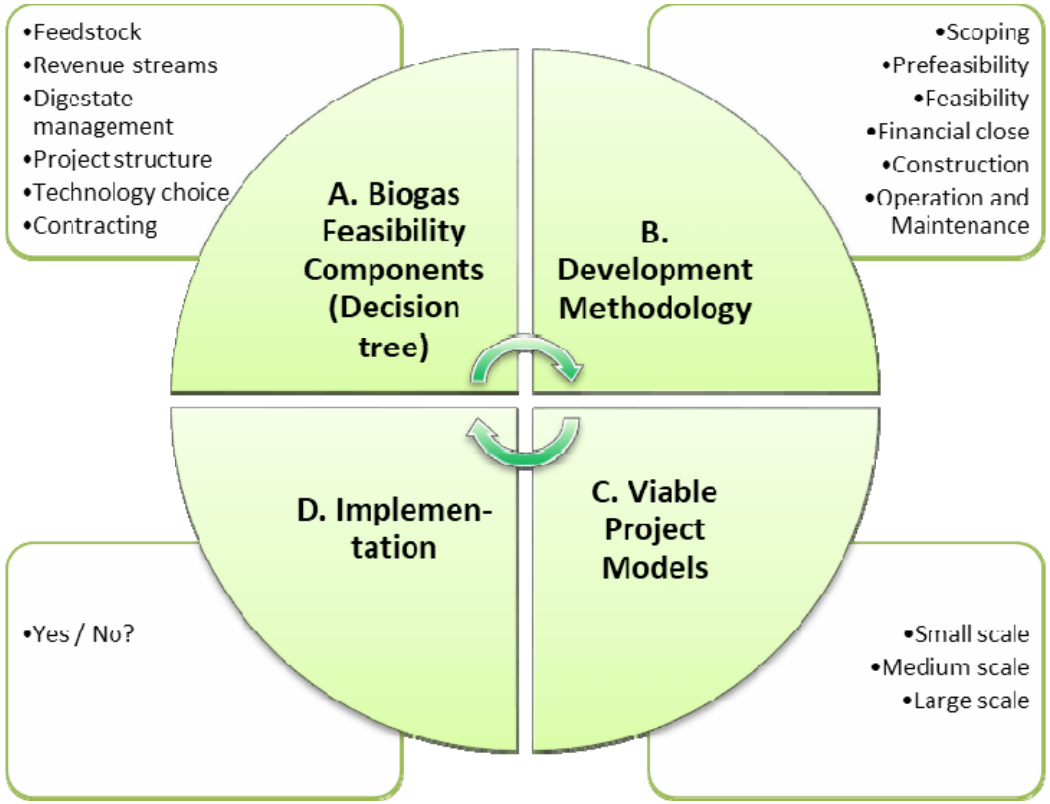
Promoting organic waste-to-energy and other low-carbon technologies in small and medium and micro-scale enterprises (SMMEs): Accelerating biogas market development

Policy Context/Legislative/Limitations

- Compliance and enforce the regulations on waste management and disposal.
- Interpretation of digestate as “hazardous waste”.
- Framework on biogas to Energy – vs – Alternative renewable energy framework.
- Education on substrate & the use of it is also critical for long term sustainability of biogas industry. To little is known by potential clients. Hence, reluctance to “purchase” digestate as an organic fertilizer. Therefore, a very large portion of the revenue stream is not been realised.
- Norms and standards on digestate are yet to be developed.
- Work on potential biogas generation from various feedstock is being undertaken by the Agricultural Research Council in liaison with University of Pretoria.
- Insurance is also still a problem where insurance companies are not willing or do not understand our challenges and what we need to have insured, operator error also have significant impact.
- Skills requirement, training for AD operators, artisan skills on biodigestor construction.

The Project Development Life Cycle

(Please refer to supporting document – Project Document Methodology which assists in determining whether or not a project is ready to proceed. M&E would apply during construction & operation).



