



Enterprise Ireland  
**Solid waste  
management Seminar**  
18<sup>th</sup> September 2007

# Who are AST Limited?

- Based in Carrickfergus, Northern Ireland
- Incorporated in 2003
- Essentially an R&D company-now moving to commercialisation
- Currently employing 8 staff



# What Has AST Limited Achieved?

*FuelForm*®

**The World's First  
“Cold Bonding”  
Solid Fuel Fines  
Pelletising System**



# Patented Technology



- FuelForm Patent granted in UK on 28th June 2006.
- Worldwide patent has been registered and presently being processed.
- OreForm system is protected under FuelForm Patent.
- BioForm Worldwide Patent has been registered in September 2006.



# Registered Trademark

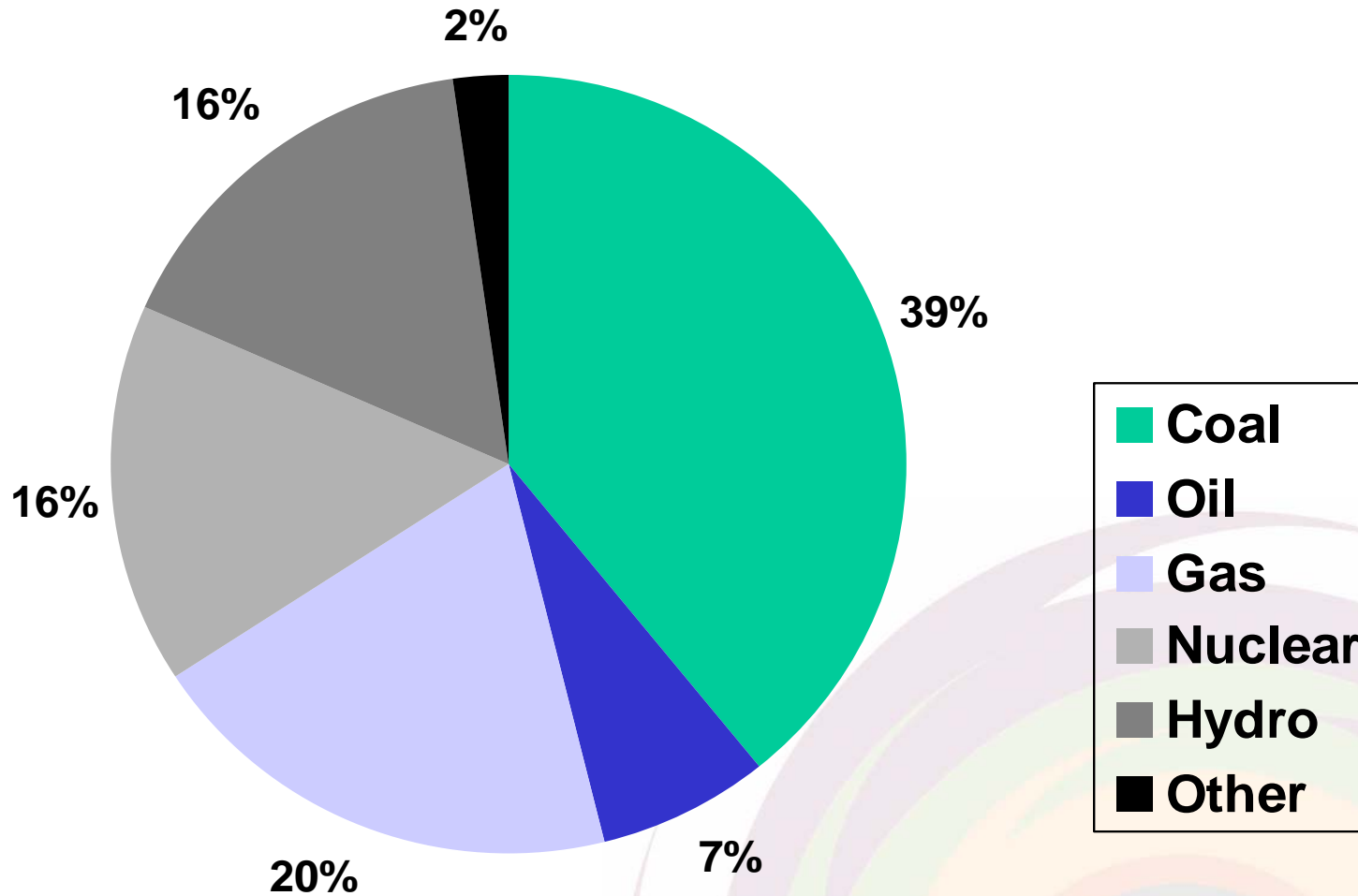


# A Brief History of AST Limited

- After 10 years of research, AST has designed, developed and patented a revolutionary mobile technology to turn low value waste, into high value fuel products, across many industries.
- AST's patented system facilitates not only the low cost pelletisation of coal waste fines, but also biomass, and iron ore fines, including various combinations of each.



