

## Client Report

Date prepared: <b>14<sup>th</sup> April 2008</b> Date finalised: <b>17<sup>th</sup> April 2008</b>	Client Ref.: <b>Environment Scrutiny Panel, States of Jersey</b>										
Status: <b>FINAL REPORT</b>	Our Ref.: <b>J 1.0</b>										
<p><b>INDEPENDENT REVIEW</b></p> <p><b>Planned infrastructure for implementing the island's Waste Strategy &amp; Consideration of possible alternative approaches</b></p>											
Project Team:	<b>Joe Schwager, BA, C.Env, MCIWM, MICM – Managing Director</b> <b>Egan Archer, BEng, MSc (Eng), PhD - Director</b>										
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*This report was commissioned as part of a review of possible alternative approaches to a proposed large EfW facility for managing waste on the Island of Jersey*

**Important Note:**

*This Review has been conducted on a completely independent basis. In reaching our conclusions we have drawn upon our knowledge of international Best Practice and documentation and Briefings provided to understand the particularities of the local situation in Jersey.*

*During the preparation of this report, we have relied upon the accuracy of the underlying information provided to us by States Officers and have not separately derived such data. This review was constrained by the time available and was a preliminary review to consider whether or not there were grounds for considering particular factors in more detail. The absence of any comment on any particular document should not be taken as an endorsement of the analysis we reviewed. A fuller consideration of the complex matters under review and more detailed analysis might lead to a change in the views contained in this preliminary report.*

*The report should be read as a whole.*

*Opinions, where expressed in this report, are those of the Consultant and are not necessarily those of the Client.*

*This report has been prepared by Juniper with all reasonable skill, care and diligence within our Terms and Conditions. Because of the preliminary and limited nature of this review we do not warrant the accuracy of the analysis and there is no implied endorsement or validation of the materials reviewed. While we have taken reasonable precautions to check the accuracy of our analysis, in the context of the time allotted, we explicitly decline any liability for any decisions or actions, taken by the Scrutiny Panel, the States of Jersey or Third Parties, whether direct or indirect, arising out of our analysis or the wider consideration of options. It is for you, as the Client, to take this input into account, alongside analysis from others, before deciding what, if any, actions or initiatives to pursue. Juniper shall not be responsible for the consequences of any such decisions.*

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## 1 EXECUTIVE SUMMARY

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- 1.1 The Environment Scrutiny Panel of the States of Jersey has commissioned Juniper to provide an independent review of the proposed approach to delivering the island's waste strategy; and, in particular, to:
- ◆ *examine the premise that the selection of technologies for the disposal of Jersey's solid residual waste shall be dealt with in one process; and,*
  - ◆ *consider such other technologies and systems as may be suitable, either alone or in association, to deal with the disposal of Jersey's solid residual waste.*
- 1.2 We have reviewed the technical analysis that led to the decision to build a single large EfW; considered the scope for more pro-active approaches to waste minimisation, additional recycling and composting than those currently proposed; and examined the feasibility of using alternatives to a standalone large scale EfW facility.
- 1.3 T&TS (Transport and Technical Services) Officers collaborated with our enquiries – we held two detailed meetings with them, they facilitated visits to the Bellozanne and La Collette sites – and they responded to our requests for documentation. We reviewed reports prepared by them, their predecessor organisations and by their advisers between 2000 and 2008. However some documents were not made available because they were deemed to be confidential and, in one instance, a particularly important piece of analysis (that we had requested and which was listed in a dossier of documentation to be made available to us), was not provided. In consultation with the Scrutiny Panel we delayed finalisation of our report for one month to give an additional opportunity for this to be provided, but the listed document was still not made available.
- 1.4 Our review has concluded that the concept outlined in the States of Jersey Waste Strategy is a standard approach not in-consistent with international Best Practice. However we are not satisfied that the practical steps will deliver on the goals that are expressed in the opening paragraph of the Strategy (entitled 'Vision'). Specifically the Waste Strategy states, quite simply, that the trend towards increasing quantities of waste "must be stopped and then reversed"<sup>1</sup> and yet Officers are planning to build an EfW plant that is sized on an assumption that waste will actually grow year-on-year. This implies that T&TS Officers are assuming that the Waste Minimisation efforts that are integral to the Strategy will in fact fail.
- 1.5 We agree with the Environment Scrutiny Panel's observation that the 32% recycling target set in the Waste Strategy would be regarded nowadays as a relatively modest goal but we do also accept T&TS's view that there are practical constraints associated with achieving high levels of recycling on a small island. However our review has identified some streams where there would seem to be potential for more recycling. Moreover we think that the use of different technologies for waste processing, new methods of collecting waste from households and a new approach to managing the island's commercial waste could result in a further significant boost to the level of recycling on the island. We also believe that some of the ideas contained within the

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<sup>1</sup> *Executive Summary, Waste Strategy, p4*

Scrutiny Panel's earlier 2007 report on Recycling merit greater consideration than they appear to have been given so far.

- 1.6 In our opinion, handling all of the island's residual waste within a single EfW is an acceptable way of dealing with the problems. However, we do not accept that a case has yet been made that this is either the only practical approach or indeed the best approach for Jersey.
- 1.7 In our view T&TS has failed to demonstrate that they have sized the EfW appropriately. Insufficient evidence was provided that their decision was properly informed by:
- ◆ *formal quantitative up-to-date modelling of mass flows into the EfW under a range of scenarios;*
  - ◆ *financial analysis of the relative benefits of procuring a large plant now versus a small plant now with further plants (if required) at a later date; and by*
  - ◆ *formal risk analysis of the consequences of wrongly predicting the quantity and nature of wastes over the lifetime of the plant.*
- 1.8 In particular we are concerned that Officers seem to have been mainly concerned about the possible problems if the plant is not big enough to meet long-term future demand without reflecting to a similar degree upon the very significant operational difficulties that could occur if the plant is too big. This seems particularly puzzling given that the stated intention of the Strategy is to reduce the amount of waste that requires treatment.
- 1.9 Officers told us of their reasons for favouring moving grate incineration as the technology for the EfW: the operational reliability, the large number of reference plants and the strong track record of leading suppliers. We fully accept the validity of these benefits but are concerned that Officers and their advisers do not seem to have given equal weight to the features of this technology which are poorly suited to the island's requirements:
- ◆ *the optimum scale is larger than Jersey needs, making it more expensive per unit of capacity;*
  - ◆ *the process would cope poorly (relative to some other alternatives) with certain changes in the type of waste requiring processing;*
  - ◆ *the relative inflexibility of the process in terms of adapting to changes in the amount of waste needing processing;*
- 1.10 We are also concerned that the need to ensure a constant feed to the EfW combined with the decision to oversize the plant relative to current needs will act as a significant constraint on increasing recycling beyond 32% or the adoption of more pro-active waste minimisation initiatives. In addition, there may be changes in the types and amounts of wastes (less packaging for example) in the future, which could cause significant operational issues.
- 1.11 We believe Officers are right to stress the importance of only using proven technologies and agree with the criteria that have been adopted for judging this parameter. However some technology options seem to have been eliminated on the basis of incorrect or outdated information. Within the body of our report we also criticise some of the other grounds that were used to narrow the range of technologies deemed to be appropriate for consideration as part of an overall integrated approach to managing wastes on the Island. We are concerned that this has led to an over-emphasis upon a solution dominated by a single oversized EfW.

