TAKACHAR

Small-scale, decentralized biomass upgrading

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More than $120 billion/year of biomass is burned

Current paradox

Biomass serves as the feedstock to many important industries

Forestry residues

Biomass

Agricultural residues

Renewable energy

Activated chemicals

Biofuels

Fertilizer

Plastic additives

Logistical challenge

Biomass is loose, wet, bulky, and expensive to transport.

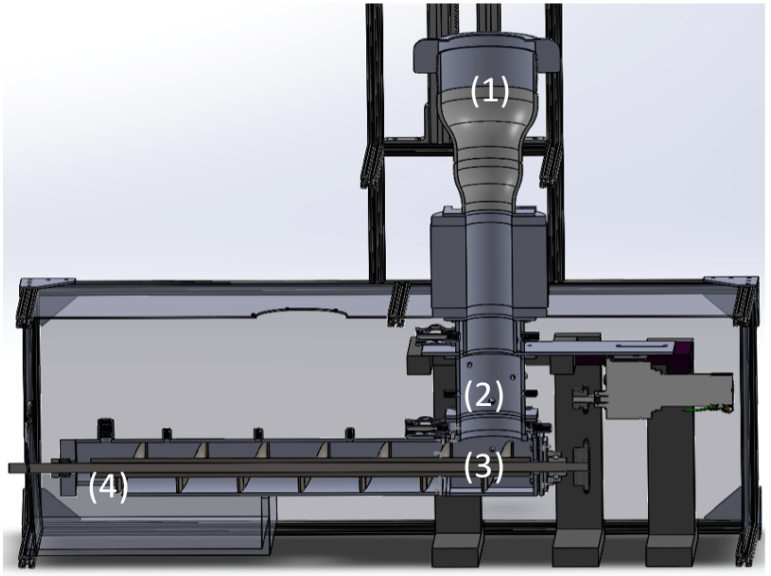
Our solution

Low-cost, small-scale, portable systems to convert biomass at source

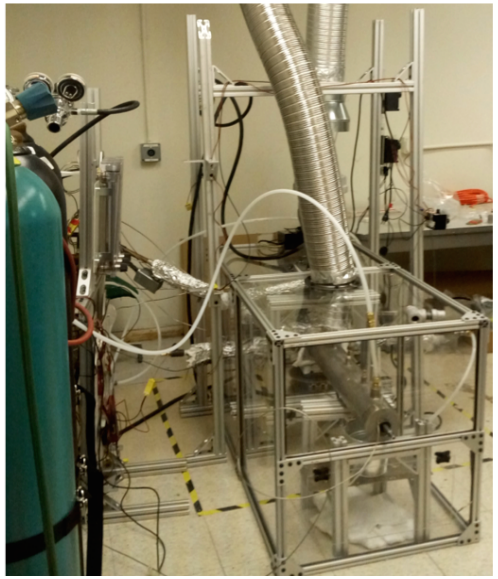
- Latched onto tractors, trailers, or shipping containers
- Requires no external heat/fuel (autothermal)

Raw Biomass	Densified Biomass
Loose and bulky	Volume reduction by 600%
Costly to transport	Reduces transport cost by 40%

(a) Cross-section rendering in SolidWorks



(b) Actual test reactor



Competitive advantage

Our design simplifies the reactor design and makes it flexible

Requirements	Competitors	Takachar system
Gas reactant	Heated special gases	Room temperature air
Gas handling	Scrubbing, drying	None

Market segmentation

We will first target the filtration and remediation sector.

Forestry residues

Biomass

Agricultural residues

Renewable energy

Activated chemicals

$5 billion/year
12% growth

Biofuels

Fertilizer

Plastic additives

Activated carbon

And its $5 billion/year value chain

Coal or other fossil fuel sources

$3.3 billion/year

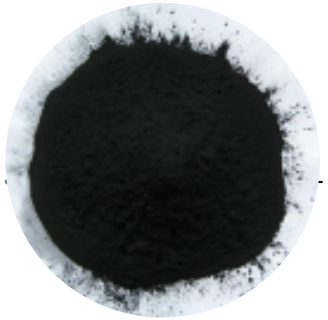
Charred precursor

CalgonCarbon

CABOT

Carbon activated corp.