Technology Demonstration

1. Ibert/Cavalier Abattoir – Operational

(Province – **Gauteng)**

2. Renen-Midlands Biogas Project/Sunshine Nursery Services – Operational (Province – **KwaZulu Natal)**

3. GCX/Elgin Fruit Juices – Planning stage

(Province – **Western Cape)**

4. GCX/Winelands Pork Abattoir – Planning stage

(Province – **Western Cape)**

- **Call for Project proposals**: x2, at contracting stage

Demonstration Projects

- **Feedstock types:**
  - Abattoir waste – GCX/Winelands
  - Fruit waste – GCX/Elgin
  - Mixed farm waste – Renen/Sunshine
  - Dairy waste – Lebone/Limpopo Dairies
  - WWTP (waste water treatment plant) co-digestion – JS Moroka
  - Piggery waste – none yet
  - Poultry waste – none yet
- **Digester technology:**
  - UASB(Upflow anaerobic sludge blanket reactor) – Elgin; JS Moroka
  - IBR – Sunshine; Limpopo Dairies
  - Lagoon – none so far
  - Dry fermentation – none so far
- **Biogas target market:**
  - CHP (Combined heat & power) on-site/wheel surplus – Sunshine; Limpopo Dairies; JS Moroka
  - Package biogas for off-site sale – JS Moroka
  - Upgrade for own vehicle fleet - Elgin
  - Upgrade/compress/bottle for off-site market – none so far, one project being considered
  - Upgrade for vehicular fuelling – none so far
- **Digestate use options:**
  - Wet/solid fraction separated for own use – Sunshine
  - Wet/solid fraction separated for off sales – Limpopo Dairies; Elgin; JS Moroka
  - Ash from pyrolysis for brick making - Winelands

Observations:

- Most feedstock is seasonal in terms of abundance/availability making it necessary to supplement with other types of feedstocks
- Complicates management and increases risks of system shock
- May require stockpiling of the supplementary feedstock during peak season of own feedstock
- Relationship between feedstock type and digester technology is normally influenced by the relationship between project developer and EPC (Engineering, Procurement & Construction) contractor
- The combination is then negotiated with the owner/investor
- The owner/off-taker arrangement has been the most successful so far
- Off-site sales have not yet been demonstrated practically – complex framework
- This will be tested when other forms of the product become available, i.e., upgraded biogas; biomethane; compressed; bottled
- The quality/value of digestate has not yet been determined/agreed upon between the producers and target market
- Admission of pyrolysis was as a result of biogas viability challenges under certain conditions
- In the final analysis these projects are subject to complex investor approvals that determine whether and how they are implemented

Demonstration Project: Ibert Case study

- **Feedstock types:**
  - Abattoir waste – Ibert/Cavalier;
  - WWTP (waste water treatment plant) co-digestion – Ibert
- **Digester technology:**
  - UASB(Upflow **anaerob**ic sludge blanket reactor) – iBert Cavalier
- **Biogas target market:**
  - CHP (Combined heat & power) on-site/wheel surplus – iBert Cavalier;
- **Digestate use options:**
  - Wet/solid fraction separated for off sales – Cavalier

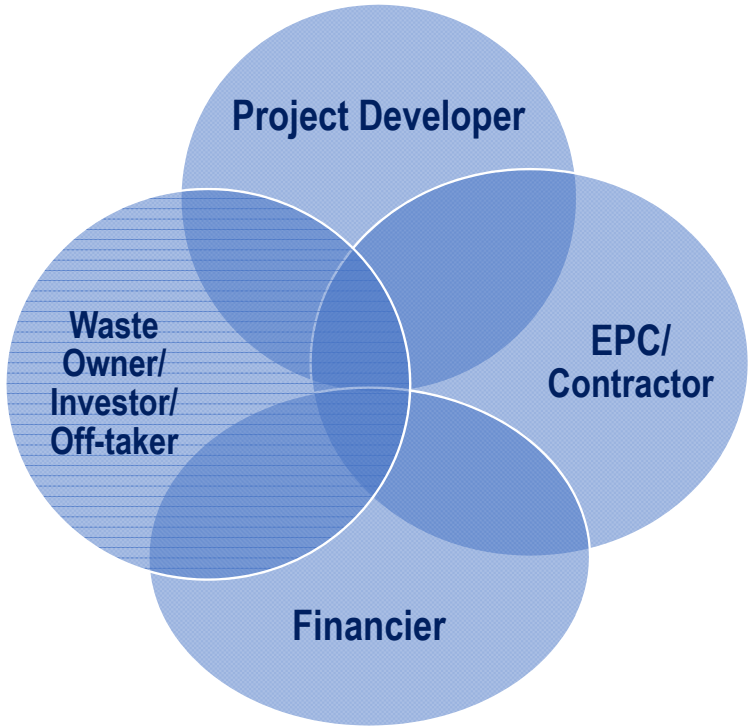
Observations:

