



Refuse Derived Fuel as feedstock for Waste-to-Energy systems – The AmbWTE project

Catarina Nobre¹, Margarida Santos¹, Carolina Assis¹, Roberta Panizio¹ and Paulo Brito¹

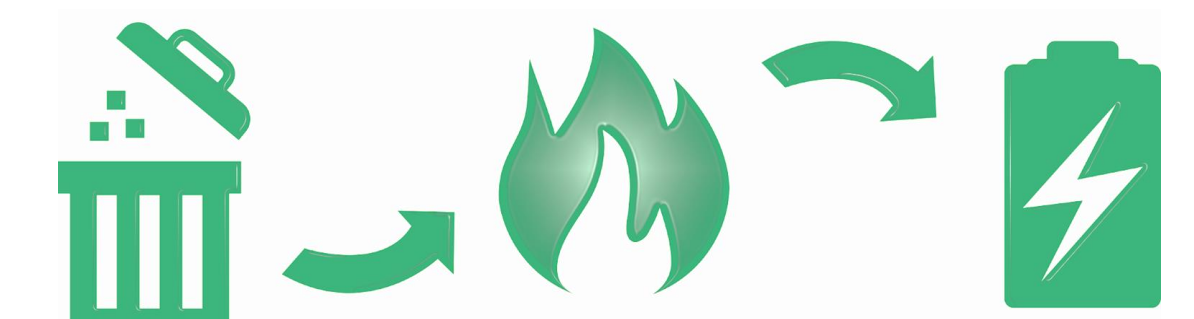
¹VALORIZA – Research Centre for Endogenous Resource Valorization, Polytechnic Institute of Portalegre, Campus Politécnico 11, 7300-555 Portalegre, Portugal. catarina.nobre@ippportalegre.pt, margarida.santos@ippportalegre.pt, carolina.assis@ippportalegre.pt, rpanizio@ippportalegre.pt, pbrito@ippportalegre.pt

Problem framework



Waste production has followed an increasing trajectory because of population growth and technological and social development. This trend is currently reaching very **significant impacts** in overall society, mostly due to the high waste quantities that are produced and the existence of toxic and pathogenic agents, both factors posing high risks to the environment and human health. **By 2016, Portugal produced 4.9×10^6 t of Municipal Solid Waste (MSW), 2.6×10^6 t of Construction and Demolition Wastes (CDW), and 119×10^3 t of wastewater treatment sludge.** As such, **Waste-to-Energy (WtE)** technologies are progressively being studied and implemented in waste management, aiming at producing energy, materials and increasing value from wastes.

