

INNOVATIVE ENERGY SOLUTIONS

**RJIM**



INTERNATIONAL





# CCT 2019 PROGRAMME – DAY 1

Room 2

Tuesday 4<sup>th</sup> June 2019

15.40hrs – 17.20hrs

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## **Cofiring other fuels**

Supporting the migration from coal to a new generation of engineered fuels using a mix of biogenic and non-recyclable waste materials for thermal power plants



# The global energy challenge...

- Rapidly-increasing demand for energy
- Urgent focus on low carbon energy
- Massive plastic waste problem
- Landfill no longer a viable long-term option
- Oceans / aquatic life really suffering





Supporting the migration from coal to a new generation of engineered fuels using a mix of biogenic and non-recyclable waste materials for thermal power plants



**SIMEC ATLANTIS  
ENERGY**



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## SIMEC ATLANTIS ENERGY

- A global developer of renewable and sustainable energy projects
- >1,000MW of power projects in various stages of development
- World's first flagship tidal stream project, MeyGen in Scotland
- 6MW Meygen Phase 1A is just the beginning... a further 40% increase in yield is in progress



And...

- Owner of Uskmouth Power Station in Wales, a 220MW coal-fired power plant, closed in April 2017
- Ambition to generate green / low carbon power using redundant assets
- Private wire option to adjacent steel works to manufacture "green steel"



# Partnership in action



## WSP

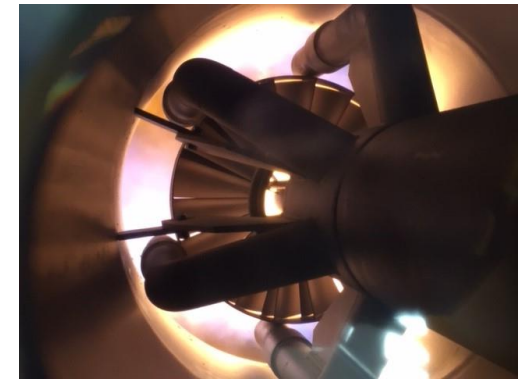
- One of the world's leading professional services firms
- Providing technical expertise and creative, comprehensive and sustainable engineering solutions
- Recent successes include expansion of the Sand Hill Energy Center in Austin, Texas and the Kalahari Solar Power Project
- November 2018: Appointed by SIMEC to:
  - Focus on the return to service of the Uskmouth power plant, especially the steam turbine and associated equipment
  - Manage the Front-End Engineering and Design (FEED) work for the new fuel conversion project



# Partnership in action

## RJM International

- Award-winning, global leader in emissions reduction and combustion improvement technologies
- Offices in UK, USA and Singapore
- Over 50,000MWe US / 10,000MW global references
- Over 12,500MW of biomass / co-firing / new fuel feasibility studies
- November 2018: Appointed by WSP to carry out Front-End Engineering and Design (FEED) work for the revolutionary new fuel conversion project at SIMEC's Uskmouth plant



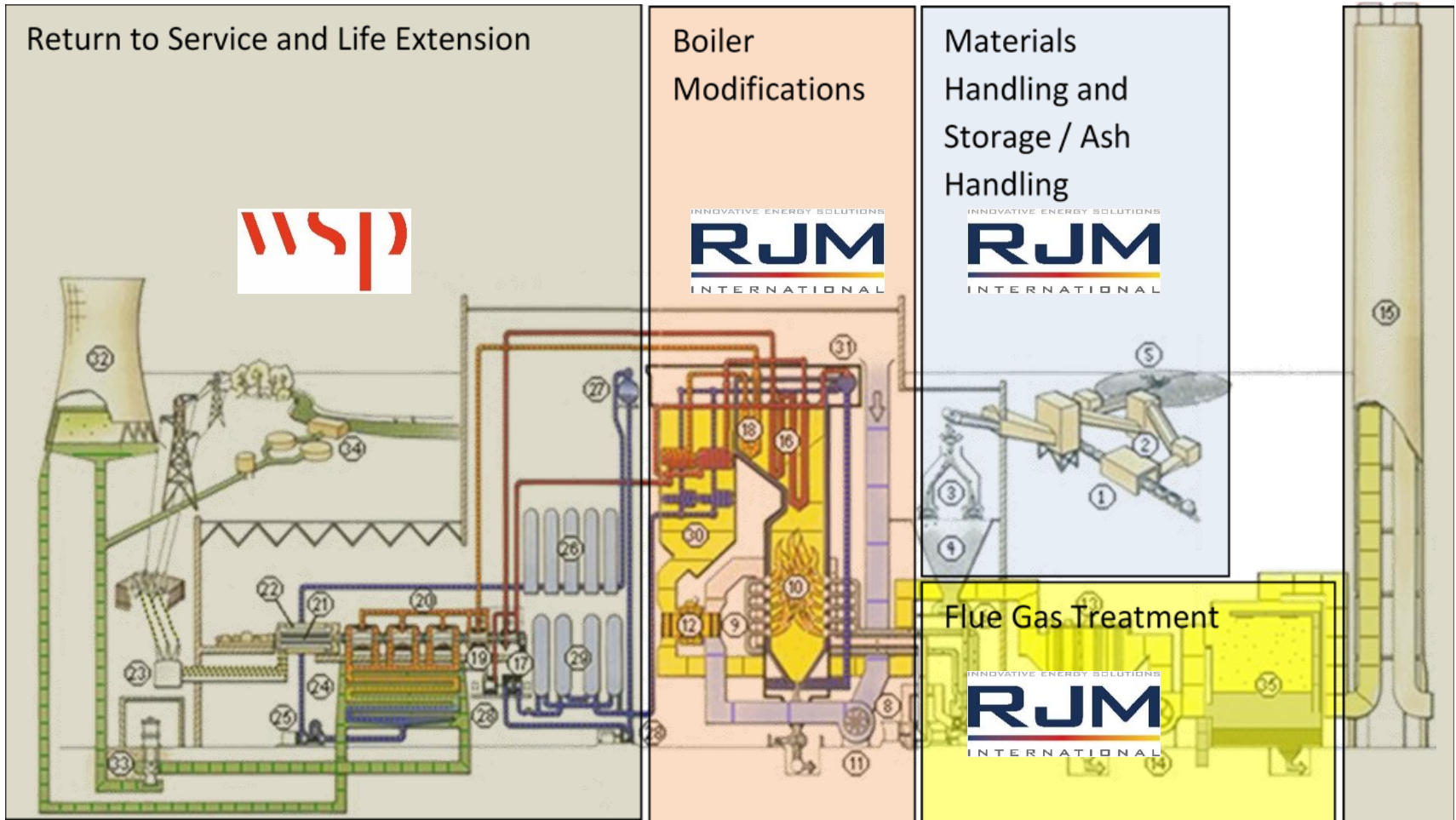
Proud winner of the Queen's Award for Innovation 2017



