

Creating sustainable social housing from coal ash

Submission to AGL Macquarie Bayswater
Power Station upgrade:

Coal Ash recycling production targets

July 2020



The Opportunity

- Provides opportunity for 100% repurposing of fly ash for beneficial reuse without further processing.
- Edos Global and Nexsys Industries have partnered to develop and bring to market a robust and sustainable solution to Australia's social housing crisis, putting sustainable, energy efficient housing back in reach of thousands of Australians.
- The NeoPanel Building system, developed by Edos Global Sustainable Solutions, dramatically reduces the cost to produce and construct housing, using standardised, prefabricated panelling systems.
- Partnering with Community Housing Providers we will deliver social housing that costs less for tenants to live in, lasts longer and is cheaper to maintain, all with a dramatic reduction in the cost of construction through our innovative process.
- We are seeking partnerships to maximise coal ash recycling for sustainable social housing solutions.



Utilising Coal Ash

- Provides opportunity for 100% repurposing of fly ash for beneficial reuse without further processing.
- During development of the NeoPanel Building System, coal ash was identified as an ideal component material for ELC—the insulation in-fill for the NeoPanel.
- Edos Global, in collaboration with CHT Australia, have developed AquaZero, a geopolymer cement blend – the core component of Edos Lightweight Cement (ELC).
- In the production of ELC, fly ash is bound into a stable, thermally and acoustically efficient and fire resistant material – perfect for a new innovation in housing construction.
- Potential to be extended for fly ash pond mining and utilisation, removing waste management challenges in the long term.



Benefits of Coal Ash Utilisation

- Eliminating the environmental legacy of Coal Combustion Residue.
- Significantly reduce the carbon footprint from construction, transport and ash disposal methods.
- Eliminate and or reduce reliance on natural resources i.e. potable water use in ash sluicing.
- Recycling industrial by-products that otherwise be sent to land-fill.
- Promoting energy efficiency across the building materials industry.
- New supply chain for developing affordable housing initiative



