



**PPP**

Biogas Cogeneration plant

**US-EPA / American University**

Technology Market Summit

May 14<sup>th</sup> 2012



# Primer

- Anaerobic digestion produces methane
- Wastewater Treatment Plants have a lot of solids associated with treatment of sewage.
- The investment in infrastructure to collect **wet organic waste** and to digest it under anaerobic condition has already been made in many areas.



# Public Private Partnership

- Most common is a power purchase agreement (PPA) used heavily in Solar Industry; risk on third party.
- We are using a public private lease model, only valid under the ARRA legislation where a true lease between a tax exempt agency and a taxable entity allowed for the deal to enjoy the benefit of tax incentive.



# Biogas Co-Gen

- Cogeneration is the simultaneous production of heat and electricity
- **Biogas** Cogeneration is the use of a renewable fuel to produce that heat and electricity.
- Biogas has zero carbon footprint.



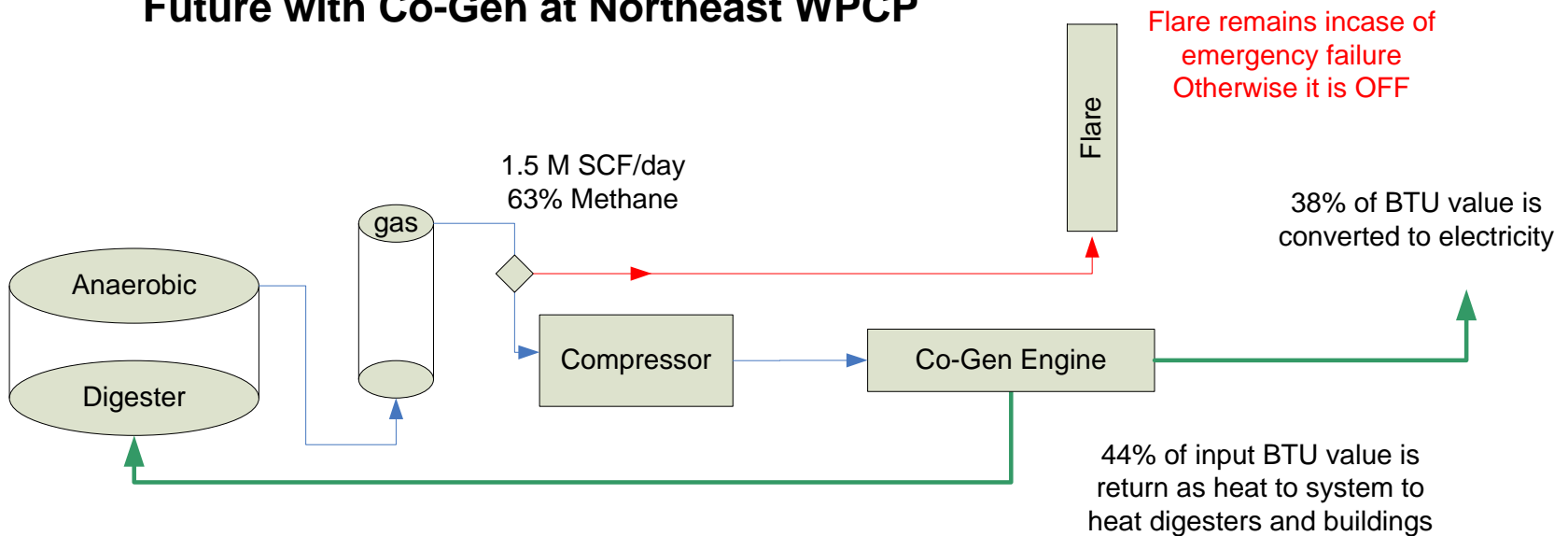
# Project History

- PWD utilized 50% of the digester gas – flare the rest.
- Considered purifying the flared gas to pipe line grade quality (2006), Designed to (30% of full design)
  - Not possible to ‘right size’, expensive and n.g. cheap.
  - No premium on anthropogenic gas (as there is for electricity)
- Evaluated effect impending removal of rate caps on electricity (2008); Moved Forward with Elec. Gen.
- Internal funding issues arose
  - Could not compete with mission critical capital plans
- Pursued PPP (late 2009)