- 1.12 Our review has concluded that biological processing could play a greater role in recycling specific fractions of the island's waste into good quality composts. We accept many of the arguments advanced by Officers to explain why it has not been possible to increase composting on the island but do not accept that their analysis demonstrates that there is no scope for increasing green waste composting. We were also surprised that there did not appear to have been greater consideration of anaerobic digestion for managing the island's household and commercial kitchen waste. Our report addresses this topic in detail. While we accept that there are challenges, we have concluded that this approach merits more active consideration.
- 1.13 We have considered the arguments for extending the life of the Bellozanne plant, (though it is important to stress that we have not conducted an engineering review of the facility). Whatever the reasons for the current poor operational performance of the plant, the arguments expressed within the Waste Strategy for replacement rather than upgrading and refurbishment are strong. (We understand that BDO are investigating the financial aspects of this decision on behalf of the Scrutiny Panel.)
- 1.14 We have identified a number of alternative thermal processing configurations which offer some advantages over moving grate incineration in the specific context of Jersey's requirements. Each of these also has disadvantages (but then so does the solution that is being pursued by T&TS). Indeed we feel that the issues identified in our report make it inappropriate to award a contract for the type and size of EfW plant envisaged until after those issues have been evaluated in greater detail and a proper comparative analysis from a technical, operational, economic and environmental perspective has been conducted on the alternatives.
- 1.15 We have also identified a range of political initiatives that could be considered by the States which could either enhance the sustainability of Jersey's waste management practices or lessen costs for the public purse.
- 1.16 We have concluded that the optimal approach is likely to include:
- ◆ *a recognition by the Administration that the practical steps adopted so far are insufficient to deliver, and on occasion, at odds with the Vision outlined in the Waste Strategy;*
  - ◆ *a political consensus between Parishes and the States to adopt a more pro-active, integrated approach towards the collection of waste on the island involving source-separation, separate collection of dry recyclables and kitchen waste; possibly offset by less frequent collection of residual waste;*
  - ◆ *a more positive attitude towards driving forward recycling (stressing the opportunities rather than the barriers, however real the latter may be);*
  - ◆ *more consideration of political and practical initiatives towards waste minimisation;*
  - ◆ *more encouragement of the private sector recycling initiatives, perhaps in conjunction with the parish collection system.*
  - ◆ *more consideration by the States of their policies on commercial waste pricing and new obligations on businesses to be responsible for their own wastes;*
  - ◆ *more focus on boosting rates of commercial waste recycling through more effective source separation;*
  - ◆ *a re-evaluation of the policy of accepting unsorted commercial waste free of charge that is delivered to the Bellozanne site;*

- ◆ *a move away from mass burn incineration towards source separation and, in relation to the residual fraction, a combination of a simple fuel preparation/sanitisation process and a far smaller EfW using, modular, small scale technologies;*
- ◆ *separate processing of commercial and household kitchen waste at an AD facility;*
- ◆ *re-engagement with Jersey Potato and UK supermarkets to bring up-to-date policies on landspreading of properly certified, high quality composts that derive from source-separated feeds;*
- ◆ *institution of trials on co-processing green waste compost and AD digestate to make a soil improver optimised for Jersey soils and agricultural practices.*

1.17 In general we believe that initiatives that reduce the amount of waste that needs to be combusted and inert wastes that need to be landfilled will give the island greater flexibility in how it implements new waste infrastructure to manage waste now and into the future.

1.18 **T&TS needs to make a financial case for their chosen approach** to justify what seems, at face value, to us an excessive investment.

1.19 We have been careful to stress that there are disadvantages associated with all of the alternatives we have outlined. We are not saying that any one approach is 'better' – it is not that simple, nor are we recommending a straight switch from the current policy to a different one. But since the solution being proposed has some disadvantages, we believe that it is wrong to dismiss those other options just because one can find individual disadvantages with them. Instead we feel that a proper comparative evaluation of the options should be carried out (it does not appear to have been done so far) even though this will involve a delay, which we accept is undesirable. However, focussed evaluation of certain attractive alternatives might help the States to procure a more appropriate system and avoid:

- ◆ *failure to deliver the Vision outlined in the Waste Strategy;*
- ◆ *a costly plant that might be a poor fit with rapidly changing societal practices;*
- ◆ *the possibility that the EfW plant is grossly under-utilised for many years; or even ...*
- ◆ *that the EfW may face fundamental operational difficulties if residual waste volumes decline (as they did in Germany when it implemented similar policies to those contained in Jersey's Waste Strategy);*
- ◆ *damage the Island's international image by being perceived as a laggard in environmental and sustainability terms.*

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## 2 INTRODUCTION

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### Background

2.1 The States of Jersey has adopted a Waste Strategy<sup>2</sup> that seeks to instil a “culture shift” in the way that the community looks at waste in Jersey. In practical terms the key elements of delivering this Strategy are to:

- ◆ *boost recycling by the end of 2009 to at least 32%;*
- ◆ *establish a modern composting facility for the recycling of green waste;*
- ◆ *replace the current Bellozanne incinerator with a new, “appropriately sized” Energy from Waste (EfW) facility by 2009*

*Scrutiny Panel concerned that another approach may be better*

2.2 The Environment Scrutiny Panel of the States of Jersey is examining whether this is the optimum solution and questioning whether other approaches to managing the island’s waste should have been adopted instead. It has launched an investigation into this matter.

2.3 The Panel decided to commission outside consultants to provide specialist input to inform their deliberations. Juniper has been selected to review certain specific technical matters, outlined below, and BDO has been commissioned to consider related financial matters.

### Purpose of this report

*are the decisions to use a large EfW well-founded?*

2.4 This report summarises the findings of our review. We examined the basis of the key technical decisions that led to the choice of a single large EfW (used alongside moderate rates of recycling and composting) and we report on whether we consider those decisions well-founded. We also assessed whether there were alternative approaches which could be cost-effective, reliable and environmentally appropriate alternatives. We considered whether such solutions could or should have merited more detailed evaluation alongside the solution proposed by T&TS. We report our preliminary conclusions on this matter.