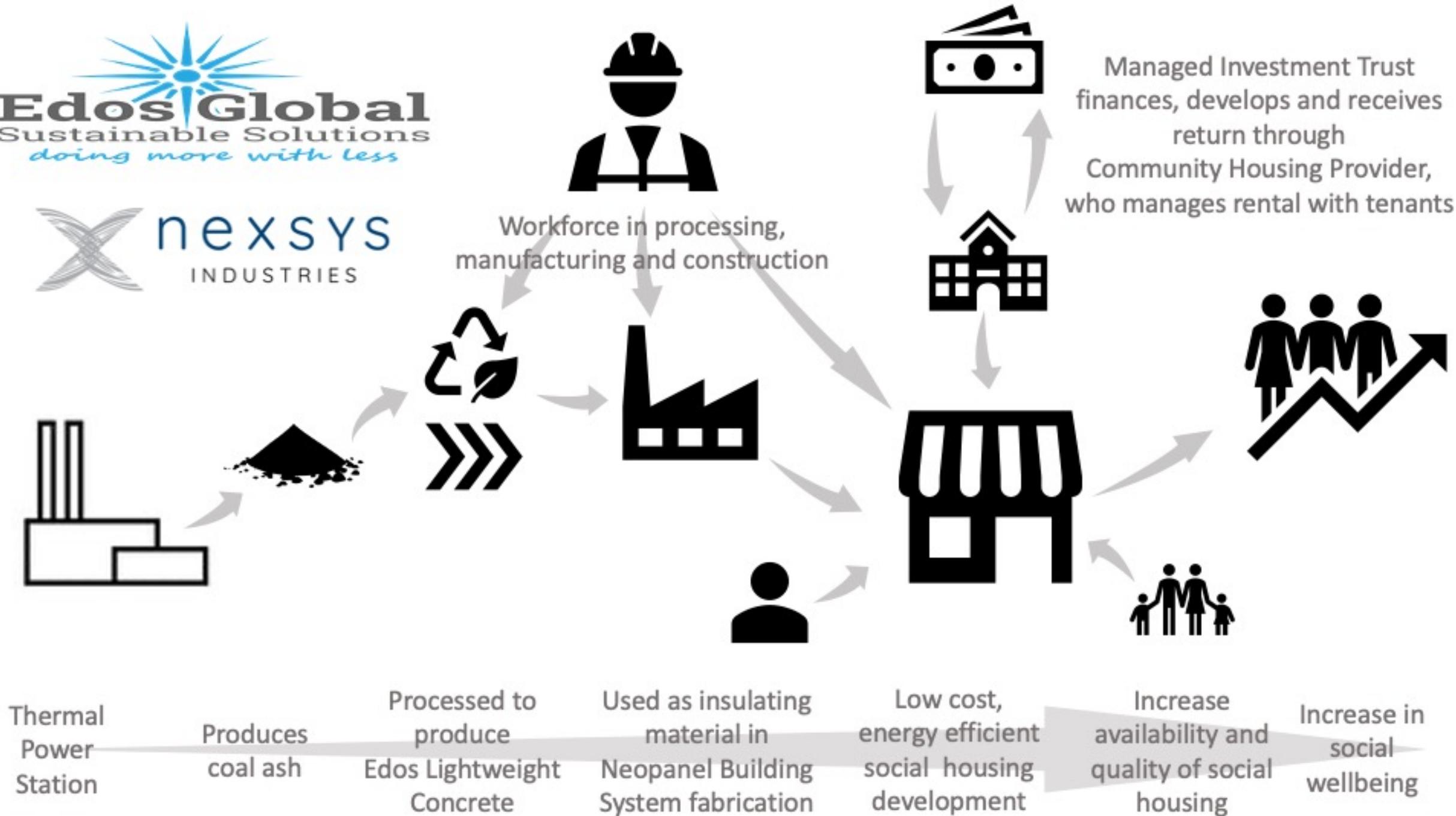
Recycling Coal Ash for Social Housing

- With coal-ash based ELC as the insulation component of NeoPanels, a new innovation in coal ash recycling and housing development is enabled.
- Utilising NeoPanels and the production system designed by Edos Global, a 2 bedroom house can be built for less than the market rate.
- Partnering with Community Housing Providers, the cost of delivering new