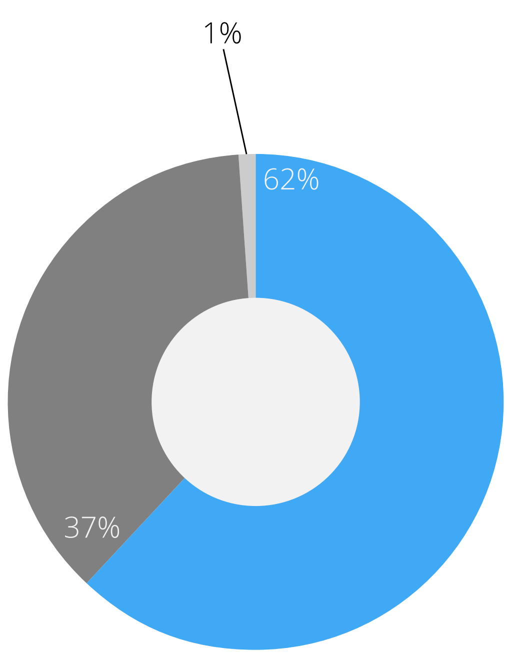
We have pioneered efficient methods of collaborative production that allow us to build complex machines in one day. Also, we are developing documentation and development standards for open hardware. Our next milestone is to demonstrate that we can attain four to six machine builds per month while attaining high quality control standards and complete documentation. If we can attain this, we will complete the entire set of 50 GVCS tools by the end of 2015.

Financial Statements

Balance Sheet

for the year ending Dec. 31, 2012

	2012
Assets	
Cash and Cash Equivalents	$179,720
Grants and Others Receivable	258,646
Buildings & Site Infrastructure	78,564
Equipment	135,047
Total Assets	651,977
Liabilities and Net Assets	
Total Liabilities	0
Total Liabilities	0
Net Assets	
Unrestricted	577,877
Temporarily Restricted	74,100
Total Net Assets	651,977
Total Liabilities and Net Assets	651,977



Asset Acquisition Expenditures

Machine Research & Development - *Equipment*
$132,507

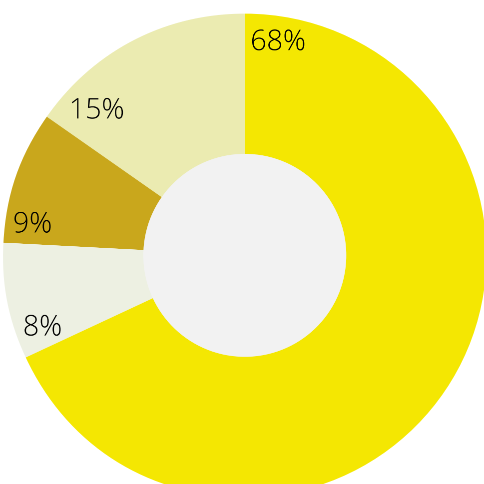
Infrastructure - *Buildings and Infrastructure*
$78,564

Machine Documentation - *Equipment*
$2,540

Statement of Activities

for the year ending Dec. 31, 2012

	2012
Support & Revenue	
Individual Contributions	$129,292
Grants	511,678
Interest	129
Total Revenues	641,099
Operating Expenses	
Program Services	
Programs	24,633
Total Program Expenses	24,633
Supporting Services	
Fundraising	28,942
Management	46,477
Total Supporting Services	75,419
Total Operating Expenses	100,052
Excess of Operating Revenues over Operating Expenses	
Net Income	541,047
Net Assets at End of Year	651,977



Operating Expenditures

Asset Acquisition - *R&D Equipment, Infrastructure, etc.*
$213,611

Management
$46,477

Fundraising
$28,942

Programs
$24,633

Press

Connecting for Change: Bioneers by the Bay (Keynote) - Marcin Jakubowski

TIME:
One of the Best Inventions of the Year 2012

"Marcin Jakubowski built a tractor in six days. Then he told the world how to do it: he made the designs, the budget and an instructional video available free online. A farmer and technologist and the founder of Open Source Ecology, Jakubowski has identified the 50 most important machines required for modern life—from the soil pulverizer to the oven—and is working to make a prototype of a low-cost DIY version of each so that anyone anywhere can build them."

WIRED

"So often hope seems abstract. This is tangible hope, made of steel. It puts independence and equality in reach for people in both the developed and developing world. Welding never seemed so inspiring."

MIT - Innovations Journal
Thomson, C.C. and Jakubowski, M., (2012). Toward an Open Source Civilization. Innovations. 7 - Issue 4

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Kevin Kelly's influential essay 1000 True Fans suggested a funding structure in which 1000 supporters each donate a small amount to sustain a project they really believe in. We would like to thank those who have joined our 1000 True Fans Campaign, **pledging $10 per month or more** to help us create the Open Source Economy.