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<sup>2</sup> *Solid Waste Strategy : Changing the way we look at waste, published by the Environment and Public Services Committee, 10<sup>th</sup> May 2005; Document 27 as listed in Appendix 1.*



## Terms of reference & Matters considered

2.5 Juniper has been retained as an Independent Reviewer and as an Adviser to the Scrutiny Panel.

2.6 Juniper's specific responsibilities are:

- ◆ *to understand the current position with regard to Solid Waste issues in Jersey;*
- ◆ *to examine the premise that the selection of technologies for the disposal of Jersey's solid residual waste shall be dealt with in one process;*
- ◆ *to consider such other technologies and systems as may be suitable, either alone or in association, to deal with the disposal of Jersey's solid residual waste;*
- ◆ *to liaise with BDO Alto Limited in matters relating to the consultants brief;*
- ◆ *to attend hearings and assist in the preparation of questions for those hearings;*
- ◆ *to provide the Environment Scrutiny Panel with a report outlining Juniper's findings for inclusion in the final review report.*

*focus on evaluating whether other approaches have merit*

2.7 The time available for our review was constrained by the timeline associated with the scrutiny process itself. Following initial discussions with the Chairman of the Scrutiny Panel and the Officer to the Panel, it was agreed that our review would focus on examining two key matters:

- ◆ *does Juniper feel that the right technical conclusions were used to underpin the decision to elect for a single large EfW to handle the island's residual waste?*
- ◆ *does Juniper consider that there are alternative approaches which should merit greater consideration than they have had so far?*

2.8 It was also agreed that Juniper would consider and provide an outside independent perspective on a number of additional points:

- ◆ *are the arguments for not extending the life of the existing Bellozanne incinerator reasonable?*
- ◆ *is the Strategy in line with international Best Practice?*
- ◆ *is there scope for increasing resource recovery through additional materials recycling, composting or energy recovery?*
- ◆ *to what extent do the particular circumstances on Jersey impact on the choice of optimum solution?*
- ◆ *is the EfW sized appropriately?*
- ◆ *is the indicative budget for the EfW reasonable in the context of experience elsewhere?*

◆ *are there economic arguments for or against alternative approaches?*

- 2.9 Within these Terms of Reference it was agreed that, as we were acting as an outside Independent Reviewer, the specific questions that would be raised and the interviews that would be conducted would be a matter for Juniper to decide. The findings are ours alone and Juniper has had full editorial control over the content of the final report (the Scrutiny Panel were invited to comment upon a draft of this report).

### Enquiries undertaken

- 2.10 The Review was conducted in the first quarter of 2008. Finalisation of the report was delayed by one month to provide an additional opportunity for the Transport and Technical Services (T&TS) Officers to provide a particularly important missing document.

### *documents reviewed*

- 2.11 Juniper reviewed reports prepared by T&TS or its predecessor organisations and by their advisers between 2000 and 2008.
- 2.12 We requested additional documentation on certain other matters. Much of this was made available and, in one case, new analysis was prepared for us, but there were some instances where we were not provided with information because it was deemed to be commercially confidential<sup>3</sup> or we were informed that such documentation did not exist. In one important area, we were told analysis existed and was being made available, but it was never actually received. Where we feel this has had an impact upon the review, we have noted this within the relevant section of our report. A list of documents requested and provided is contained in Appendix 1.
- 2.13 No financial or cost models were provided for review and this has limited the scope for us to consider the economics of T&TS's proposed approach and the relative merits of alternatives.

### *meetings*

- 2.14 We conducted two detailed interviews with senior Officers from T&TS. We were struck by their willingness to cooperate with our enquiries and are grateful to them for the time that they made available.

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<sup>3</sup> *Juniper did offer to sign confidentiality undertakings with T&TS in relation to the procurement exercise that is underway, under which we would not have disclosed commercially sensitive information but would have confined ourselves to reporting conclusions. This methodology would, in our view, have safeguarded the negotiating position of Jersey versus bidders yet allowed us to focus our review much more incisively. Officers made it clear that they would not consider releasing documentation that they deemed to be confidential under any circumstances to us and this has inevitably had an impact upon our review.*

*visits to existing facilities*

- 2.15 We met with the Scrutiny Panel and also attended one of the Parish public meetings, both of which provided useful contextual information about the particularities of the situation in Jersey.
- 2.16 We visited the Bellozanne and La Collette sites and were able to observe at first hand the mix of commercial and parish deliveries to the municipal waste incinerator and the bulky waste pre-treatment area at Bellozanne. Though waste reception at these two parts of the Bellazonne site was fully operational, all three incinerator lines were not operational at the time of our visit.
- 2.17 We were able to discuss with Officers during the course of the visit some of the operational issues associated with the incinerator, particularly the reasons for the apparently lengthy periods of downtime.
- 2.18 The Bellozanne site also housed the sludge treatment digesters (which produce two types of dried digestate for reuse on land in Jersey); a clinical waste incinerator and recycling bring site (where an impressive number of different streams were being segregated for recycling, mainly off-Island).
- 2.19 The La Collette site has been identified for the proposed new EfW plant. The site currently houses the Island's open windrow composting, which processes mainly green waste. Using open windrows clearly has potential for odour and bio-aerosol releases. We understand that there have been persistent complaints of unpleasant smells from the site but at the time of our visit (a relatively cold winter's day) we did not detect significant odours. Officers and site management accepted that odours were an issue when the windrows were turned. We note that this site is much closer to highly populated urban areas than would be normal for this type of operation in less densely occupied communities, and we would expect that odours would be a persistent issue, given the type of process utilised and the proximity to housing.
- 2.20 The composting site produces a few grades of material for reuse, but of the compost products we saw during our visit we were particularly impressed with the visual quality of the PAS 100 qualifying compost product.
- 2.21 La Collette also contains the Island's quasi-landfill, which appeared to have very limited void space remaining. At this site inert waste is being screened to produce different grades of aggregate for recycling and other material such as glass was being crushed and screened for use as a landfill lining material. Ash from the Bellozanne incinerator is also landfilled at the La Collette site, which acts as a storage area for over-spill of shredded bulky waste from the incinerator when it is down.

Some hazardous waste is also being stored at the La Collette site in sealed containers.

*matters not included*

2.22 Because the time available for this review was limited we have not conducted any:

- ◆ *engineering or environmental investigations of existing facilities;*
- ◆ *financial analysis (being covered by BDO);*
- ◆ *validation of data on waste quantities and composition.*

Our credentials

2.23 Juniper is recognised worldwide as a leading independent analyst of novel waste management technologies. In this context we have provided many Public Authorities in the UK and elsewhere with specialist advice on technology options. For more than 15 years we have been providing dispassionate assessments of the advantages and disadvantages of such processes relative to classical alternatives like incineration. Juniper's publications in the field have been utilised by over 10,000 organisations worldwide.

2.24 We have considered the infrastructure needs for waste management in a number of island contexts, both large and small: for example, we acted as an Independent Reviewer for the States of Guernsey some years ago<sup>4</sup> and have acted as Technical Adviser to the Government of Hong Kong on what would be the world's largest such infrastructure renewal programme.

2.25 Juniper is completely independent.

2.26 We have conducted site appraisals of many reference plants around the world, allowing us to comment accurately upon the relative environmental performance and operational reliability of technologies. From our Due Diligence work we have knowledge of the true cost structure associated with different processes, albeit we cannot divulge specific data because of confidentiality constraints.

2.27 Juniper favours no particular technology. Experience has taught us that the optimum solution will vary depending upon the specific circumstances locally. In many instances we have recommended adopting conventional incineration because this is a proven and reliable solution to managing household waste, but in others alternative technologies have been, in our opinion, more appropriate.