Proud winner of the Innovation Award



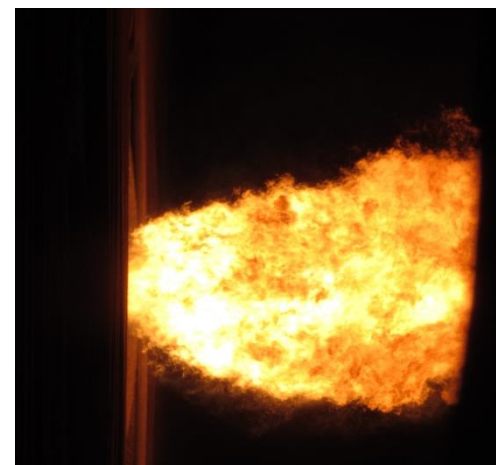
# Challenges posed by retrofit across the plant





# Background to the project (1)

- RJM working for SIMEC at Uskmouth since 2016
- RJM Combustion Audit in 2016 confirmed that certain operational issues could be resolved successfully and provided technical and operational knowledge of the plant
- RJM Biomass Feasibility Study in 2017 confirmed that 2 x 125MW units could be converted successfully to fire 100% white pellet biomass:
- Two cost options explored: new or 'pre-used' equipment
- Both options were rejected by SIMEC as the increased biomass fuel cost could not be offset by the UK government's green energy subsidies available at the time
  - Subsidies time-limited
  - Little surety on subsidy levels in the medium term



# Background to the project (2)

- Having rejected the 100% biomass conversion option, an alternative option to fire an energy pellet, made up of biogenic material plus plastics that cannot be recycled, was assessed in a further study.
- Plant conversion costs for firing energy pellet similar to plant conversion costs for 100% white pellet biomass conversion, but...
- Cost per tonne of new energy pellets versus white pellet biomass, significantly less expensive

**Ambition: To operate the plant financially viably - with no need for any government subsidy**

Plus...

**“This new fuel addresses the global challenge of how to treat waste material in an environmentally-responsible manner and use it to generate low carbon electricity.”**



# Challenges arising from the new energy pellet...

- Developing the fuel and making changes to the plant to make the fuel useable:
  - Storage and preparation
  - Combustion
  - Plant integrity
  - Emissions control to meet latest UK / EU legislation
  - Post-combustion ash

# FEED Project: Stage 1

Start date: November 2018

End date: June 2019

- Milling and Combustion
  - CFD analysis work
  - Small-scale test firings / seeking stable combustion
  - Milling trials
- Characterisation of the pellets
  - Various iterations of pellet design / key constituents
- Materials Handling
  - Transport, storage, feed system to burners

# FEED Project: Stage 2

Start date: June 2019

End date: December 2019

- Combustion system design
- Large-scale test firing
- Overall project refinement

# FEED Project: Stage 3

Start date: January 2020

End date: February 2020

- Final report produced, leading to final investment decision

# Core objectives

- First-of-its kind solution
- FEED project aims to provide a world-class reference plant for conversion of coal-fired plant to run on “new generation” energy pellets with 50% biogenic / 50% waste plastic content
- RJM operating at cutting edge of combustion optimisation and emissions reduction
- SIMEC, WSP and RJM all fully committed to seeking new solutions to deliver affordable, low carbon energy

**An exciting global opportunity!**



**CLEAN COAL TECHNOLOGIES 2019**  
CONFERENCE 3-7 JUNE, HOUSTON

# Thank you



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