social housing is reduced and solutions for Australians experiencing housing vulnerability can be delivered, helping local, state and federal governments and our communities achieve growth targets in housing provision.



Edos Global
Sustainable Solutions
doing more with less

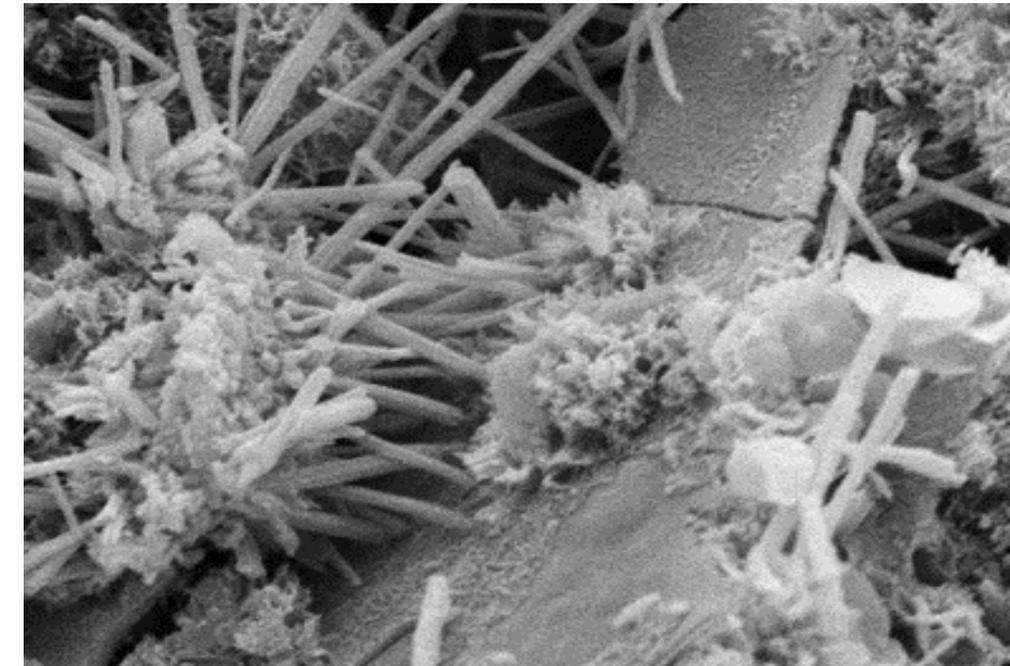
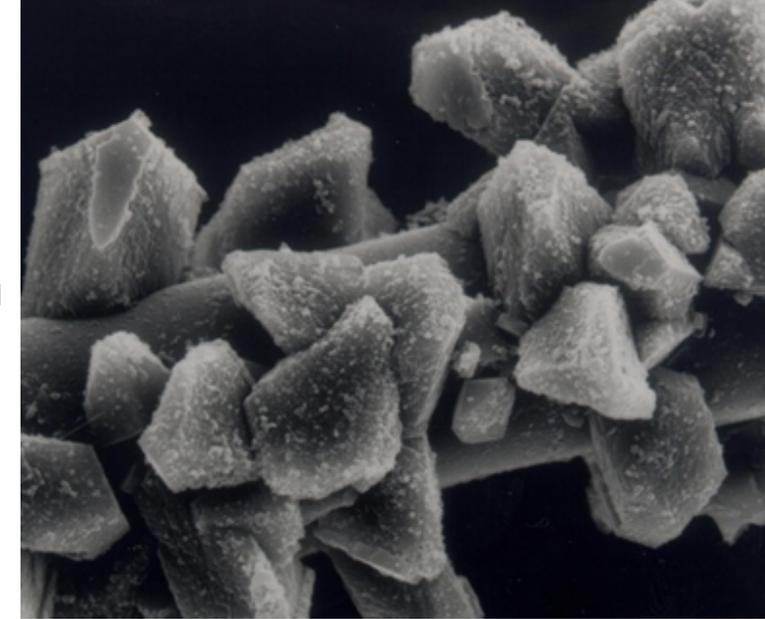
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AquaZero Cellular

