Bloom Energy and Technology for Cleaner Air

Bloom Energy | June 2011

Energy Problem: Centralized Generation

Power Generation

- Capital Intensive
- Large CO_2 Footprint
- “Not in my backyard”
- Conversion Loss ~60-70%

Transmission

- Aging Infrastructure
- Capacity Constrained
- “Run to Fail”
- Transmission Loss ~10-40%

Energy Solution: Distributed Generation

Computing

Telephony

Energy

Our Solution - A Flexible Energy Platform

Bloom Energy's Vision:

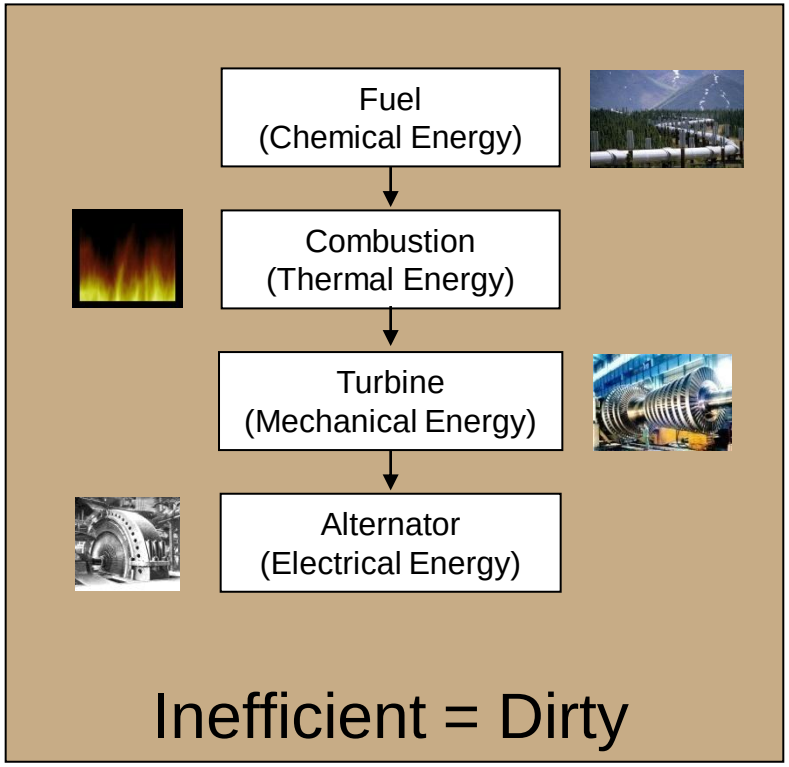
"To Make Clean, Reliable Energy Affordable for Everyone in the World."

eBay Installation

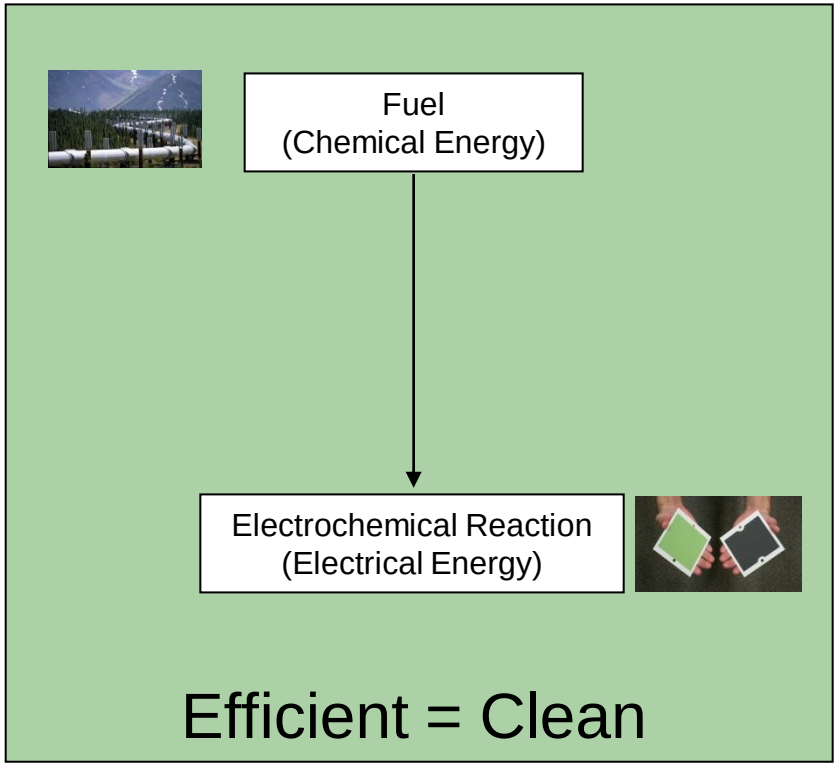
What is a Fuel Cell?