# Schematic of Biogas Co-gen System

## Future with Co-Gen at Northeast WPCP





Aerial View of Site from East

Aerial View of Site from West



Enlarged Aerial view of Site from East



Aerial Views of Site



Perspective Rendering: View from North



# Time Line of PPP Deal

- Issued an RFP 9/17/2010 closed 12/2/2010
- Intent to Contract 4/7/2011
- Issuance of Ordinances to City Council on 6/16/2011
  - Bill 110517 - Site lease
  - Bill 110518 – Equipment lease
- Art Commission 10/5/2011
- Bills passed by City Council on 11/17/2011 (13:2)
- Air permit issued and Building Permit Issued 11/28/2011
- Deal Signed **12/23/2011**
  - \$2.48 M wired to city to purchase Design drawings at **2:50 pm**

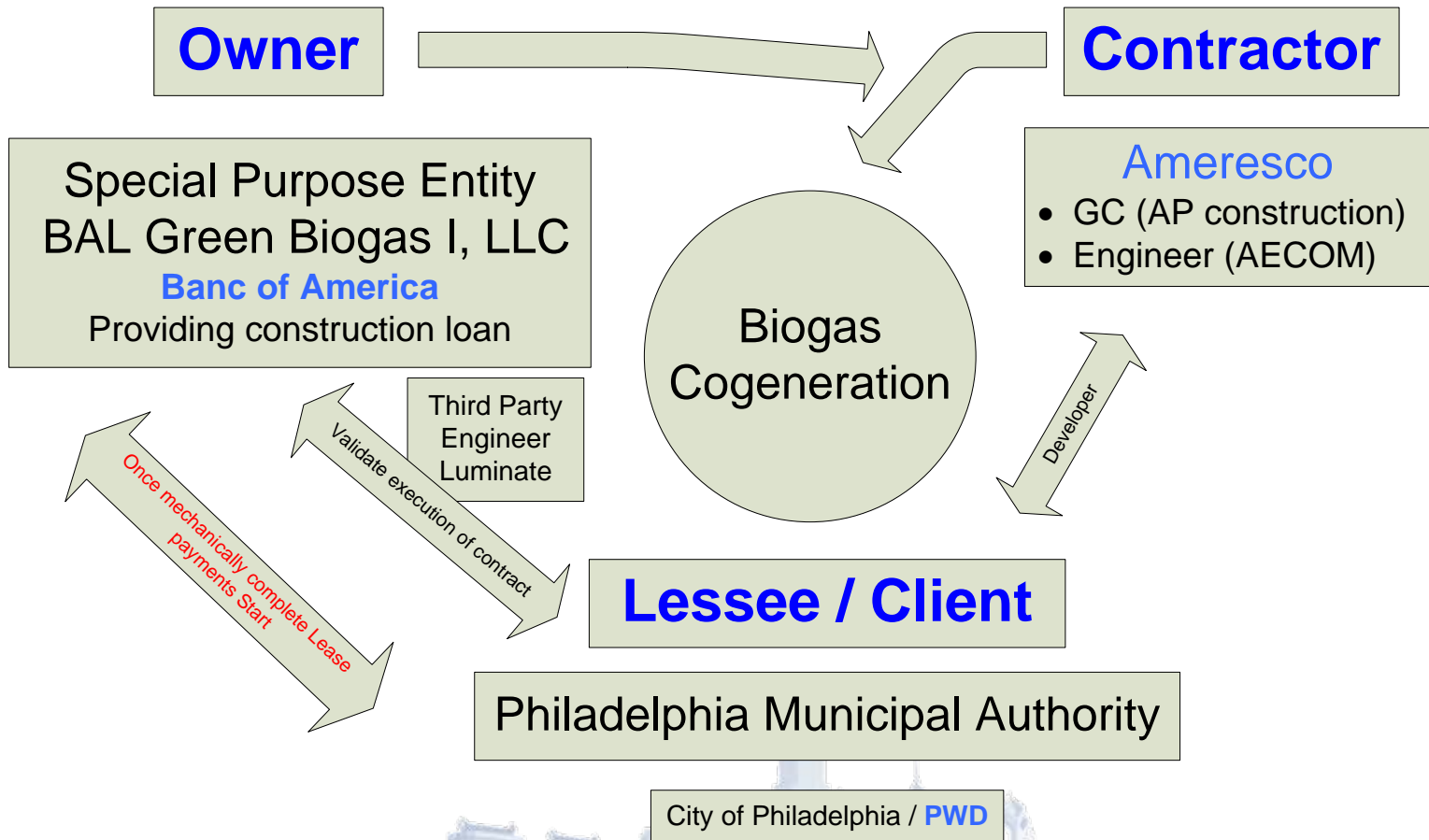