- Partnership with CHT Australia
- An innovative geopolymer cement blend
- Is 10-95% lighter in final product than when traditional Ordinary Portland Cement (OPC) is used.
- Is low carbon - produces 80-90% less carbon dioxide than OPC in manufacture.
- When used to manufacture Edos Cellular Lightweight Concrete it:
 - ✓ Improves resistance to fire and aggressive chemicals.
 - ✓ Is thermally efficient
 - ✓ Provides high acoustic absorption
 - ✓ Can provide for density management for strength differentialion depending on build requirements – low deadweight or high strength for multi-level developments.

Cement only
stabilization- low crystal
interlocking
connectivity

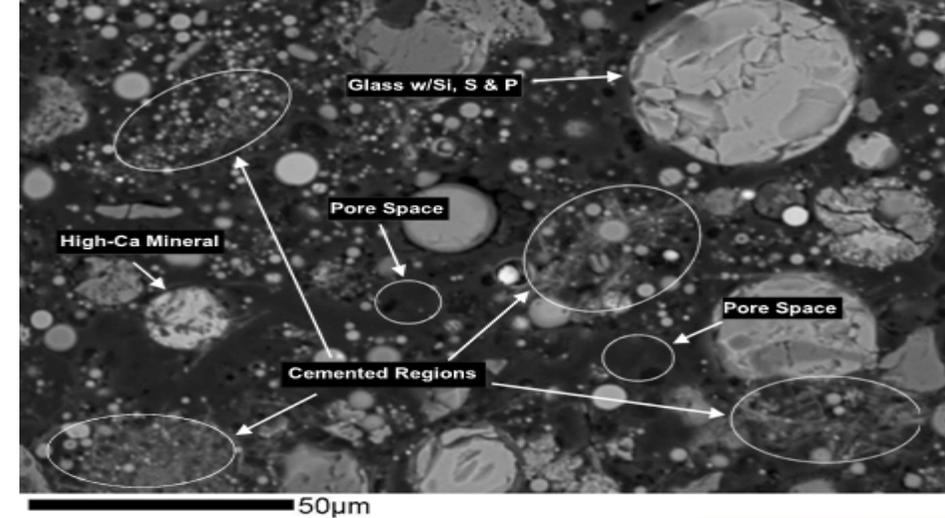


AquaZero-high crystal interlocking connectivity

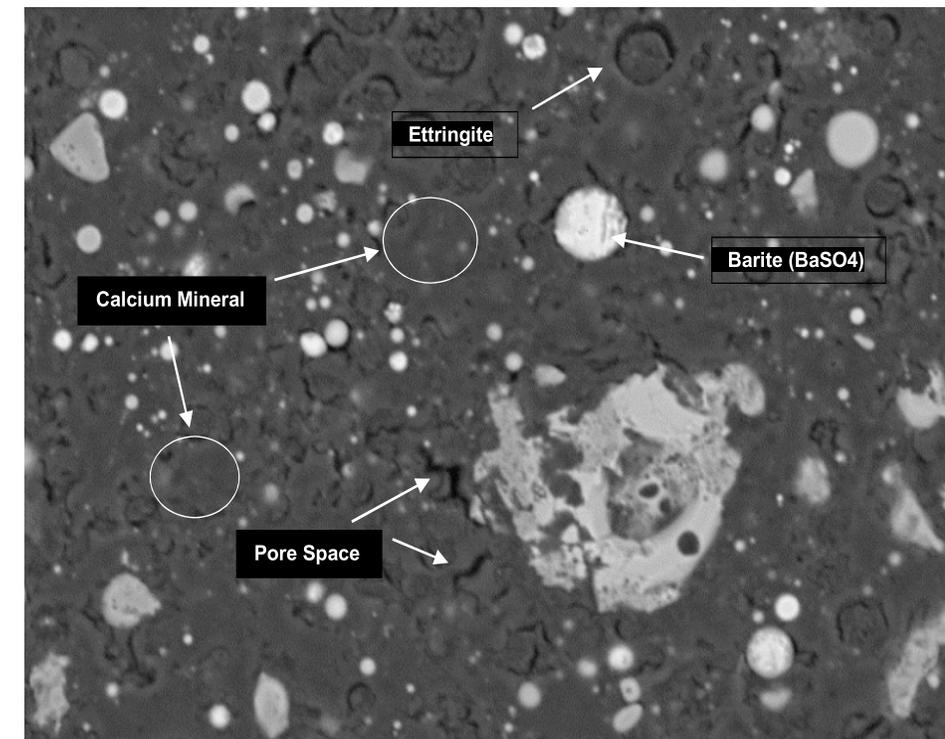
AquaZero benefits

- Combined stabilization of ash and wastewater
- Reduction of water use by 90 percent compared to traditional practice
- Zero discharge of transport water
- Significant reduction of plant-wide wastewater
- Low hydraulic conductivity (10^{-4} to 10^{-10} cm/sec)
- High compressional strength
- Enhanced metals sequestration
- No risk of liquefaction or spills associated with liquefaction
- Elimination of leachate volume
- Elimination of fugitive dust emissions
- Enhanced land-use efficiencies
- Reduced energy consumption

Electron microprobe image showing pore spaces and limited cementation.



Electron microprobe image of additive-added sample showing how hydrated minerals have filled pore spaces and bound ash particles together.



Filter Press Ash Management

- The GHT 1500 Filter Press can process 100t/hr wet fly ash
- Direct from source or pilot ash pond rehabilitation/mining process
- Current available for deployment as part of integrated Edos Global Ash Management Technology
- Filter press will bring ash moisture content down to desired level and allow recycling of recovered waste water
- Ash can then be blended with AquaZero for stabilisation and further beneficial reuse.



