Global drivers of urbanization

- **1.5 million** people per week moving to cities
- **65%+** of world population living in cities by 2050
- Paris Agreement—global emissions reductions
- UN SDGs—clear, implementable plan
- Public funding gap
- UN SDG 17—Private sector participation
- Citizens increasing use of technology
- Mix of technology and traditional infrastructure

**Increasing urbanization**

**Sustainability focus**

**Public private mix**

**Technology-led citizen services**
City Development | Putting the Citizen at the Centre
Three goals provide the foundation for a city initiative: Economic competitiveness, sustainability, and quality of life.

**City Development Goals – Citizen Centric**

### Economic Competitiveness
- Attract and keep companies and workforce
- Foster innovation and entrepreneurship
- Private sector participation in service delivery and financing

### Sustainability
- Save energy and natural resources
- Recycle and reuse assets
- Reduce Emissions

### Quality of Life
- Improve health, safety, and education
- Create operational efficiency and timesavers
- Better citizen services

**PEOPLE**

**PLANET**

**PROFIT**

PEOPLE

- Quality of life
  - Improve health, safety, and education
  - Create operational efficiency and timesavers
  - Better citizen services

PLANET

- Sustainability
  - Save energy and natural resources
  - Recycle and reuse assets
  - Reduce Emissions

PROFIT

- Economic competitiveness
  - Attract and keep companies and workforce
  - Foster innovation and entrepreneurship
  - Private sector participation in service delivery and financing
Financing challenge

Public infrastructure financing challenge

• Revenue models—beyond exchequer funding
• Value capture—joined-up thinking
• Financing structures
• Procurement structures
• Value for money

Increased Technology financing challenge

Increased technology component—shorter-term infrastructure
Varying attractiveness to lenders and investors
• Revenue models not clear
• Evolution from pilot to full roll out—different players required
• Determine value of data/IP asset created
• Blending private finance types together
Model for delivering a successful sustainable infrastructure project

1. Understanding project and value
   - Understand business model
   - Does funding gap exist
   - Risk transfer potential
   - Return available
   - Understand value generated
   - Direct value capture
   - Indirect value capture
   - Asset recycling to fund investment

2. Consider funding & finance options
   - Public funding
   - Private financing
   - Monetize value

3. Determine relevant procurement & delivery method
   - Public provision
   - Operating contracts
   - Joint venture
   - Long-term lease
   - Public-private partnership
   - Franchising
   - Privatization
Value capture
Capturing the value of gains from an infrastructure investment, and directing those funds to infrastructure investment.

Direct value capture
Indirect value capture
Asset recycling
Supply of infrastructure finance

Multiple sources and types of finance available.

Appropriate match to financing source

- Government funding
- Grant funding
- Senior debt
- Bonds
- Export credit
- Vendor financing
- Alternative lenders
- Mezzanine finance
- Multilateral finance
- Infrastructure funds
- Sponsor equity
- Exchequer financing

Funding

Equity

Hybrid

Debt
Varied procurement solutions
Different levels of private sector participation

- Direct delivery
- Conventional Procurement
- Operate Contract/licensing
- Long-term lease
- Joint venture
- PPP
- Franchising
- Privatizations (sales)

Risk transfer
Innovation
Leveraging public capital to unlock private sector participation

Can exchequer funds be applied more effectively?

**Single project solution**

Exchequer funding/support → Project → Private sector participation → Private finance

**Multiple projects solution — capital program view**

Exchequer funding/support → Project → Project → Project → Private sector participation → Private finance
Alternative solutions | Leveraging public capital

- Scale up investment in project preparation and pipeline development
- Project-preparation facilities and technical assistance to increase the “bankability” of projects
- Partial revenue support
- Finance incremental cost support
- Increase of grants—emerging technologies, non-public retrofit
- Use of guarantees—revenue, loans
- Create secondary market for sustainable infrastructure projects—anchor syndicated loans
- Public policy insurance
- Public equity/subordinated equity fund
Dublin Waste to Energy PPP Project
Reduce landfill and address Dublin's non-recycled waste

- 600,000 tonne Waste to Energy Facility
- Procured by Dublin City Council, Ireland
- Design, build, finance and operate for 45 years
- Covanta Energy successful bidder
- Demand risk on waste transferred (some supports for 15 years)
- Revenue sharing on Energy sales for contract period
- 58 MW Energy production capacity (80,000 homes)
- District heating potential for 50,000 homes
Dublin Waste to Energy PPP Project

What is involved in WTE?

Waste-to-Energy is the process of generating energy in the form of electricity and/or steam from the combustion of non-recyclable residual waste.

Recovers the value in the waste remaining after recycling by recovering clean energy.

Use air pollution control equipment that scrubs and filters exhaust gases to achieve superior environmental performance, which is fully protective of human health and the environment.