- Construction of the biogas plant completed end Oct 2017
- Biological commissioning of the plant commenced in November 2017 with filling of material
- Material was pumped from the existing digester 1 into the new phase 2 digester
- Heating and mixing in Phase 2 digester was done until first gas production in mid-January 2018
- The 2 CHP units are currently running on biogas producing electricity and heat supplied directly into the abattoir's network.
- Optimization underway to realise full
- biogas generation (

Crucial Partnerships in a Biogas Project

The balance of relationships:

- The Project Developer leads the process of building the partnership
- Waste producer / Investor / off-taker feels most exposed
- Financier tends to impose terms that may scare investor away that impinge on the core business and balance sheet
- EPCM tends to be close to Project Developer from design stage

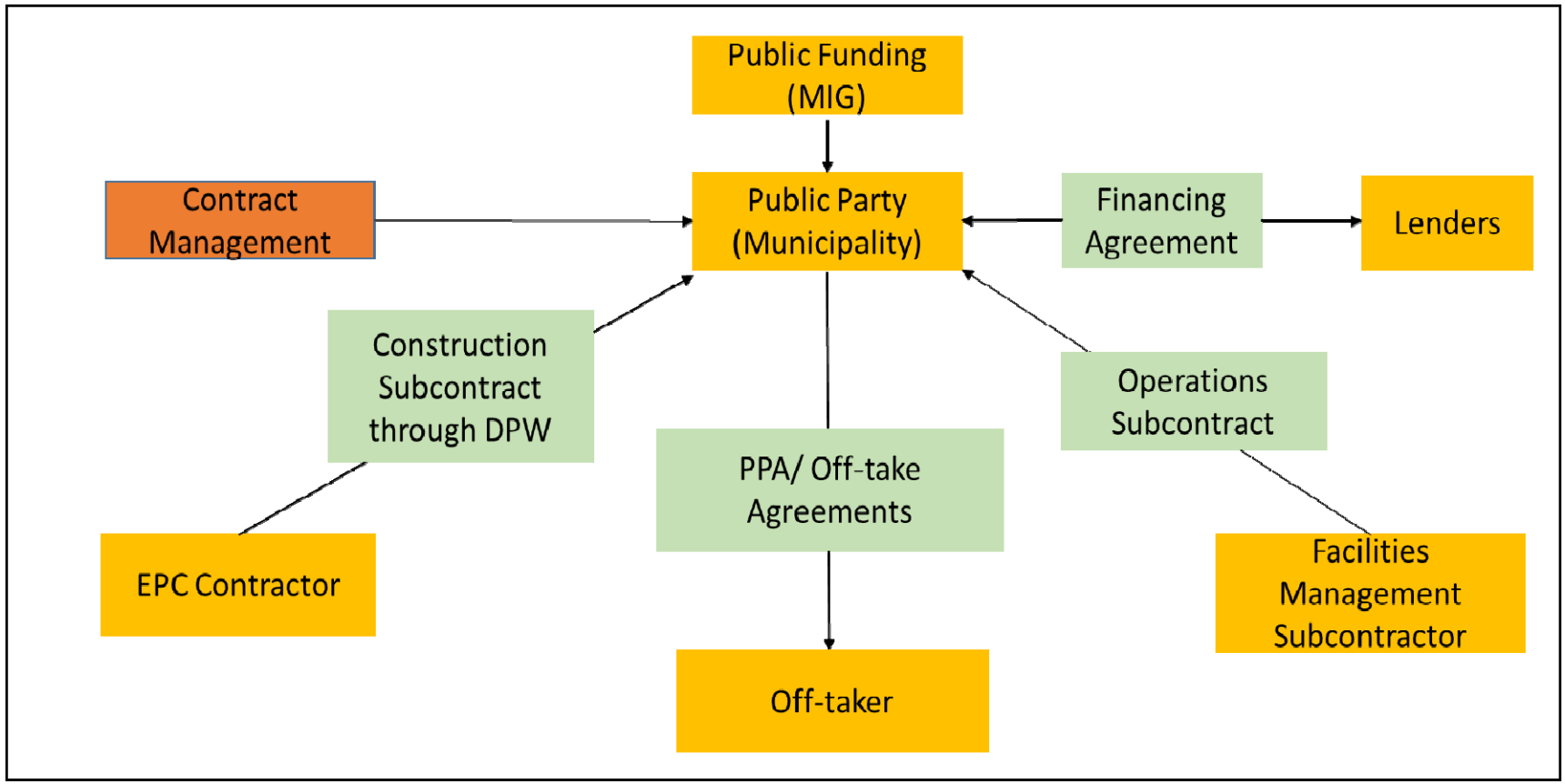


Variations:

- Public Sector Comparator (PSC) – Fully Government financed, owned and operated
- Public Private Partnership (PPP) – Centred around a PPP/SLA agreement between Government and Private Sector parties
- Joint Venture (JV) – Shareholders' between Government and Private Sector

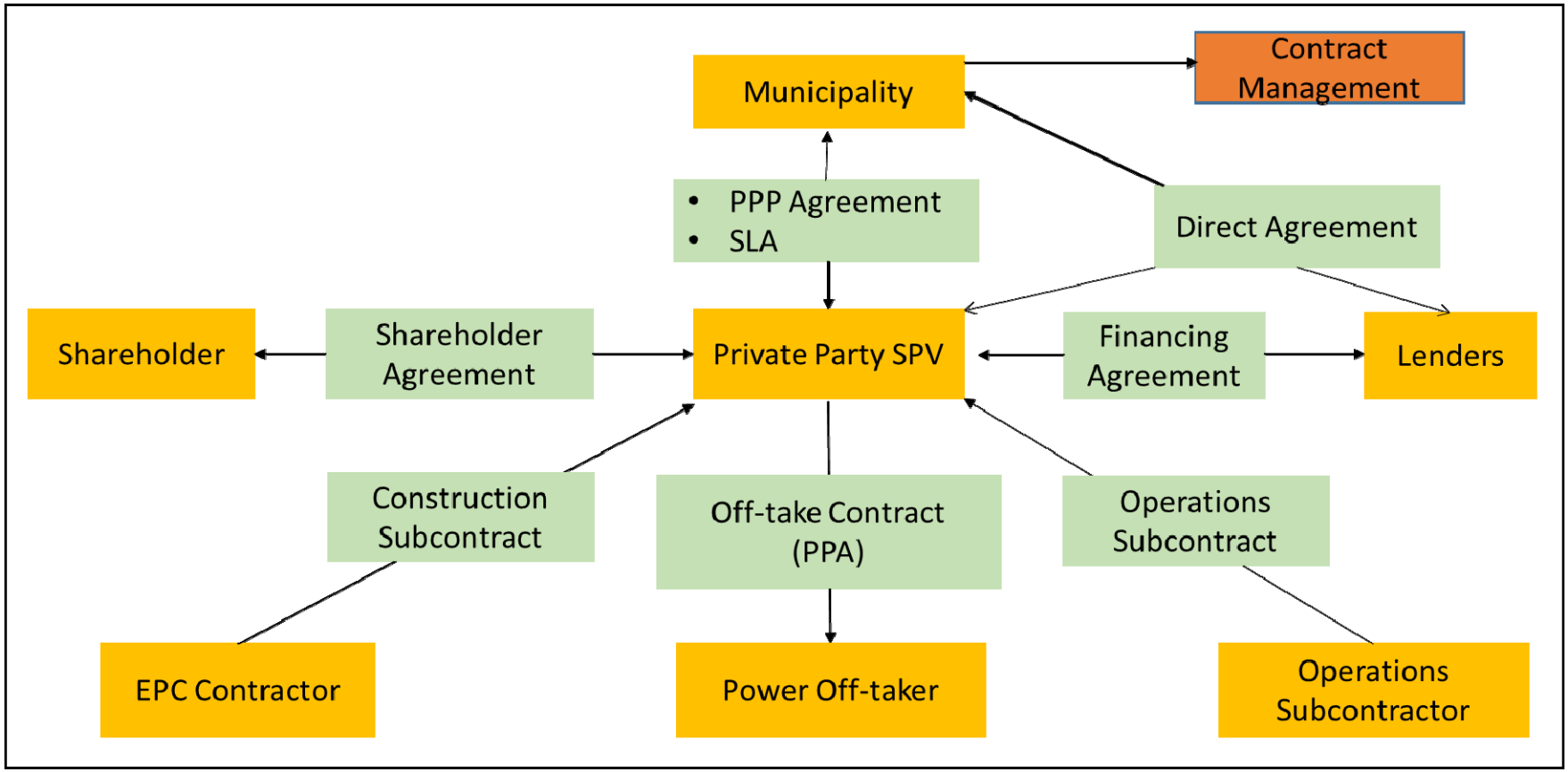
Public Sector Comparator (PSC) Option

(Slides 8 – 10 consider project owner & operations options)



