



The challenges of tourism to waste-to-energy public-private partnerships



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ABSTRACT

The use of municipal solid waste (MSW) for energy generation is an important paradigm shift in municipal solid waste management (MSWM). The concept of waste-to-energy (WTE) is consistent with the basic principles of waste hierarchy set by the European Commission in environmental agenda. WTE became an effective response in small-island which usually rely on tourism for economic development.

Many WTE power plants have been developed through PPP arrangements; however, little attention has been paid in the academic literature to the impact of tourism to WTE utilities performance. This paper analyzes the influence of tourism to a waste-to-energy public-private partnership (WTE PPP) through the case study of Mallorca, an internationally renowned summer seaside destination. The analysis of Mallorca's experience shows that tourism strongly influences management costs of WTE facilities and PPP contracts still needs to adapt the tariff system to promote better performance of the public service.

1. Introduction

Economic and population growth have increased the rate of municipal solid waste (MSW) generation over the last decades [49]. This has increased pressure on public authorities to develop public policies to deal with the impacts on ecosystem services related to MSW generation [21,34,47,6]; Magrinho, 2006; [38,33,52,3].

Nevertheless, the consensus about the basic principles of municipal waste management established by the European Commission: (i) source reduction, (ii) reuse/recycling, (iii) recovery and (iv) disposal [36,52,57,63] made possible to understand that efficient municipal solid waste management (MSWM) system should aim to reduce the amount of MSW as its main goal and efficient reuse of resources in MSW flows as a secondary goal. Given the importance of reuse and recovery in MSWM hierarchy as part of efficient environmental policy, nowadays it is possible to find a wide variety of technological solutions for MSW treatment (Magrinho, 2006) in which Waste-to-Energy (WTE) facilities have increased in importance [1,36,63].

The utilization of waste for energy generation is an important paradigm shift in municipal waste management [1]. The concept of WTE is used to describe a set of alternatives to collect, treat and dispose of waste in a manner consistent with the basic principles of the waste hierarchy with a specific focus on recovery [17]. Energy recovery has higher priority over landfilling but lower priority over waste prevention and reuse/recycling according to the European Commission. WTE technology constitutes an interesting alternative

given that resource reuse and recycling is not always technically feasible or financially viable and because it diverts the energy needs from fossil fuels [36,37]. Furthermore, according to the International Panel on Climate Change (IPCC) and other experts WTE technology is the key greenhouse gas emission mitigation technology [63]. Therefore, WTE technologies are useful for policy makers to reduce MSW volume, to provide cleaner energy and to enable an environmentally friendly growth [46,53,60].

The growing volume of waste and its variety [1,50,59] increases resources needs to operate the MSWM system as well [43]. This is a matter of concern given the limited resources for its funding [47,48,52,64,16]. MSWM services have traditionally been under the public procurement provision, unfortunately, there are many experiences in which public provision failed to achieve acceptable results [10,26,7].

During the last decades, many national and regional governments have increased cooperation with the private sector through Public-Private Partnerships (PPPs) in which the private sector investment in public projects, whereby investors receive a return on their investment within a specific legal framework [13]. PPPs are long-term contracts between the public and private sector in which the private sector has responsibility for significant aspects of the building and operation of an infrastructure for the delivery of public services that the public sector should provide while both share risks, costs and benefits [14,22]. This kind of contracts seemed to be an effective means to attract funds from the private sector to provide public infrastructure and services while

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improving resource efficiency (shorter construction time, lower construction, operation and maintenance costs, etc).

Many WTE power plants have been developed through PPP arrangements [55]. WTE became an effective response in small-island which usually rely on tourism for economic development [19,20,30,41]. The need to provide small-island with a framework for sustainable development in renewable energies was highlighted in the European Commission's White Paper on Renewable Energy Sources given that insularity leads to increases in energy costs which make renewable energy sources more economically viable in small islands.

However, the analysis of experiences regarding to PPPs performance suggests that there is no a uniform principle to design PPP contracts in any sector [14,22]. There are many factors that can impact in the likelihood of success or failure in PPP agreements. Therefore, the analysis of the contract design in PPPs are significantly relevant to understand PPP outcomes [22].

Even though previous case studies in the academic literature have attempted to analyze waste-to-energy public-private partnerships (WTE PPPs) performances in many countries [1,24,46,55], just a few of them analyze the particular characteristics of them in tourism destinations [19,61]. This is, in our opinion, an important shortcoming since tourism is a growing sector worldwide that is intensive in MSW generation, and, as we try to show in this paper, specific challenges for WTE PPPs are encountered in those regions specialized in tourism [5,27].

This article analyzes the main characteristics, problems and challenges of WTE PPPs related to mature tourist destinations with special focus in Mallorca (Balearic Islands, Spain), which is considered as a typical example of a second-generation mass tourist resort [2,29,35] with a level of tourist arrivals equivalent to approximately 10 tourists per resident¹ per year.