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<sup>4</sup> see: 'Independent Review of Process Technology Options : Incineration versus Emerging Technologies' prepared May 2002 for the States of Guernsey and a subsequent addendum, in 2003, that was an update on the status of certain novel technologies

### 3 OBSERVATIONS ON THE APPROACH OUTLINED IN THE WASTE STRATEGY

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#### General observations

- 3.1 Overall, it is clear that the authors of the Strategy have an understanding of the complex issues involved, the limitations of particular types of waste management option and the parameters that need to be taken into account in designing an integrated approach to managing all of a community's wastes.
- 3.2 The Waste Strategy compares favourably with others that we have seen in that it stresses the need for practical, reliable solutions that fit the particular needs of Jersey.
- 3.3 The concept of integrating a certain amount of recycling (focused on so-called 'dry recyclables' such as metals, glass, paper and plastics) with composting of green waste and energy recovery from the residual fraction – as outlined in the Waste Strategy – is a standard approach **consistent with international Best Practice**.

#### *recycling target*

- 3.4 **We agree with the Environment Scrutiny Panel's observation that setting a target of 32% recycling would be regarded nowadays as a relatively modest goal but we do also accept T&TS's view that there are practical constraints associated with achieving high levels of recycling on a small island.** There are widely divergent views within the island as to how big these constraints are and whether they mean that it would be inappropriate to set a more ambitious target. Our comments on this topic are contained in paragraphs 3.19 to 3.31.

#### *insufficient explanation for the size of the EfW*

- 3.5 The use of a modern, well designed Energy-from-Waste plant to process the residual waste fraction and so minimise the need for landfill is increasingly accepted as Best Practice – not least because this can reduce the use of fossil fuels for power generation. But in a Jersey context the value of this energy from a financial and environmental perspective is less than elsewhere (see paragraphs 3.128to 3.146).
- 3.6 Furthermore **we do not feel that T&TS has explained sufficiently the reasoning and justification for the size of Energy-from-Waste plant they propose.** This facility represents the bulk of the investment proposed and **we were struck by how little comparative financial evaluation appeared to have been carried out** versus other options that might be much cheaper (these alternatives are considered in

Section 4). When we first read the Strategy, it was not self-evident why the EfW plant needed to be as large as was proposed, given that the Strategy was also calling for greater recycling, composting and additional emphasis upon waste minimisation. We therefore feel that **the Scrutiny Panel is correct in requesting more clarity** in relation to this matter, not least because this is the dominant element of the proposed capital expenditure programme and, we have been told, the largest single infrastructure investment on the island.

*apparent absence of formal, quantitative analysis*

3.7 When we sought up-to-date supporting spreadsheets that substantiated the calculation - in terms of materials flow analysis and forecast demand under varying scenarios - we were at first informed that these had been prepared and were being made available to us at the end of the meeting on 15<sup>th</sup> February. It transpired that the document which Officers referenced "*Updated (2007) Solid Waste Strategy Model*" [Document 8] was not in the dossier provided. Since we had determined that the other explanations provided for the sizing of the facility seemed questionable in the context of the Strategy's commitment to waste minimisation and increased recycling, we felt that it was vital to review the calculations that underpinned Officers' decisions. The missing document was sought by the Scrutiny Panel on our behalf and it was agreed that our report would be delayed. The document has not been provided and it is not clear whether Officers have chosen not to make it available or that it did not exist (though we understand that the Scrutiny Panel Officer was informed that the reason for the delay in providing it was because an Officer was waiting for input information, which implies that some analysis was now being prepared post-hoc). **We are concerned that a formal<sup>5</sup> model has not been available for review since this is the primary technical input required to underpin the calculation of the optimum sizing of the EfW plant, which is currently being procured.** Without being able to review such analysis it is very difficult to accept that the sizing of the EfW has been conducted with appropriate rigour and that the capacity selected is appropriate. The forecasting requirements are elucidated from paragraph 3.86 and the sizing is discussed further in 3.100 to 3.122, while alternative approaches are outlined in Section 4. It should also be noted that we would have expected the analysis to include some element of financial modelling of options to ensure that public monies were being committed optimally.

*green waste composting*

3.8 Biological processing of green waste is a nearly universal component of a modern integrated waste strategy. We were

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<sup>5</sup> the Chief Officer told us that he had prepared some informal calculations while travelling and that he could make his notes available to us if we wished

however struck by the **conflicting views in Jersey about the extent to which increasing composting is practical**. We accept the arguments put forward by T&TS in relation to the importance of finding outlets for the resultant compost or soil improver, but do not feel that the analysis they have prepared proves that there is no possibility to increase landspreading.

- 3.9 We were surprised that **there did not appear to have been greater consideration of anaerobic digestion** of kitchen waste and believe that there is justification for further evaluation of the scope for separate processing of kitchen waste – we return to this topic in Section 4.

### Is it feasible to continue to rely on the Bellozanne incinerator?

- 3.10 The Waste Strategy sets out the case for replacing the Energy from Waste plant without delay<sup>6</sup>.
- 3.11 Juniper visited the Bellozanne facility on 14 February 2008 and also held discussions with various T&TS Officers and plant personnel in the context of this review. We have not conducted a formal engineering review of the plant's operations (and we also understand that another organisation, BDO Alto Ltd, has been retained by the Scrutiny Committee to consider the relative economics of replacement vs. refurbishment) but we have considered the general arguments made in favour of replacement in the context of our knowledge of incineration Best Practice and the operating parameters of such plants.
- 3.12 The latest of the 3 EfW lines at Bellozanne has, it seems, achieved less than half its service life. We recommend that an evaluation of the causes should be conducted to see if they might also lead to a shortened lifetime at any new facility.
- 3.13 Broadly **we accept the arguments for replacement made within the Waste Strategy**.
- 3.14 In particular we note the reported emissions level from this plant and the concerns expressed in the Strategy about the potential harm to human health and the environment associated with this level of emissions (which the Strategy points out far exceed the EU's limits). If the plant were located within the EU it would have had to close by 1996 or have substantially improved its emissions to the environment by that date. It is already widely appreciated that this is probably one of the most polluting

*the Strategy is right to emphasise concerns about emissions*

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<sup>6</sup> Waste Strategy, pages 70 -73

facilities of its type still operational within Western Europe. Any new facility that used state-of-the-art emissions abatement equipment would have emissions well below, rather than above, the EU limits, which would be desirable from the perspective of the potential for cumulative impact upon human exposure and environmental loading.

*continued operation not compatible with Best International Practice*

- 3.15 We also note that the Waste Strategy states that “the States have made various commitments to comply with best international environmental standards.”<sup>7</sup> In our opinion, independent experts would not judge continued operation of Bellozanne, in its current configuration, as compatible with complying with best international environmental standards.
- 3.16 Although retrofitting to meet emissions standards is a possible option, this would be costly and may not – for technical reasons - consistently result in reduced emissions. The operational availability may also remain poor.
- 3.17 We are aware that there are views in favour of trying to extend the life of the existing incinerator and that there are differences of opinion about the ease and cost-effectiveness of so doing (related, for example, to specific matters such as the structural integrity of the chimney and the feasibility of refurbishing plant equipment at Bellozanne). From our visit, **our preliminary view is that it would not be in the best interests of Jersey to try to upgrade the current incinerator**. This view derives from our impression of the current operational condition of the equipment and the current provisions to deal with emissions. If it were felt that extending the life of the Bellozanne EfW plant was a viable option then we believe a full techno-economic assessment should be undertaken prior to any decision but we are yet to be convinced that such further consideration and investigations would be appropriate.
- 3.18 In this context, we accept that the **arguments for replacement** are reasonable and the rest of this document is therefore focused on considering the options in terms of replacement infrastructure.