# Cash flow

- Project will be paid out of operating funds
  - the electrical budget line
- Lease payments fixed
- Maintenance cost variable as reflected by magnitude of work required, the engines are rebuilt every 60,000 hours (~ 8 years)



# Diagram of relationship for the construction of Biogas Cogeneration



# Risk Distribution

- The developer takes on the risk of system integration, operability and project schedule
  - less risk to City than standard public works.
- Engineer of record retains liability of design.
- City accepts risk of grant qualification and must not be obstructive in construction process (PPA for same plant was more expensive)

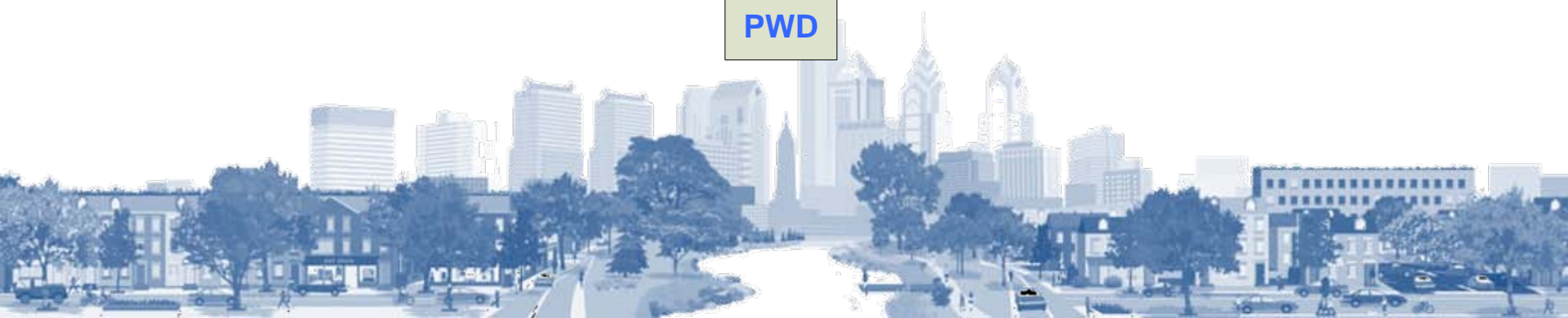
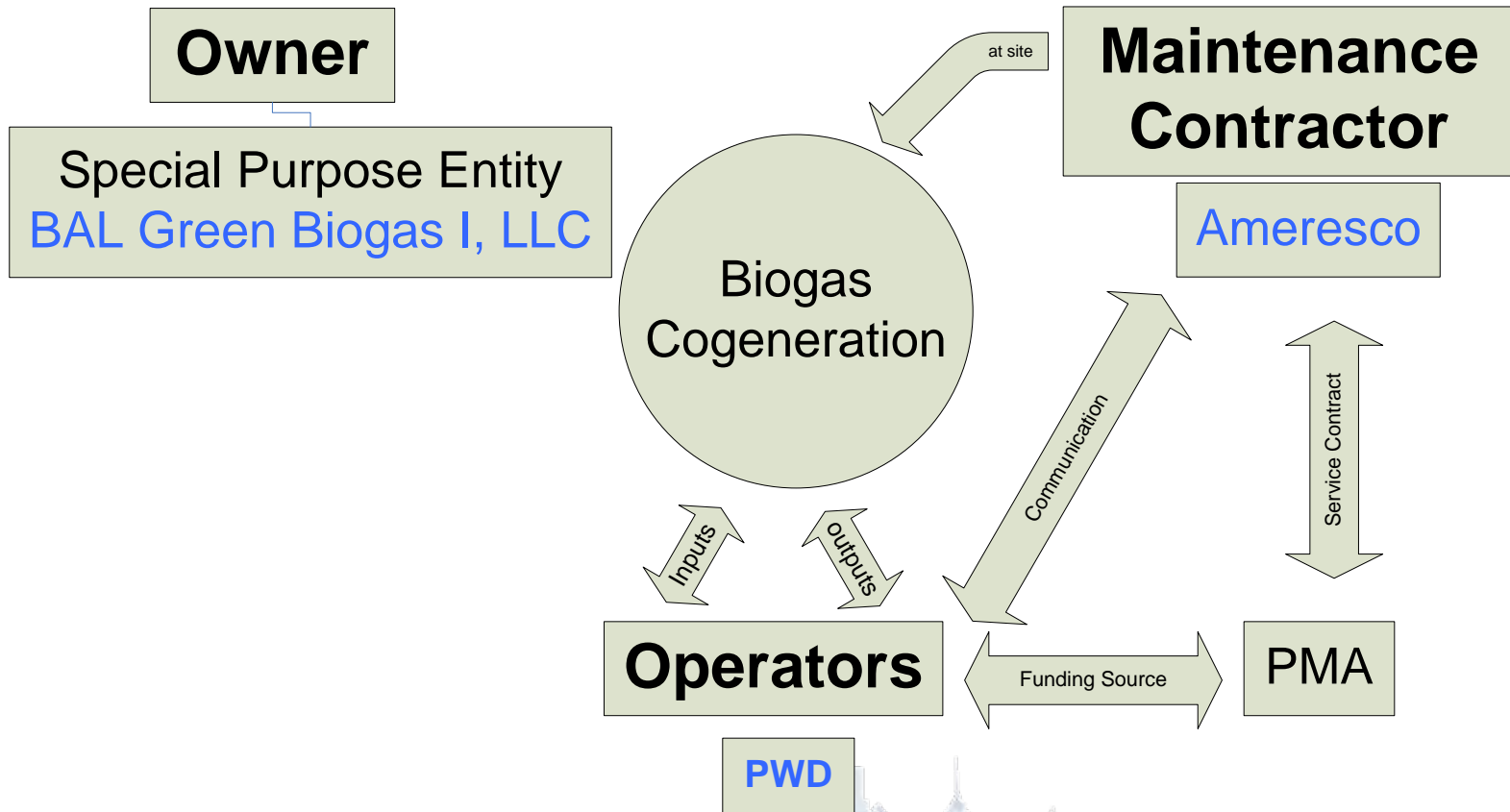