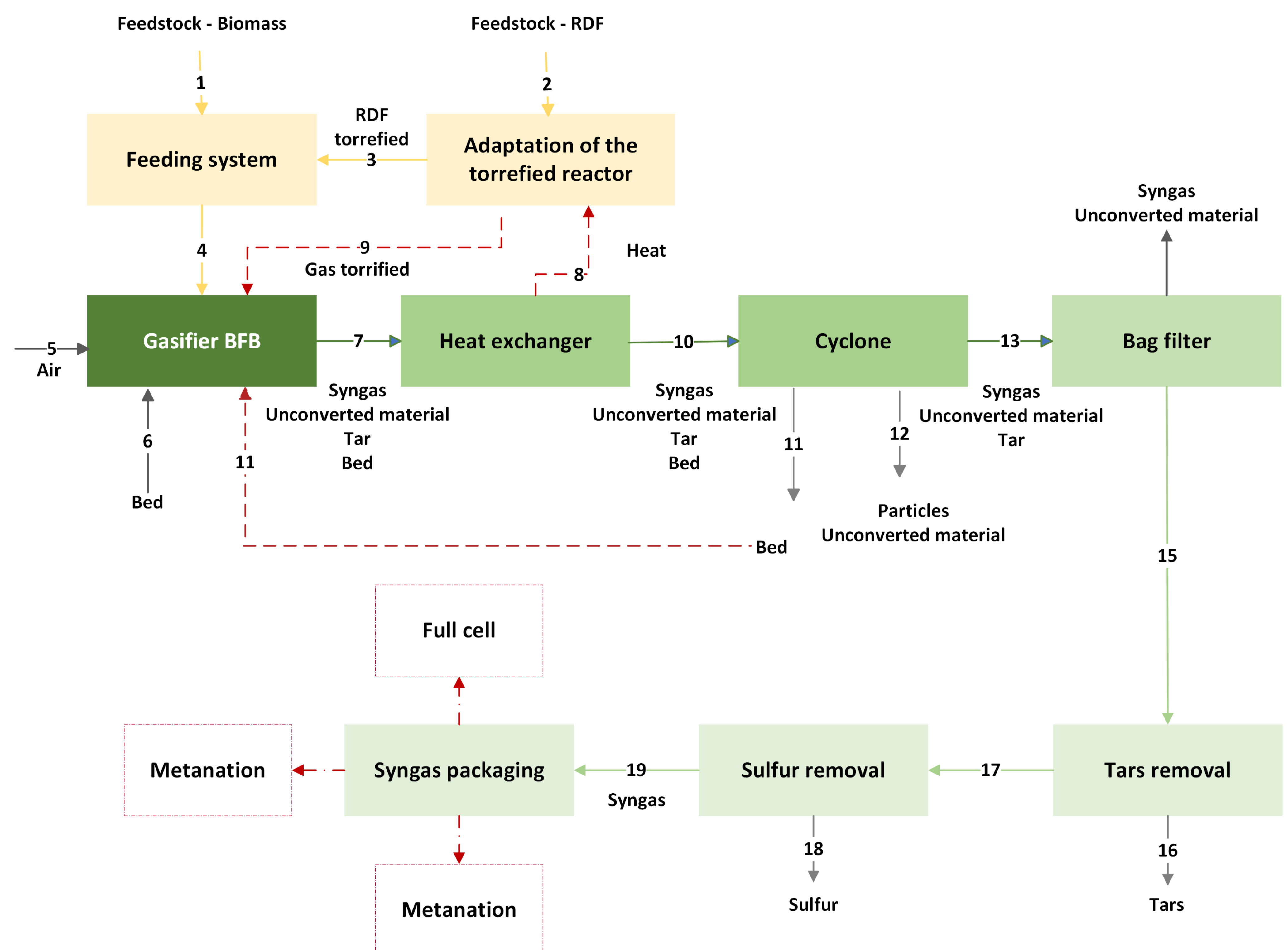
The residual, non-hazardous organic fractions that can be separated from **MSW or CDW (and industrial wastes)** can be processed to obtain a **waste derived fuel (WDF)**.



Refuse Derived Fuel (RDF) is one type of WDF with characteristics that are more suitable for Waste-to-Energy applications than non-treated waste. In the case of **Portugal, 683 t of RDF were produced in 2019.** The production potential of this fuel in the national territory is much higher, but it was hindered by its high moisture and chlorine contents. Nevertheless, **RDF may constitute an alternative raw material** with greater interest for **Waste-to-Energy applications**, which may promote the development of new economic markets associated with waste.

The project

The **AmbWTE project** aims to develop an innovative combined cycle gasification system that can be fed with different heterogeneous feedstocks, namely a fuel mix mainly composed by RDF (mixed with other waste flows, e.g., lignocellulosic wastes or sewage sludge). The goal of AmbWTE is to achieve a WtE system that operates continuously with small amounts of waste and that is based on the **reuse of syngas to produce electrical and thermal energy**, reducing the environmental impact of this process, and contributing to the **efficiency and energy autonomy of waste management companies.** Moreover, this concept will also produce biochar, with improved properties, that can have other industrial applications, namely as an adsorbent or as solid fuel for boilers.



Global goals

Overall, **AmbWTE** will contribute to the transition from the **linear model of production of goods and services**, to a circular model (**Circular Economy**), allowing waste to be transformed, through innovation, into potential by-products or energy with low carbon footprint.