More Information:
http://opensourceecology.org/wiki/True_fans

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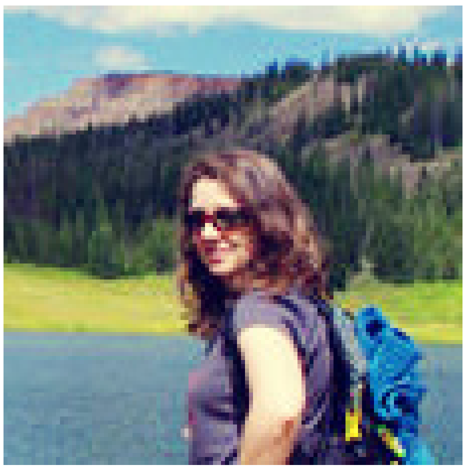

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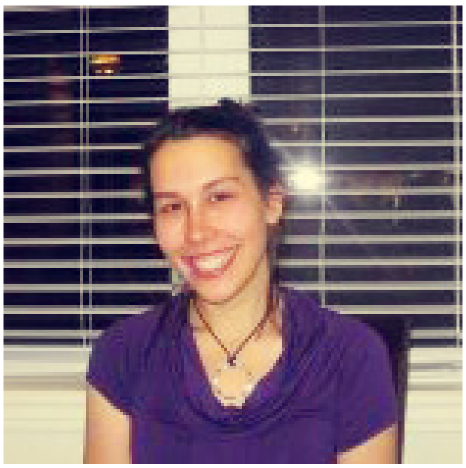

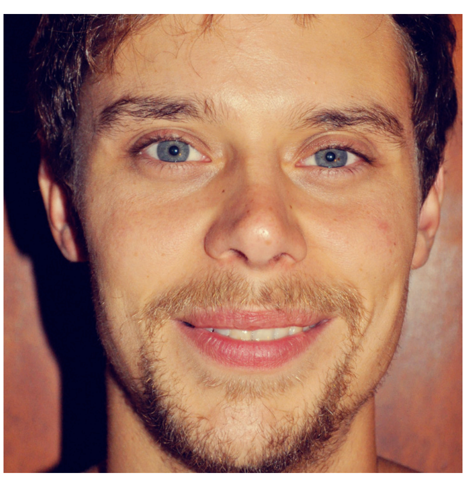

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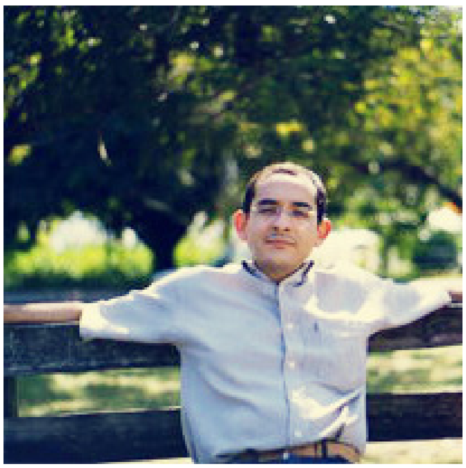

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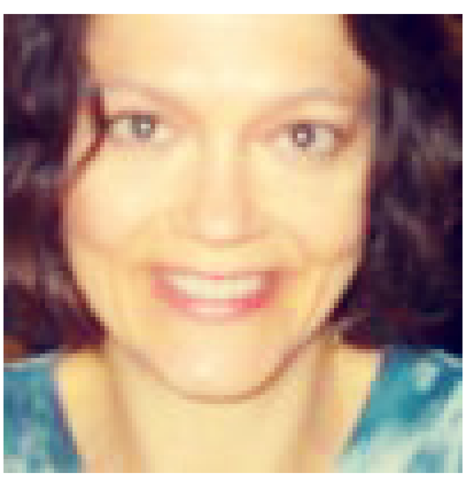

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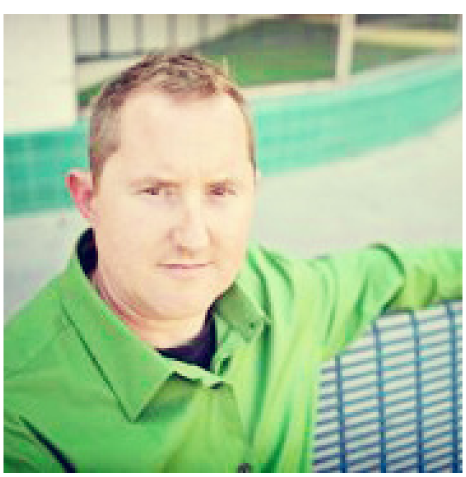

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