### Scope for more recycling

- 3.19 In our review of Jersey’s existing waste management capabilities, we were impressed by the number of streams that are currently already being separated at the Bellozanne recycling

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<sup>7</sup> Waste Strategy, Executive Summary, section 4.0, page 4



facility. The Scrutiny Panel feel that more could be done – above and beyond the goals set out in the Waste Strategy. But T&TS rejected<sup>8</sup> many of the arguments put forward in the Scrutiny Panel’s report on recycling [Document 36]. We have considered the arguments put forward. Our perspective, as an outside independent reviewer, is that some of the rebuttal arguments put forward by T&TS seem valid but others do not.

*arguments re. cost potentially misleading*

3.20 For example, T&TS point<sup>9</sup> to the high cost associated with boosting recycling but do not compare this with the high cost associated with processing waste through the EfW. We do not accept their argument<sup>10</sup> that there is no cost saving because the CV (calorific value) of the waste is “unaffected”; and it seems to us that it is not the absolute cost that is relevant but the differential cost. Even if one accepts the costs ascribed to recycling by T&TS<sup>11</sup> (rather than the lower estimates from others), it is not self-evident that much recycling does not make economic sense, as the T&TS document argues. We believe that a proper techno-economic comparison is necessary. Such a comparison was not in the documentation made available for review and, in its absence, we believe that the T&TS’s arguments do not fully inform the decision making process.

3.21 Turning to another rebuttal by T&TS to the Scrutiny Panel’s views on increasing recycling, we accept that any assessment of the rationale for boosting recycling should take full account of the costs associated with “collection, sorting, bulking, transporting and finally reprocessing the waste into new products”<sup>12</sup>. However, it seems to us that it is not the role of the Scrutiny Panel to conduct such analysis; instead we believe that T&TS should be conducting objective, factual, and quantitative appraisals of some of the suggestions being put forward.

*off-island shipment*

3.22 For example, we believe that **the Scrutiny Panel’s suggestions with regard to utilising ships returning empty to their original destinations to transport recyclables from the Island merits serious consideration** and we feel that it should have been explored further by Officers; yet, this potential alternative approach has not been discussed fully in any of the reports made available to us for review. We accept that there may be practical issues and incremental costs, but Officers could not provide a balanced objective assessment of this idea when we

<sup>8</sup> Transport & Technical Services: Response to the Environment Scrutiny Panel Report on Waste Recycling presented to the States on 3 July 2007, Document 22

<sup>9</sup> see, for example, paragraph 6.3, 6.5, 6.6, 6.7, 6.8, 6.9, 6.13, para 5 of the Minister’s introduction and Appendix 1 [22]

<sup>10</sup> meeting with Officers, 15 Feb 08; see also [22] para 2.17;

<sup>11</sup> [22] Appendix 1

<sup>12</sup> [22] para 6.3

raised it during our interview with them. This is not a trivial matter, since lowering the cost of recycling to the States could be the catalyst to boost recycling of certain materials, as the financial constraints might be less of an issue. Thus, the claim by the T&TS “with the exception of aluminium cans and high quality office paper, there are no materials within the waste stream that are or could currently be collected for recycling that would not require a financial subsidy from the States or the Parishes or both”<sup>13</sup> might not be valid. Moreover this statement ignores the fact that all waste processing today requires a financial subsidy from the States, that would grow significantly once the new EfW was ordered.

*recycling performance is disappointing – and below earlier projections*

3.23 T&TS stress the increase in recycling in recent times (Jersey’s recycling and composting rate has increased by nearly 10% over the last 4 years to a current average of 30.4%<sup>14</sup>). But some aspects of this increase seem modest: composting has only increased from about 12% to the current rate of 14%; and the largest increase appears to have been the recycling of paper and card that has risen from 1.8 to 5.4% and so we do feel that **the Scrutiny Panel is right to question whether more could not be done**. It is interesting to note that the current performance on green waste composting and the recycling of paper are well below the projections made by Fichtner, acting as the Department’s consultant, for recycling performance by 2010<sup>15</sup>.

*additional recycling seems possible*

3.24 We have not conducted a detailed review of the specific proposals being made by the Scrutiny Panel and others (as we have pointed out, we believe that this should be done, objectively, by T&TS) but **our review has identified some streams where there would seem to be potential for incremental recycling, including waste wood and scrap metals**.

3.25 Based on the waste categorisation conducted in 2006, Fichtner had pointed out that up to 10% of the bulky waste processed at Bellozanne was “good wood”, suggesting “that there is the potential to recover up to 23 tonnes of wood per week [for recycling]”<sup>16</sup> (c.1 % of the non-inert waste arisings).

3.26 If the projected targets for 2010 are achieved and the additional clean wood is recycled from the bulky waste stream as outlined

<sup>13</sup> Document 22: T&TS: Response to the Environment Scrutiny Panel Report on Waste Recycling, 17 July 2007, page 10, paragraph 6.4

<sup>14</sup> Document 4: Officer’s spreadsheet summarizing changes in tonnages 2003 – 2007.

<sup>15</sup> Document 10: Jersey PSD, Review of Waste Strategy, 21/06/2001, pages D-7 and D-8.

<sup>16</sup> Document 6: Directly Delivered Waster Categorisation Summary Report, pages 3 and 15.

by Fichtner, then **recycling levels in Jersey could increase by a further 6-8 % by 2010** over 2007 performance levels (30.4%).

*data is not as good as T&TS contend*

3.27 In light of the seemingly low recovery targets set for metals from the residual waste sent for incineration (1%), we wanted to understand what percentage of metals is in the residual waste currently been sent to the Bellozanne incinerator and therefore the quantities of metals that can be realistically recovered from the residual waste sent for treatment. None of the reports we reviewed had specific information about this, which seems surprising to us as T&TS state in their rebuttal document that *“The Strategy is based upon robust household and commercial waste assumptions, two specific compositional analyses of Jersey’s unique bulky waste (not acknowledged by the Environment Scrutiny Report) and a calorific analysis of the energy value of Jersey waste of unparalleled detail.”*<sup>17</sup> We accept that such analysis has been prepared but the upshot is that we, as an independent professional expert, could not readily obtain a number for the total percentage of metals in the residual fraction from all of this analysis and hence derive an assessment of the viability of incremental recycling.

*greater role for private sector in recycling*

3.28 The Scrutiny Panel have suggested that the private sector on and off-island is ready to take a greater role in recycling of specific materials. They have provided a number of specific suggestions. We have not been able to evaluate these in detail. Many of the specific points have been robustly criticised by T&TS, and no doubt many of their points are well-founded, though we would have hoped that they had less of a closed mind to ideas from outside the Department. As in any other walk of life, many such suggestions may subsequently be found not to be workable, but some – even if they are only a few – may be excellent. **It seems to us that the private sector could play a greater role in niche recycling initiatives.** Even if these activities are not more volatile (and not underpinned by long-term contracts) they could still be beneficial and no more expensive than processing in the manner T&TS propose. Experience elsewhere has also shown that the private sector can also be more proactive in driving forward initiatives in a speedy, efficient manner, than a public service.