# Total World Electricity Generation



# Coal in Electricity Generation

Coal is the major fuel used for generating electricity worldwide with over 6 billion tonnes produced each year.

The countries heavily dependent on coal for electricity include (2005e);

Poland	92%	India	69% (2004)
S Africa	92% (2004)	Morocco	67% (2004)
Australia	79%	Czech Rep	61%
China	78% (2004)	Greece	59%
Israel	75% (2004)	USA	50%
Kazakhstan	70% (2004)	Germany	49%



# Coal Fines Problems

- Environmental/Safety
  - Coal impoundment failures have resulted in property damage, environmental contamination and, loss of life.
  - Spontaneous combustion.
  - Dust pollution during summer.
- Waste
  - The impoundments can be acidic and pollute the water table.
- Transportation
  - Fine and dusty material is difficult to transport and when wet becomes a sticky unmoveable mass.
  - Freezes during winter.



# 3 MT Coal Waste Impoundment in the UK



# Horrible Stuff!



# The Extent of the Waste Coal Problem

- UK – 100 million tonnes
- EU – 250 million tonnes
- US – 2 billion tonnes
- World – 10 billion tonnes with 500 million tonnes being produced each year



# Why is *FuelForm*<sup>®</sup> Unique?

- The system is mobile
- High output – 100 TPH per unit
- This is a wet process
- Extensive drying of feedstock is not required
- Different materials can be blended
- Heat treatment of the finished pellet is not required
- Variable density pellet



# AST's Unique System

- The AST **FuelForm**<sup>®</sup> system turns fine coal waste into higher value transportable solid fuel
- This is achieved by adding environmentally clean reagent to wet coal fines using a very low energy process
- Hard-shelled waterproof spheroid pellets are then formed using a tumble and growth rotary agglomeration plant
- Pellets then cure for a few days to become handleable and storable
- Moisture content can reduce to as little as 5-10% over time