The NeoPanel Building System

1

Use a library of 3D components to Design

2

Leverage repeatable processes and designs

3

Simplify quality control

4

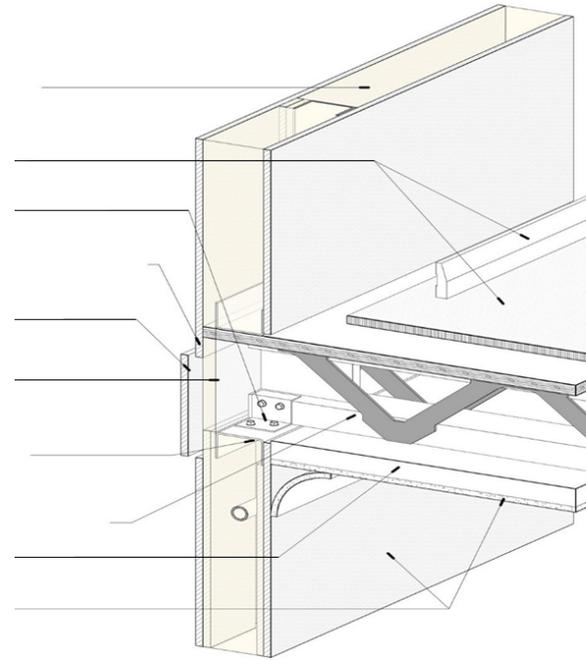
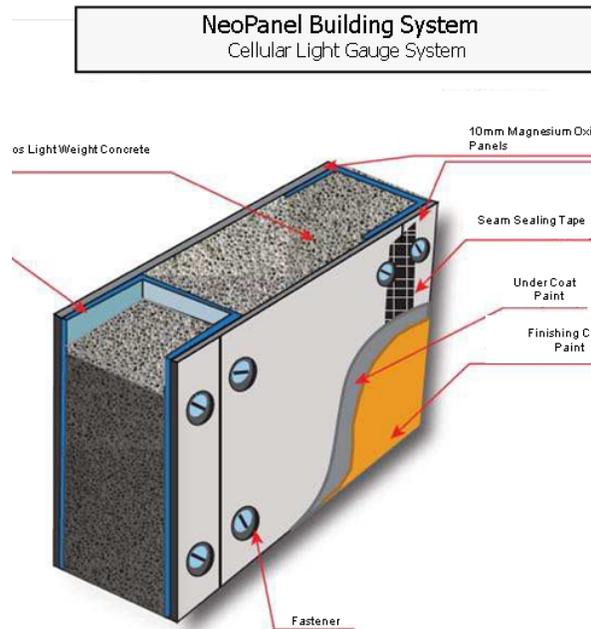
Build without dependence on weather

5

Drastically accelerate the government approval process

6

Create certainty in cost and timing



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Social Housing need

- NSW will require 500,000 new affordable houses over next 10 years.
- The Hunter region will require 15,800 new affordable houses over next 20 years
- The current Hunter region wait list is 6500 families/individuals
- As of June 30 2019, the waiting period for affordable housing in Muswellbrook is:
 - 2-5 years for 1, 2 and 4 bedroom houses
 - 5-10 years for 3 bedroom houses

Hunter: Whats happening with supply?

Expected Waiting Time				
ALLOCATION ZONE	1 bed	2 bed	3 bed	4 bed
NN01 LAKE MACQUARIE	5-10 years	5-10 years	5-10 years	10+ years
NN02 LAKE MACQUARIE/ EAST	5-10 years	5-10years	5-10 years	5-10 years
NN03 MAITLAND	5-10 years	5-10 years	10+ years	5-10 years
NN04 MERRIWA			10+ years	10+ years
NN05 MURRURUNDI		5-10 years	2-5 years	
NN06 MUSWELLBROOK	2-5 years	2-5 years	5-10 years	2-5 years
NN07 NEWCASTLE	5-10 years	5-10 years	5-10 years	5-10 years
NN08 PORT STEPHENS	5-10 years	10+ years	10+ years	5-10 years
NN09 RAYMOND TERRACE	5-10 years	5-10 years	5-10 years	2-5 years
NN10 TEA GARDENS			10+ years	
NN11 SCONE	2-5 years	2-5 years	Up to 2 years	5-10 years
NN12 SINGLETON	5-10 years	2-5 years	5-10 years	2-5 years
NN13 ABERDEEN		2-5 years	Up to 2 years	Up to 2 years
NN14 DENMAN		2-5 years	Up to 2 years	2-5 years
NN15 KARUAH			5-10 years	10+ years
NN16 DUNGOG	5-10 years	10+ years	5-10 years	2-5 years
NN17 CESSNOCK	5-10 years	5-10 years	5-10 years	5-10 years
NN18 KURRI KURRI	5-10 years	2-5 years	10+ years	5-10 years

Two Markets, Two Approaches

1. Market Rate Development – Development partner with landowners and investors
2. Not for Profit Development – Fee based development, Affordable Housing Development as a Service.



Partnerships

- Edos Global and Nexsys Industries are seeking partners to utilise coal ash for sustainable social housing.
- Existing opportunities will be made possible through partnering with:
 - ✓ Thermal Power Stations seeking to manage coal ash differently
 - ✓ State Governments wanting to manage coal ash and increase social housing availability
 - ✓ Local governments seeking to support their community through increasing social housing availability through responsive planning, retain and grow jobs and support local industry, whilst minimising environmental impact of coal ash.



Attachments available on request

1. AquaZero Ash Management
2. ALS Environmental Analysis Results – Loy Yang A Brown Coal

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