# Maintenance Contracts

- Ameresco maintains the Biogas Cogeneration facility for 16 years (term of lease).
  - On site 40 hours a week
  - Access to service off hours
  - Responsible for all maintenance
- PWD operates the facility
  - Selecting number of units and fuel source
  - Monitors for alarms



# Diagram of relationship for the **operation** of Biogas Cogeneration



# Carbon is Source of Bio-fuel

- PWD currently accepts ADF directly into anaerobic digester from Philadelphia International Airport.
- City of Philadelphia is participating in an InSinkErator pilot project that will increase the delivery of easily digested domestic biomass via the sewers to the WPCPs. Sewers are designed to collect wet organic waste. (food waste is 70% water before FWD)
- City of Philadelphia is considering food-waste co-digestion options for commercial waste.



# Vision for Future at PWD

- Net Energy Neutrality at Wastewater Facilities; accessing Energy within waste
  - Kinetic
  - Thermal
  - Latent Chemical – AD and Biogas cogen
- Resource Recovery Facilities
  - Energy
  - Nutrients
- Industrial Eco-Complexes
- There is a need for renewable fuel to be appropriately valued.





# Take Home

- PWD's PPP deal is a complex, one-of-a-kind, deal that is best used to explain the struggle.
- Providing access to capital that does not “compete” with mission critical infrastructure is useful in the development of sustainable infrastructure.
- Allowing municipal utilities to compete along with taxed entities for grant money. Current ITC/NPC grant structure is for taxable firms only.
- The groundwork of existing infrastructure is in place to expand renewable fuel-derived distributed energy generation throughout country.