# A Look Inside a *FuelForm*<sup>®</sup> Pellet



Ionic Liquid  
Capillary action  
Accelerated evaporation



# Benefits to the Coal Industry

## • Benefits

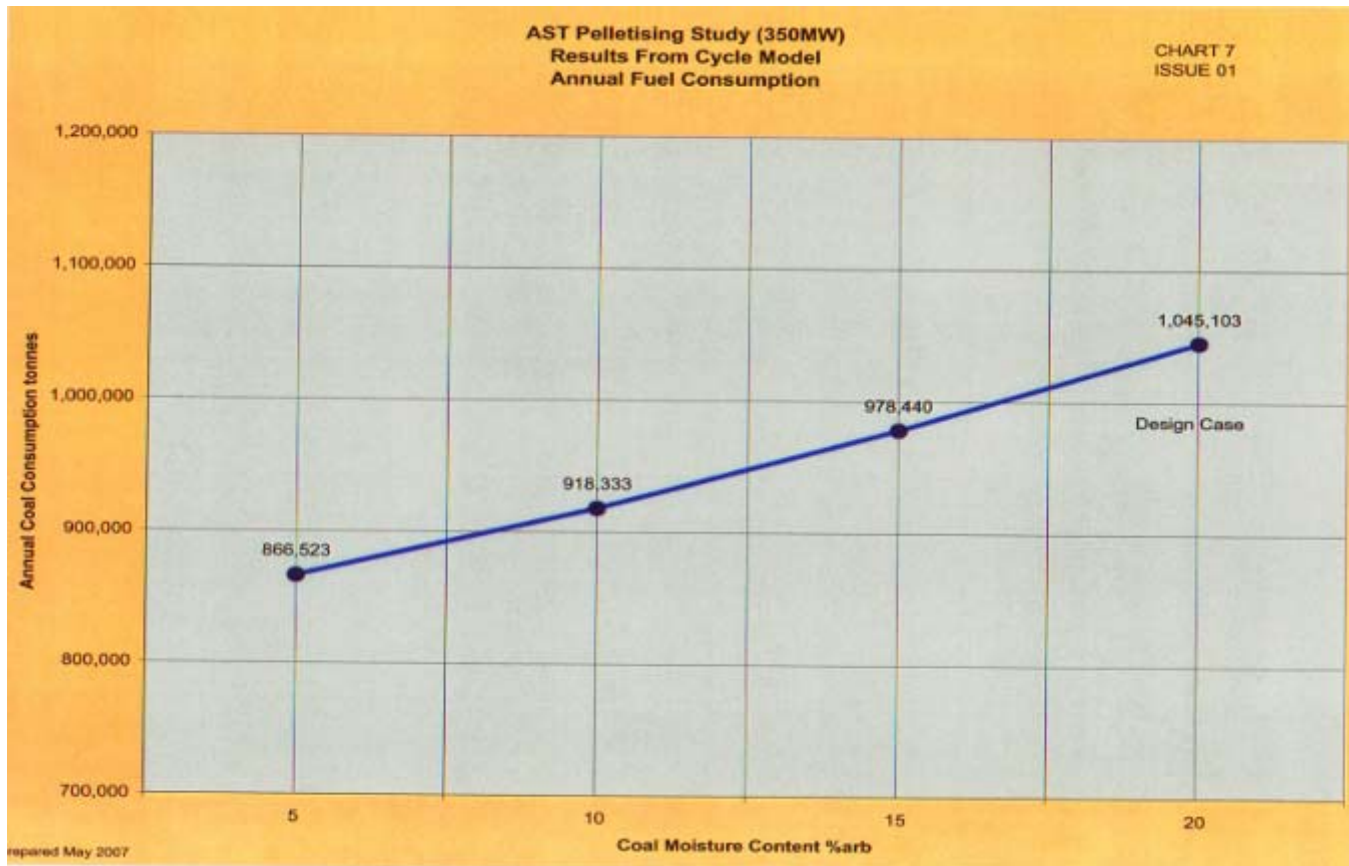
- Lower moisture = higher net CV resulting in less fuel being required for the same output, giving huge cost and emission reductions
- Lower moisture = lower transport costs
- Mine output increased by up to 15%
- No waste slurry ponds are left behind
- During remediation of redundant mine sites the added value of the pelletised coal waste can contribute dramatically to the cost of the scheme

## • Competition

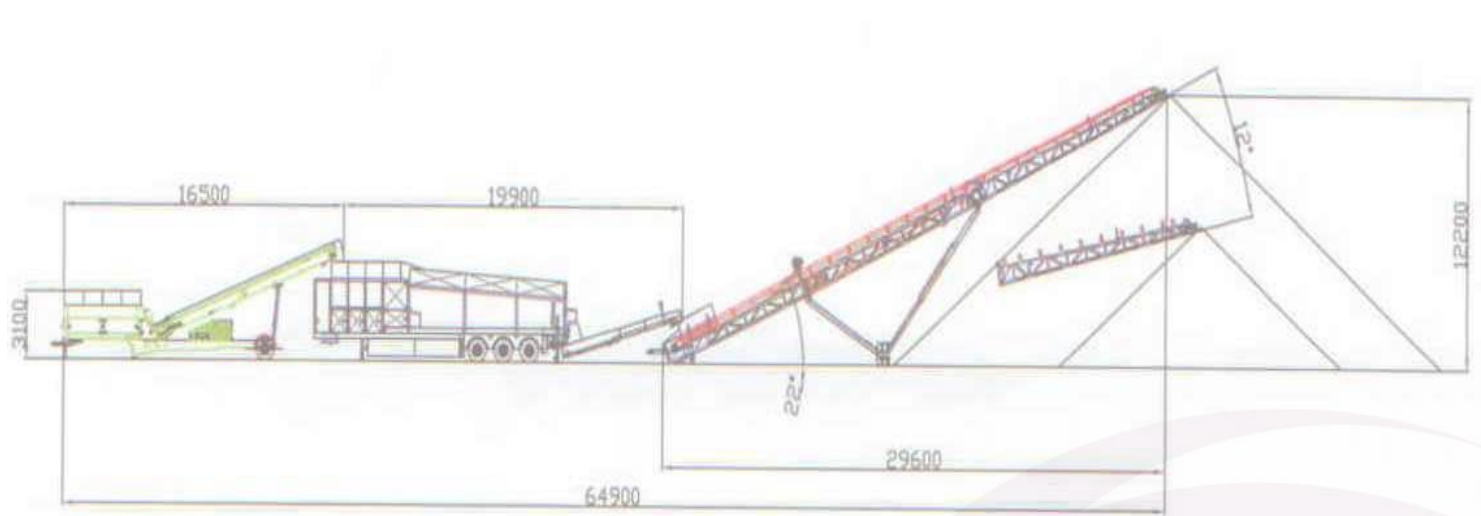
- No direct competition
- Briquetting and Standard Pelletising – negatives include:
  - low output 6 TPH per unit
  - high capital costs
  - high energy use (250kWhrs/tonne v 1-2kWhrs/tonne)