*scope for more metals recovery?*

3.29 Apart from the metals that are recycled from the household and commercial waste streams at the Bellozanne recycling area, other Bring sites on the Island facilities and via source segregation of aluminium cans, the residual waste going to Bellozanne (black bag and shredded bulky waste) is not being currently further screened to recover metals prior to incineration.

<sup>17</sup> [Document 22], para 2.4

**Based on Best International Practice, we suggest that serious consideration should be given to recovering this material.**

- 3.30 In Germany, for example, where far more waste segregation has been in place for many years, as much as 3-4% ferrous metals are still recovered at the residual waste treatment plant. Considering the significant quantities of the so-called 'bulky waste' that is co-processed with household waste on Jersey, it is possible that the residual waste sent for incineration contains more than 3% metals. Therefore, there may be potential to extract a worthwhile quantity of additional metals from the residual waste stream prior to treatment to further boost recycling rates.
- 3.31 However, we feel, as T&TS themselves have pointed out; "*the full financial implications to the Island*"<sup>18</sup> need to be fully understood before such options can be rejected.

Is it right to focus on Energy from Waste?

- 3.32 **In our opinion, handling all of the island's residual waste within a single EfW is technically, commercially and environmentally sound. However, we do not accept that a case has yet been made that this is the only practical approach.**
- 3.33 **There are specific technical disadvantages in using a single EfW that are not highlighted within the Waste Strategy** or the supporting documents we were provided for review, which, in our view, **could have led to a different perspective on the relative merits of this approach.**

*many negatives of EfW not emphasised in the Waste Strategy*

- 3.34 We have identified a number of factors that we believe should have been given greater emphasis:
- ◆ *the relative inflexibility of conventional moving grate incineration in terms of adapting to changes in the amount of waste needing processing;*
  - ◆ *incineration becomes much more costly at smaller scales than some other technologies;*
  - ◆ *Officers stress the provenness of mass-burn incineration yet they have still included significant redundancy into their capacity*

<sup>18</sup> Document 22: T&TS: Response to the Environment Scrutiny Panel Report on Waste Recycling, 17 July 2007, page 14-15, Point no. 5.

*assumptions to deal with potential operational downtime, obviating much of this advantage;*

- ◆ *some higher temperature processes can produce inert residues that are more attractive than incinerator ash for recycling into building materials;*
- ◆ *the energy from the incinerator seems less useful or valuable in Jersey than it would be in mainland UK, reducing the attractiveness of EfW;*
- ◆ *an integrated approach using a combination of technologies seems to have been dismissed by the Government's advisers without detailed evaluation;*
- ◆ *some technologies seem to have been dismissed because of scale, some of which are sufficiently proven to meet the Strategy's own criteria at the scale needed if a more integrated approach were adopted;*
- ◆ *others have been dismissed because they are not capable of handling all of the different types of waste, yet these could be used together as part of an integrated solution.*

3.35 In broad terms we feel that these factors have not been given the same weight in the reports we reviewed as those other, equally valid, arguments that tend to favour incineration, which are emphasised within the Strategy. This places at risk the formulation of a properly balanced judgement.

*other options have merit*

3.36 Specifically, we think that **if the additional factors identified above were now taken into account, in the context of the particular circumstances that apply in Jersey, some other approaches would also emerge as serious contenders** (see Section 4).

3.37 In our opinion, therefore, there would be some merit in re-evaluating a focused set of options and benchmarking these against the proposed EfW in terms of:

- ◆ *cost;*
- ◆ *environmental performance;*
- ◆ *reliability;*
- ◆ *commercial viability;*
- ◆ *community acceptance;*
- ◆ *flexibility to adapt to changing circumstances; and,*
- ◆ *fit to the island's requirements (now, in the medium term or in the future).*

3.38 **It is quite possible that once such a review had been conducted, using a single large EfW will have indeed been shown to be the optimal approach. But at the present time we have concluded from our review of the documentation that this case has not yet been made and that there is a**

**reasonable possibility that the review would instead show that another approach was better, for the reasons we are exploring in this review.**

## Criteria used to select technologies

### *emphasis on proven technologies*

3.39 The States appointed consultants to review technology options as part of the development of the Solid Waste Strategy. Their report<sup>19</sup> stresses the need for the residual waste treatment facility to use proven technology. **We concur with this view.**

3.40 If whichever process was selected subsequently proved to be unreliable, the Island would face considerable difficulties in managing its waste in a safe and effective manner, given the absence of any backup infrastructure (such as significant amounts of landfill void space) on the island. Indeed the Waste Strategy points to the unreliability of the current incinerator and says that *“this has often resulted in volumes of waste being stockpiled around the island, during periods of breakdown or maintenance.”*<sup>20</sup> It continues: *“This is not acceptable, from the point of view of public health, in that such piles are unsightly, will attract rodents, cause smells and potentially create leachate.”* We agree strongly with this analysis and feel that this factor alone, aside from the obvious cost implications of having a poorly performing plant, is sufficiently fundamental to justify the emphasis placed within the Waste Strategy on selecting a *“robust solution”*<sup>21</sup>.

### *criteria used for judging provenness are appropriate*

3.41 Moreover, we believe that the seven criteria that have been built into the procurement process by T&TS<sup>22</sup> for judging whether technologies are sufficiently proven and reliable are appropriate. For example, Juniper has championed for many years the adoption within the industry of the following definition of ‘proven’: *demonstrated at the same scale on the same feed for at least two years at two or more commercial reference facilities*, which is almost exactly the same wording as that adopted by the Waste Strategy Steering Group.

3.42 In our view those in Jersey who champion novel technologies as ‘better’ solutions for the island’s waste need to recognise the reasonableness of this type of procurement test and **we recommend that, in considering the merits of alternative**

<sup>19</sup> Solid Waste Strategy – Technology Review prepared by Babbie Fichtner rev4 dated 24/10/05: Document 19

<sup>20</sup> Waste Strategy p.68

<sup>21</sup> Waste Strategy p.77

<sup>22</sup> Waste Strategy p.78-79

**approaches, the Scrutiny Panel should apply the same seven tests.**

*focus on 'deliverable' solutions*

3.43 Such an approach will lead to the **elimination of some options that may have other merits, but which are not yet sufficiently proven.** We have taken this into account in considering potential alternatives and feel that this greater degree of focus on a narrower range of 'deliverable' and reliable solutions is important, given the pressing need to replace the existing infrastructure for operational and environmental reasons.

*requirement for a process to be a complete solution*

3.44 While we endorse the procurement criteria contained in the Waste Strategy, we do note that there is an important difference between them and those used by Babbie Fichtner in the Technology Review. The latter states "a key factor in determining the suitability of facilities has been the ability of the proposed process to deal with the whole waste stream."<sup>23</sup> This criterion has then been used to eliminate "a number of technologies [which] are considered proven and commercially available, but have been rejected because they can only process part of Jersey's waste stream, or because they pre-treat the waste producing a number of streams requiring further treatment."<sup>24</sup> **We do not believe that this criterion should have been used to eliminate options** which otherwise have merit, since it is widely accepted that optimal waste management solutions frequently include several process elements that are each optimised to handle a particular component of the waste and which together integrate in a fashion that maximises resource recovery. In practice, this criterion on its own has excluded processes that could have potentially played an important role in an overall solution, such as anaerobic digestion or thermal technologies that are suitable for smaller scale implementation.