Activation



Activated carbon

Biomass

$2.1 billion/year

TAKACHIYO

Water treatment

Air purification

Food processing

Others

Source: BCC Report (2018)

Customer persona

Ramesh Chandra Shah |
Small-scale producer of biomass-based activated carbon

Customer pain

Ramesh's current profit margin is razor-thin.

Ramesh's status quo

Revenue:	$280,000/year
Input costs:	$250,000/year
Net:	$ 30,000/year
	(±60,000/year)

Value proposition

We triple Ramesh's net income.

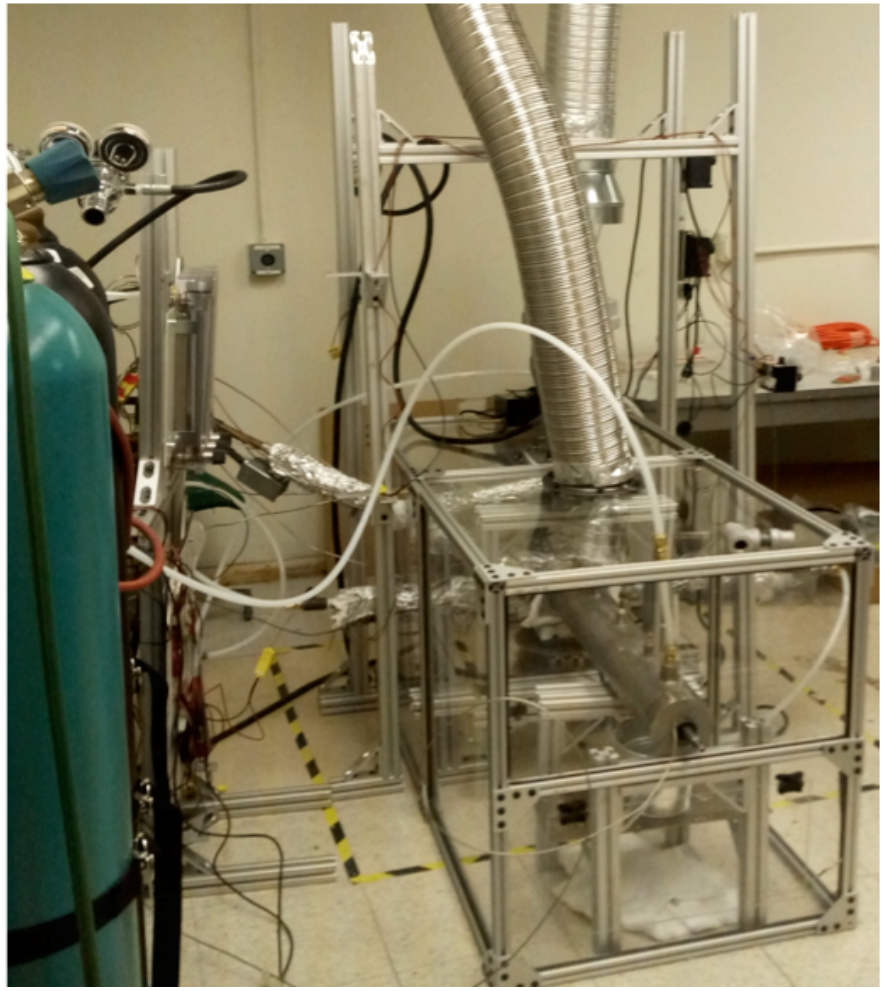
Ramesh's status quo		Takachar's system	
Revenue:	$280,000/year	Revenue:	$280,000/year
Input costs:	$250,000/year	Input costs:	$200,000/year
Net:	$ 30,000/year (±60,000/year)	Net:	$ 80,000/year