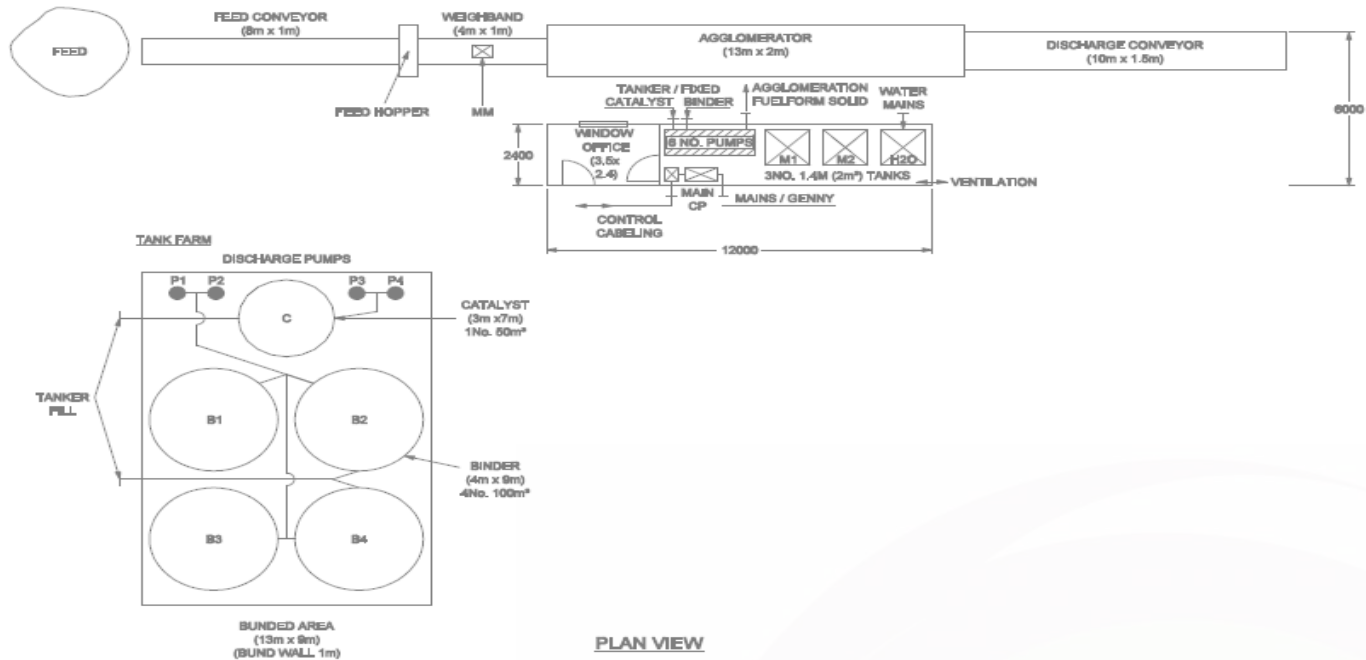
# Fuel and Emissions Reduction



# Diagrammatic Layout of System



# Diagrammatic Layout of System



# Prototype No.1 in Kazakhstan



# Pilot Plant Built in UK



# Pilot Plant on Site in the UK



# AST Commercial Business Model

- Client pays AST for the following:
  - Operating Licence
  - Chemicals
- AST supplies the following:
  - Equipment
  - Training
  - Chemicals
  - Maintenance
  - Technical support