*need for pre-processing*

3.45 A number of other technologies are eliminated in the Technology Review because they do not take as received waste (so-called 'black bag waste', (i.e. waste straight from the garbage truck collection system)). We do not feel that this was a necessary requirement and it also results in a bias in favour of mass burn incineration, eliminating otherwise acceptable technologies from more detailed consideration.

3.46 Together these two criteria seem to reflect an underlying prejudice towards only considering single unit operations that can handle all of the waste without pre-processing and

<sup>23</sup> Document 16: States of Jersey Solid Waste Strategy Technology Review -, Management Summary page ii and pg 2, section 2.

<sup>24</sup> Document 16: see for example pages 21-25 and pages 53-58

potentially pre-judges a key issue: whether or not the waste should just all be burnt without secondary recycling.

- 3.47 In conclusion, we feel that **the Technology Review was wrong to eliminate a number of options just because they were not capable of handling the totality of the waste without secondary processing** a point which Officers accepted when we met with them.

### Are the cost estimates for the incinerator reasonable?

- 3.48 As part of our Terms of Reference, we were asked to consider whether the cost estimate for the EfW that is included within the Strategy was too high. In our opinion – based upon our knowledge of underlying costs for waste treatment infrastructure and the widely ranging commercial quotations for similar types of facility in recent years - **the £75.5 million the Waste Strategy recommends allocating for a new EfW plant is as good a preliminary estimate as any other for the possible cost of such a facility**. Under current market conditions (and given the requirement to use proven technology from credible suppliers of larger scale technology), it is unlikely to be a significant over-estimate; and may even be shown to have been significantly too low, once the tenders are opened<sup>25</sup>. Recent experience in Guernsey has shown that the tendered prices for relatively small scale projects in an Island context are higher than the indicative EfW costs that are available in the literature, and also higher than the unit costs per tonne of capacity that might apply for a project in a large city in the UK. T&TS are clearly aware of this and we believe that they have been **right to take this experience into account in developing their budgetary estimates and procurement strategy**.

*prices have risen sharply*

- 3.49 Indeed we would actually caution that **the cost estimate may even be too low under current market conditions** (it was developed some three years ago). Actual tendered prices for Energy from Waste plants have, in the meantime, risen sharply: some current quotes are coming in much higher than had been anticipated. This is partly due to high raw materials costs, partly due to a very significant upturn in civil engineering costs for all large infrastructure projects and partly due to a change in the supply/demand balance: the big demand for new infrastructure in the UK to help authorities meet LATS targets has meant that prices have hardened. This has been exacerbated by a

<sup>25</sup> We understand that this had not taken place at the time of preparing our analysis, but the price quotations may be known by the time this report is released.



consolidation in the number of world-class suppliers because of acquisitions and mergers meaning that fewer companies have the resources to meet the current demand.

3.50 It seems to us pointless to analyse this aspect further since Officers will know the actual tendered price at approximately the same time as this report is finalised.

*no techno-economic evaluation of alternatives seems to have been undertaken*

3.51 Instead we believe that **the focus of questioning should be on the specified plant capacity** which will have had an impact on the tendered price. We are concerned that a formal techno-economic evaluation of the sizing of this plant does not seem to have been undertaken. **The documents which were provided to us do not contain a full financial analysis of the options.** If this means that none has been done we would regard this as a **serious oversight** given the scale of the investment. We would have expected that the results of such a cost analysis would then have been put alongside a more formal analysis than appears to have been conducted of the operational advantages and disadvantages of each approach to determine which solution was optimal. No such analysis was made available to us for this study and **in the absence of such a document, T&TS have, in our view, not demonstrated that Due Process has been followed, given the scale of the investment.**

*costs of alternatives*

3.52 The proponents of novel technologies typically claim that their processes have low capital or operating costs. Such claims should be treated with caution, since most of them have never been tested under market conditions and we have found, over many years experience, that the **initial 'indicative' costs often rise sharply when a formal tender is submitted.** We are not convinced that any robust, deliverable and proven technology that would meet the criteria adopted by T&TS<sup>26</sup> (and which we are recommending should continue to be used) would necessarily be cheaper. In our experience from Due Diligence reviews, 'indicative costs' for novel technologies are also often based on over-optimistic assumptions for operational performance, operating costs and revenues; they frequently do not include a number of essential secondary costs; and some do not relate to local market conditions (under-estimating labour costs or over-estimating electricity revenues for example). **We believe that it would be a mistake to adopt preferentially any alternative technology solely on the basis of its indicative costs.**

3.53 The cost of introducing certain credible alternative technologies, such as anaerobic digestion, could be significantly less than EfW costs, but such systems need to be integrated (AD cannot treat

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<sup>26</sup> see paragraph 3.41

all of Jersey's waste) and a careful evaluation of the overall costs of an integrated solution would need to be undertaken.

- 3.54 For example, if AD is used as part of an integrated waste management approach that also includes more aggressive waste minimisation initiatives, additional recycling, in-vessel green waste composting and a smaller EfW capacity, it is not possible to say without conducting a proper assessment whether such an overall solution would be cheaper or more expensive for the States. We believe such an assessment should have been undertaken by Officers prior to electing to use an EfW-led approach.

### Implications of the way waste is collected in Jersey

*parishes free to manage their own waste*

- 3.55 Both the Scrutiny Panel and T&TS informed us that the individual Parishes, which collect most of the waste, are free, if they wish, to manage that waste themselves rather than handing it over to the States for treatment or recycling.

- 3.56 We were told that St Helier Parish (the largest, accounting for some 30% of household waste) is considering doing so for some or all of their waste, and we understand that others are not ruling out some degree of separate recycling or composting. During our visits to the island we heard differing views about the relative practicality and economics of such an initiative, but it seems to us that there is at least a possibility that a significant proportion of the total wastes could be diverted prior to T&TS's area of responsibility, which would reduce the amount of waste that was handled by their new facilities.

*increases uncertainty about required capacity*

- 3.57 While detailed consideration of the practicality of the Parishes' ideas is beyond the scope of this review, it is clear to us that, if Parishes have the right to manage some or all of the waste they collect, there is increased uncertainty about the amount that T&TS can be certain they will have to manage.

- 3.58 It seems from our review of documentation and our interviews of Officers that **the implications of this possibility have not been fully evaluated**. Given that this could cause be **significant operational issues** for the EfW – and that, under such circumstances, the plant would be seen to be **oversized and hence over-costly**. It would be particularly unattractive under such circumstances.

*an ability to adapt to changing quantities of input should have been a bigger factor in choice*

*incineration is very inflexible*

3.59 In our view **an important consideration in selecting technologies should have been their flexibility to cope with changing amounts of waste**. Some processes are reasonably flexible to both short-term and long-term changes in input quantity, but others are extremely inflexible.