A saving of $50,000/year per customer per system

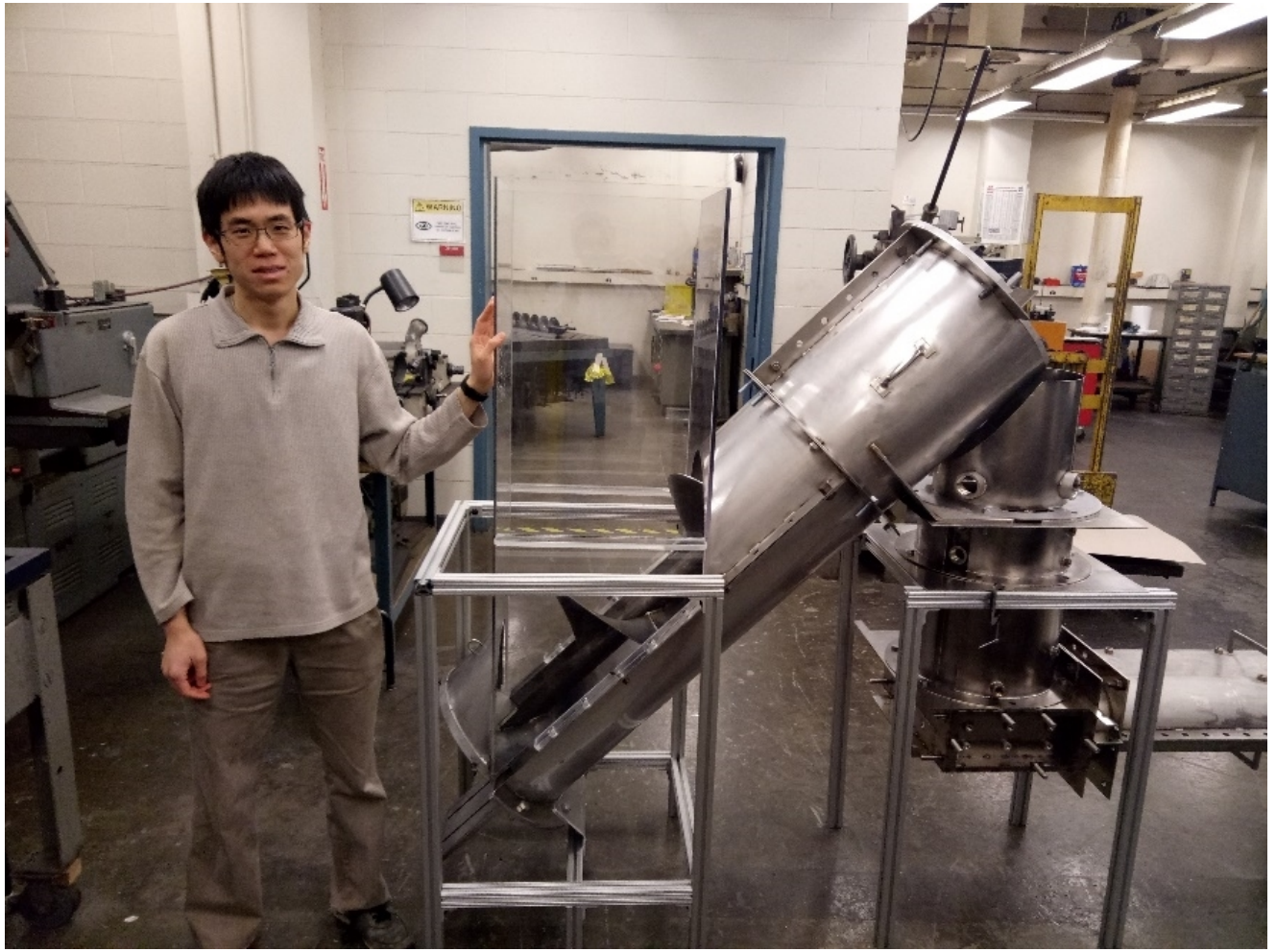
Current development

We built laboratory-scale and pre-commercial prototypes at MIT.