The remainder of this paper is organized as follows. Section 2 describes the main factors to consider for a WTE PPP by taking into account the experience of Mallorca. In Section 3, explains the main economic analysis behind an WTE PPP. Section 4 describes the challenges of tourism specialization and how these impact on the PPP performance. Finally, Section 5 shows the central conclusions of the article.

2. WASTE-TO-ENERGY PUBLIC-PRIVATE PARTNERSHIP IN MALLORCA

Traditionally in academic research, the responsibility and management of WTE facilities should exclusively rest with the public authorities as it is part of MSWM systems [50,52]. However, several authors have suggested that the cooperation between the public and private sectors would increase efficiency by allowing the former to participate in building, operation and maintenance of WTE utilities while the public sector keeps its responsibilities for environmental policy and planning of the system [6,7,9,18,37,48,51,63,65].

Public-Private Partnerships can be found in many countries all over the world and are based on the idea that extra value can be obtained by combining knowledge and co-production; therefore, a PPP implies cooperation between public and private actors to develop products or services sharing risks, costs and benefits [28,44,56]. Most of these projects are related to urban reconstruction or renewal of public infrastructure [22].

In 1990 the Balearic Government published the Urban Solid Waste Management Master Plan (PDRSU) by Decree 87/1990 in which WTE was established as the main technological solution and its implementation would be reached by means of a PPP. This is a special kind of PPP since its main purpose is to increase environmental quality by reducing externalities from MSW [10], therefore as [22] argued there is an important task in output specifications which should be clearly defined

and consistent with the infrastructure needs that the PPP intends to satisfy.

Under WTE PPPs public authorities play a major role as regulators that set environmental goals, while private sector brings financial resources, technical capability, and entrepreneurship to provide the public service. Therefore, for successful WTE PPPs there is the need for a strategic vision of public authorities. Institution building and the possibility to set clear and stable environmental policies would reduce risks from the public side. This would encourage WTE PPPs by reducing possible negative impacts on the financial stability [13,22]. Furthermore, PPPs not only requires of a legal framework and policies that set goals, but also need to set responsibilities between many multi-level public authorities [3,52]. The legal framework in Mallorca sets the main responsibilities between the different administrations such as:

- Municipalities which are considered to be the primary managers and responsible for the collection and disposal of MSW for WTE utilities.
- The Island Council (Consell de Mallorca) has the responsibility of: (i) Transport of MSW disposal from transfer stations to WTE utilities; (ii) the choice of the technological treatment method and its planning; (iii) tariff setting and (iv) Inspection and control.
- The Balearic Government is responsible for hazardous waste that requires specific treatment that does not go to WTE utilities.

Regarding to the role of the operation of the WTE PPP in Mallorca, there are several aspects to highlight in its implementation. First of all, MSW collection responsibility relies on municipalities. Generally, in major tourist destinations like Mallorca the collection system involves cooperation from citizens and companies to separate MSW into five fractions.

Concerning to MSW transport, Mallorca's MSWM system uses a set of transfer stations to increase efficiency. Once at the transfer station, MSW is unloaded in hermetically closed containers and compacted. Because of their financial² and environmental³ advantages, transfer stations could be considered a good alternative in mature tourism destinations compared with daily transport from municipalities to treatment facilities. Waste containers, once full in transfer stations, are then transferred to treatment facilities.

Environmental PPP's should not only cover aspects such as environmental quality, but also financing sources [52]. Thus, the system must adequately balance revenues with capital investment and operational costs in order to achieve sustainability, which is a complex task and a major challenge for MSWM systems [25,47,52]. WTE utilities require not only large capital investment [47] but also a supply of materials with high calorific value such as paper and cardboard to raise combustion levels [39]. Thus, the financial sustainability of the system in Mallorca imposes a challenge for public authorities to structure the appropriate economic incentives, since recycling promotion as part of environmental policy would, to some extent, lead to a reduction in energy production.

Many PPPs attempt to promote self-supported financial schemes. In MSWM systems, this would imply that waste generators should pay to the provider a cost-covering user fee; however, due to the nature of these services as public goods with bulky investments, it is usual that the governments provide payments to the private sector [13,22]. Following this idea, the WTE PPP in Mallorca is funded by two main sources: revenues generated by treatment facilities (sorted material) and the incineration fee.⁴ The first source includes the revenues

² By combining the loads of several individual waste collection trucks into a single shipment, communities can save money on the operating costs of transporting the waste to a distant treatment facility.

³ Transfer stations let solid waste managers to separate recyclable resources and ensure that no hazardous waste or other undesirable materials enter the waste stream.

⁴ For a matter of simplicity (and to avoid any kind of confusion) we will call this fee "incineration fee" but this fee includes more than incineration but the whole MSW treatment service.

¹ Source: IBESTAT & CAIB (Balearic Islands Autonomous Community).

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