A fuel cell is an electrochemical device that converts fuel directly into electricity…without combustion

Conventional Electrical Generator



Fuel Cell

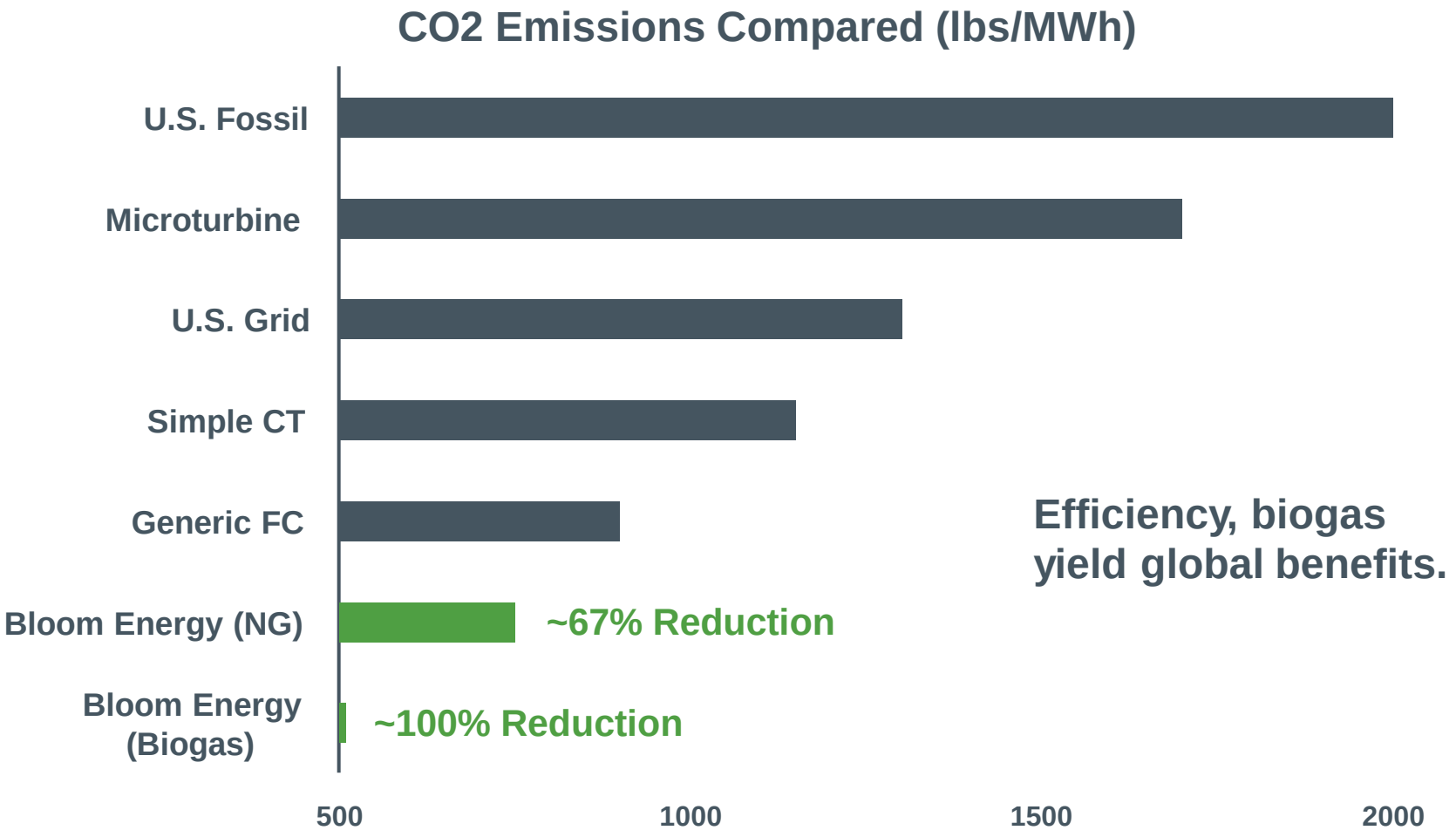


Clean Energy

Emissions	
NOx	< 0.07 lbs/MW-hr
SOx	negligible
CO	< 0.10 lbs/MW-hr
VOCs	< 0.02 lbs/MW-hr