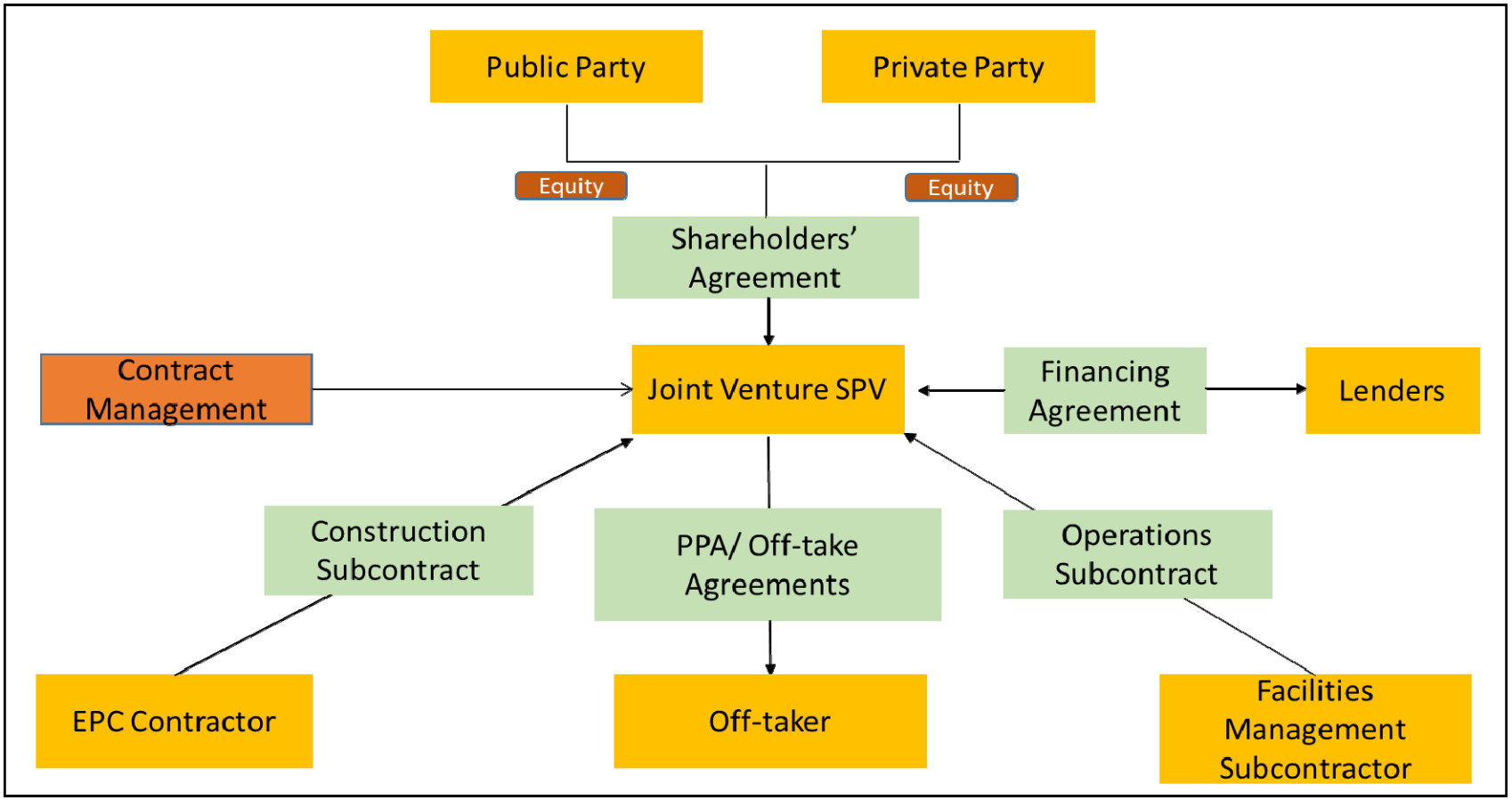
Public Private Partnership (PPP) Option

(Slides 8 – 10 consider project owner & operations options)



Joint Venture (JV) Option

(Slides 8 – 10 consider project owner & operations options)



Thank you