Provides a safe, technologically advanced means of waste disposal that reduces greenhouse gases, generates clean energy and recycles metal.

Widely recognized as a technology that can help mitigate climate change. Waste combusted at a WTE facility does not generate methane, as it would at a landfill; the metals that would have been sent to the landfill are recovered for recycling instead of being thrown out; and the electricity generated offsets the greenhouse gases that would otherwise have been generated from coal and natural gas plants.

Energy produced at waste-to-energy facilities is reliable baseload power, (generated 24/7). Provides opportunity to sell electricity onto the grid, but also provide steam delivered to houses, public buildings and industry.
Dublin Waste to Energy PPP Project

Benefits of the Project to Dublin City

**Waste Disposal**
Process 600,000 tonnes of solid waste that cannot be sensibly recycled, moving the Dublin region away from dependence on landfilling waste.

Fulfills a key part of the Dublin Regional Waste Management Plan which includes reducing waste, maximising recycling, minimising landfill, and generating energy from residual waste.

Eliminates the need to export waste to other countries, enabling the Dublin region to become self-sufficient in managing waste and achieve compliance with EU landfill diversion targets.

**Energy/Heat Generation**
Safely converts non-recyclable waste into c60 megawatts of electricity which is exported into Ireland’s national grid – enough to power 80,000 homes.

Avoids the importation of 250,000 tonnes of fossil fuels, such as coal that would be needed to generate the same volume of electricity.

Capable of generating 90 megawatts of district heating - enough heat for 50,000 homes.
Dublin Waste to Energy PPP Project

Benefits of Project to Dublin City

**State-of-the-art Design and Technology**

Designed to achieve very high overall energy efficiency and energy recovery, operating 24 hours a day, seven days a week.

Employs state-of-the-art pollution control equipment to scrub and filter emissions to be fully protective of human health and the environment and exceed stringent EU emissions standards.

Minimizes water usage by using all the surface water and rain water from the site, as well as reusing water from the neighboring waste water treatment plant. Cooling water will be drawn from the local river estuary which reduces the energy requirement for cooling and maximises power output.

**Benefits to the Community**

Provides 100 jobs – 60 full-time at the facility and 35-40 full-time contractor and service support roles.

More than 300 jobs were created during construction, of which more than 50 jobs were given to local people. Many have secured permanent employment at the facility.
Dublin Waste to Energy PPP Project

Long timeline with lots of obstacles

Dec 2017  Covanta completed refinancing and sells 50% equity stake in the project to GIG

Sep 2014  Financial Close reached

May 2014  European Commission rules that support measures provided by Dublin City Council are in line with state aid rules. Measures include provision of a waste revenue guarantee, a waste and electricity revenue sharing mechanism and a profit sharing schedule

Mar 2014  Dublin city councillors voted to abandon the Dublin WTE project

Feb 2013  First Reserve joined Covanta as equity provider

Oct 2012  Irelands National Pensions Reserve Fund (NPRF) joins the lending club. Other lenders include Bank of Ireland, Ulster Bank, Allied Irish Bank, Barclays and GE Energy Financial Services

Sep 2007  Commercial Close - Covanta and DONG Energy

Mar 2006  DONG Energy acquired Elsam A/S

May 2005  Elsam A/S Appointed as preferred tenderer

Oct 2002  Prequalification of bidders commences
Dublin Waste to Energy PPP Project

Key risk transfer to achieve deal

- Supply / Volume Risk
- Gate Fee risk
- Recycling

- Construction Risks
- Environmental
- Technology

- Demand Risk
- Offtake Covenant
- Level of residual waste
Dublin Waste to Energy PPP Project

Blended Financing Structure

<table>
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<tr>
<th>Type</th>
<th>Value (€m)</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Equity</td>
<td>75m</td>
<td>Covanta</td>
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<tr>
<td>Convertible Loan</td>
<td>75m</td>
<td>First Reserve Corp</td>
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<td>Sub-Debt</td>
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<td>Sub-Debt</td>
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<td></td>
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<td>Barclays</td>
</tr>
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<td></td>
<td></td>
<td>RBS/Ulster Bank</td>
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<tr>
<td>Total</td>
<td>500m</td>
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Dublin Waste to Energy PPP Project

Lessons Learned

- **Long Term Project**
  - 45 Year Term
  - 12 year Procurement
  - Flexed deal and procurement to deliver

- **Environmental Solution**
  - Sustainable Focus
  - Reduced Landfill
  - Utilisation of Heat and Energy Produced

- **Blended Financing Solution**
  - Multiple sources of Finance
  - State funds used as cornerstone during financial crisis

- **Value Capture**
  - Revenue Share
  - Refinancing Gain Share
  - Supply and demand risk transferred
In conclusion