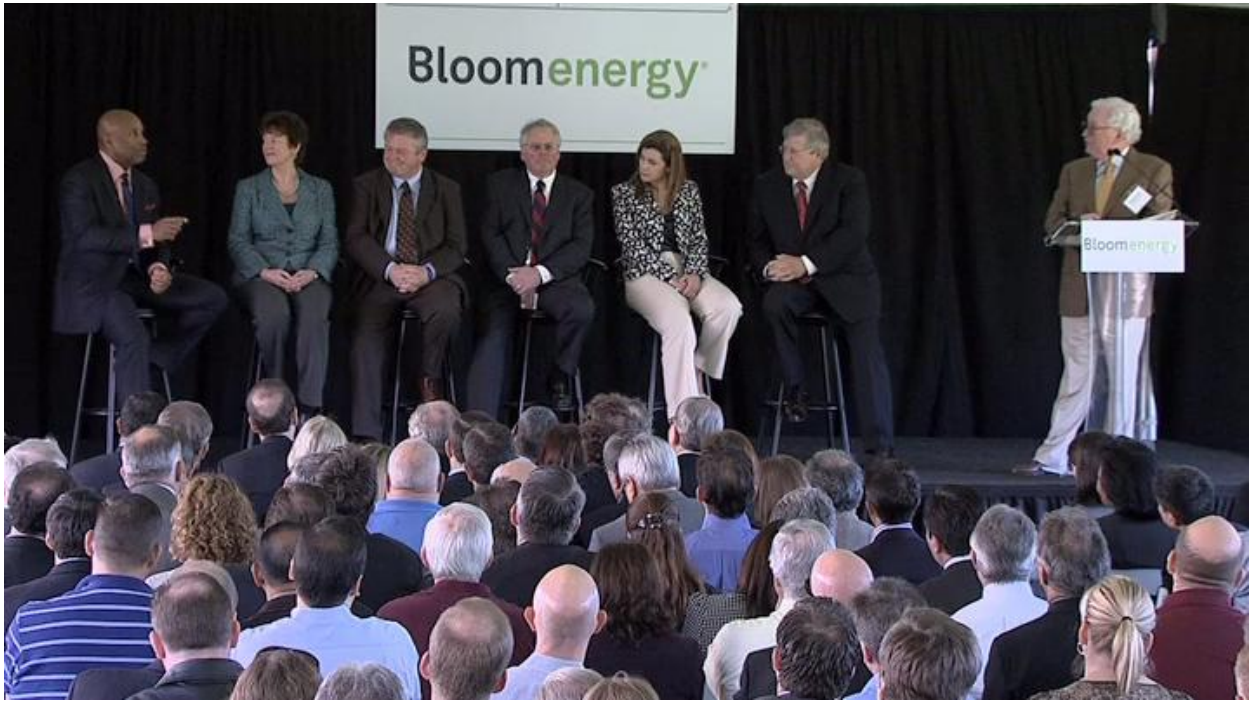
Non-combustion technology yields local benefits.

Clean Energy



Bloom Electrons – Announced Jan. 2011

Clean, Reliable, Affordable Energy Without the Initial Expense



Caltech Event – First Bloom Electrons Installation (2MW)

Honorable Michael R. Peevey, CPUC President; Dean Curry, Caltech; Kim Sentovich, Walmart; Glenn Barbi, BD; Marc Buckley, Staples; Kathy Gerwig, Kaiser Permanente; Rick Frazier, Coca-Cola