Lab-scale (NanoTorr)

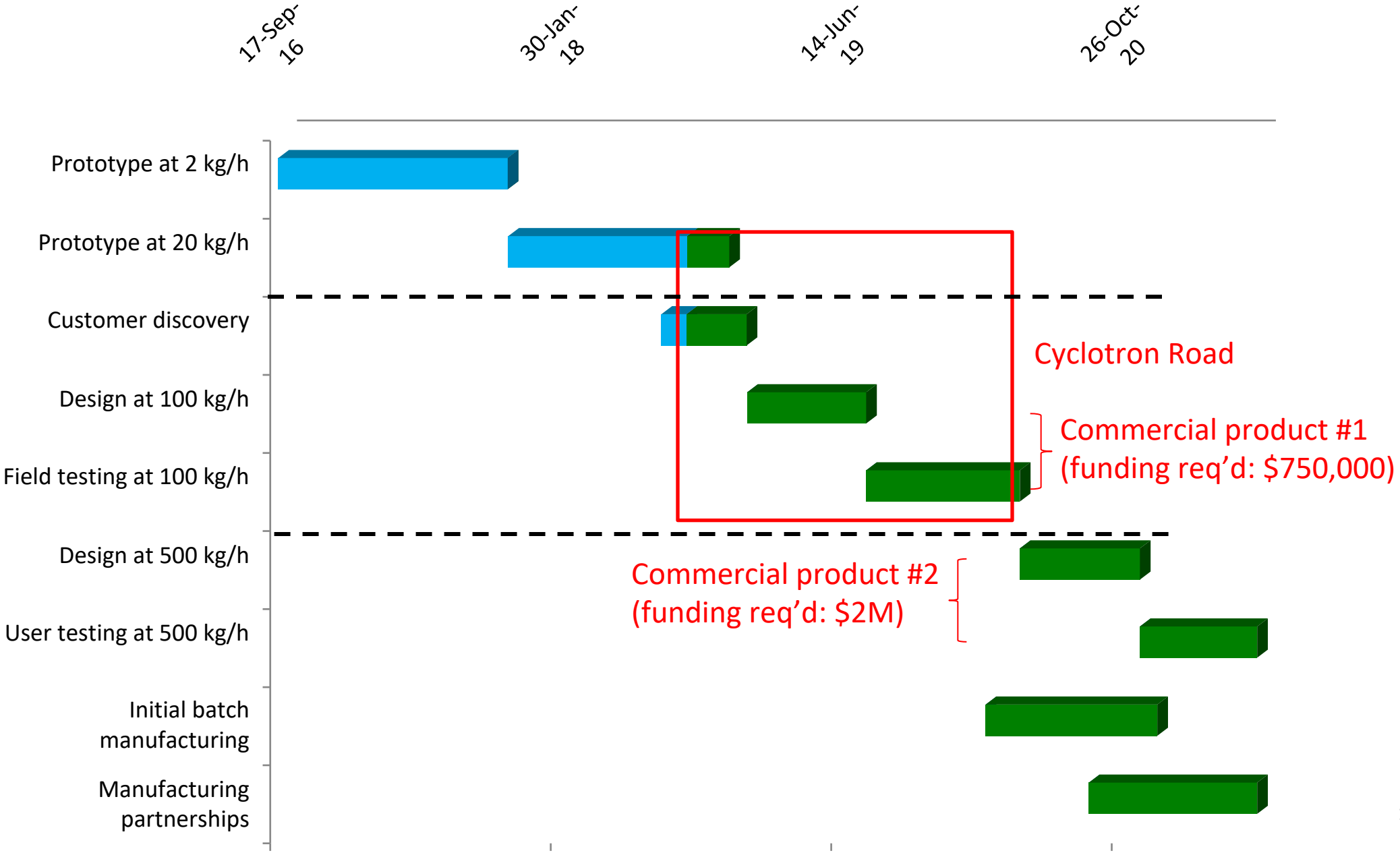


Pre-commercial (MicroTorr)




Preliminary manufacturing

Development milestones



At-scale vision

We serve biomass generators and consumers worldwide

Forestry residues

Agricultural residues

Renewable energy

$2 trillion/year, 2% growth

Fertilizer

$3 billion/year (U.S.)

Biofuels

Other chemicals

$168 billion/year, 5% growth

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