Announced Bloom Electrons Customers

Caltech

KAISER PERMANENTE

BD

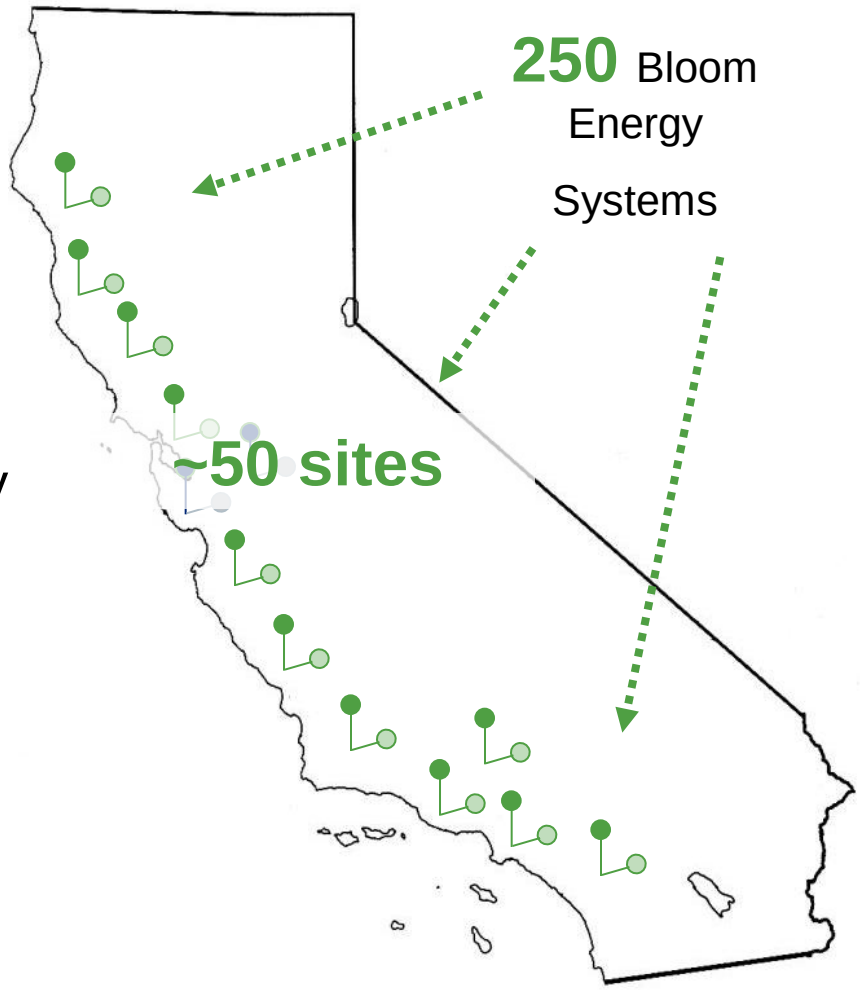
Walmart

The Coca-Cola Company

STAPLES

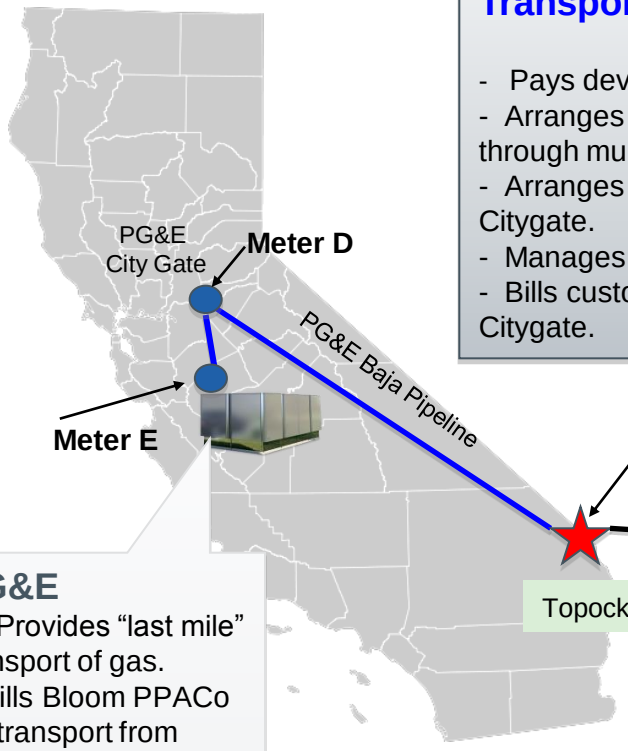
Bloom Electrons in California

- **Distributed portfolio** of assets
- **Investment grade** power buyers
- Delivery began in **2010,** full ramp by **early 2012**
- "**S**elf **G**eneration **I**ncentive **P**rogram" (SGIP) = cash up front
  - Makes use of incentive for "Directed Biogas."



1) Source: EIA

Biogas Purchase and Transport



Transporter

- Pays developer for gas.
- Arranges for transport to CA border through multiple pipelines (2-3 typ.)
- Arranges for intrastate transport to utility Citygate.
- Manages gas scheduling and balancing.
- Bills customer for gas and transport to Citygate.

PG&E

- Provides "last mile" transport of gas.
- Bills Bloom PPACo for transport from Citygate to meters.

Landfill Gas Developer

- Extracts biogas from landfill, cleans and injects it into the pipeline.
- Biogas sold to transporter.
- Developer attests that gas sold is renewable.

Biogas is transported and sold no differently than fossil gas.

Nature of Biogas Market

- CA landfills currently ineligible.
- Cleanup of other CA biogas currently difficult:
  - Wastewater biogas noxious.
  - Ag Waste biogas quantities lack economies of scale.
- Scattered supplies.
- Spotty demand.
- Regulatory uncertainty.

Therefore, market is thin and poorly developed. We are at the birth of a real CA biogas market, for SGIP and RPS.

Next Steps for Progress on Clean Air

- Remove prohibitions on pipeline injection of landfill gas.
  - CA landfills could provide gas for 11,500 MW of generation – ***five Diablo Canyon plants.***
  - On-site generation at landfills in non-attainment areas eliminated.
  - Gas used at most efficient sites.
  - Elimination of flaring.
- Promote development of new, in-state biogas sources.
- Extend SGIP incentives for directed biogas.

Bloomenergy®

Be the solution