3.60 Specifically, while moving grate incineration has a number of advantages, it has one significant disadvantage: a lack of flexibility to adapt to moderate changes in the amount of waste requiring treatment, yet this is the technology which is favoured for the residual waste treatment plant. (Mass-burn incinerators need to operate continuously on a relatively constant volume of input.) There are some other specific variants of thermal, biological and mechanical processes that would be much more suited to a situation where there was uncertainty about the capacity requirements.

3.61 In practice, moving grate incinerators are only economic when each line is sized to process a significant amount of waste (roughly the total quantity produced in Jersey at the present time). This means that increments in capacity are too big – or too costly – to adopt to Jersey’s situation. Many other technologies are optimal at much lower scales, so each line or module can be smaller. This makes it easier to fine tune both the initial capacity and any adaptation to changing needs (up or down) in the future. Such processes are described as modular. We believe greater consideration should be given to this aspect when evaluating technology options.

3.62 **The Waste Strategy does not appear to have taken these factors sufficiently into account** when considering which technologies are most appropriate. If greater emphasis had been placed on this factor when developing the Waste Strategy, it is possible that **different conclusions may have been reached about which was the optimum approach**.

*If waste minimisation and recycling are successful, there could be operational issues for the EfW*

3.63 In particular we found no evidence of any consideration of the possibility that the quantity of waste could decrease – even though the strategy calls, as we have pointed out earlier, for a concerted effort to minimise waste. There does not appear to have been any evaluation of the potential operational issues that could be experienced at the EfW if the quantity of waste requiring treatment were to reduce significantly. This is an oversight, not least because such **operational difficulties have occurred at many German incinerators** when an increase in recycling took place at the same time as a concerted programme by industry, supermarkets and consumers to reduce packaging. Opinions may differ about the likelihood of this happening on Jersey but given the emphasis that the Strategy has placed upon the need for the infrastructure to respond to upward changes in

tonnages requiring processing, we believe that an evaluation of the impact of that tonnage decreasing should have been conducted alongside the sizing that assumed a significant increase.

3.64 Since an ability to adapt to a decrease is a fundamental disadvantage for the type of EfW technology favoured in the Consultants' reports, **we believe that a more balanced assessment of the scope of upward or downward changes in waste would have had a material impact on the assessment of the relative merits of each approach.**

3.65 Given the rapid change in societal views on environmental matters and on packaging of foods and other consumer products in particular we do not believe that it is beyond the bounds of possibility that the amounts of these types of waste could lessen very dramatically over the lifetime of the plant (15-30 years), though we do accept the Officers contention that it is prudent to assume that waste creation might increase – but we do not accept that this necessarily has to translate into an equivalent increase in the quantity of residual waste requiring thermal treatment, as discussed in Section 4.

*need for greater clarity over roles of Parishes and States?*

3.66 Looking forward, it is vital, for fundamental operational reasons, that the capacity of any incinerator is balanced to the amount of waste being processed. This implies that **there may have to be greater legislative clarification of the roles of the Parishes and the States in managing waste.** We are aware of other communities where, because those who collect the waste could elect not to send it to the treatment facility; legal, operational and contractual difficulties have resulted (one currently topical example is Dublin City).

*impact of collection method on recycling rates*

3.67 **The way that waste is collected, both from households and businesses, has a significant impact upon recycling performance.** In our interviews Officers explained the status quo and how this constrains the scope for obtaining more, better quality recyclables. We accept the validity of many of the points that were made and recognise, for example, the narrow roads that exist on the island, which we understand exclude the use of standard UK vehicles for kerbside sorting of dry recyclables. In our discussions with members of the Scrutiny Panel, the more ambitious recycling goals set on the island of Guernsey were cited as evidence that T&TS could do more, since Guernsey faces similar, or even greater, logistic issues, yet believes that it can reach a 50% recycling target. (We have not reviewed the position on Guernsey recently and cannot comment upon how achievable this target is.) But, based on the information provided to us, **we do not accept the contention that the island's situation, of necessity, limits the scope for**

**increasing resource recovery significantly. With a different approach to waste collection and the use of different waste processing technologies, more could be done relatively easily, and possibly at no extra net cost** (we identify some ways of doing this within Section 4 of this report which we think merit more detailed evaluation).

3.68 There is, in our view, **scope for more pro-active initiatives to encourage recycling** (and waste minimisation). We were surprised that these did not seem to be under active consideration by T&TS nor did there seem to have been any formal financial analysis of these possibilities, given that St Helier have, we understand, recently elected to conduct a so-called “Zero Waste” trial.

*separate collection of kitchen waste merits evaluation*

3.69 The arguments put by Officers as to why there could not be a separate kitchen waste collection did not seem compelling to us. This is increasingly regarded as Best Practice and is becoming widespread in continental Europe, including locations which might be felt to have difficulty achieving high participation rates, such as apartment blocks within large cities. Many UK Local Authorities see the merit of frequent collection of the putrescible fraction (kitchen waste) in small dedicated containers (weekly for households and possibly more often for commercial premises) so allowing fortnightly collection of residuals and weekly or fortnightly collection of dry recyclables.

3.70 We believe that **such a collection strategy could potentially have significant benefits**. Because of the separate collection, the putrescibles could now be processed separately, possibly through an anaerobic digester. This would greatly reduce the biodegradability of the residual fraction. One of the arguments put forward by T&TS for specifying a two-line over-capacity plant is to be able to process the waste if one line breaks down unexpectedly. Removing kitchen waste would lessen this potential problem very significantly and might make it feasible to store residual waste temporarily (e.g. at the La Collette landfill) avoiding the need for this additional capacity. We believe that it would have been appropriate to have conducted a techno-economic assessment of this prior to deciding to go ahead with such a costly investment in a large EfW.

3.71 We accept that changes in collection strategy are largely a political decision and that there has to be community involvement and acceptance of any change. But the community is more likely to respond positively to such changes if there is more positive leadership from the ‘Powers that Be’ and that, in this context **more could be done by T&TS to inform the community by providing fuller cost-benefit assessments of a range of options**.

- 3.72 In our opinion, **a working group comprising parishes, business, political decision makers and T&TS Officers should review a range of alternative collection strategies** – with professional advice from specialist consultants – to determine whether a different approach would have environmental or financial benefits and, thus, overall, be beneficial.

## Composting

### *desirability of composting*

- 3.73 All the stakeholders we talked to agreed that green waste composting was desirable on Jersey.

- 3.74 There appears to be little appetite for compost generated from mixed waste. The historical opposition that has been expressed in the farming sector on the Island with regard to the use of ‘composts’ in agriculture that derive from mixed waste (i.e. black bag<sup>27</sup> waste including green waste and food waste, rather than source separated waste) is still very pertinent today. In our view, **the use of such mixed waste derived composts should not be considered for application to agricultural land in Jersey**. Not only is contamination an issue with this output, in many EU States, including the UK, this material is not certified for reuse in agricultural applications and is actually banned in some countries from such uses.

- 3.75 T&TS’ view is that there is little appetite for food waste derived composts in Jersey in the agricultural sector. The main basis of their position being that Jersey Royal Limited, which market much of the produce from many agricultural lands on the Island “are not prepared to accept ABPR compliant composted food waste”<sup>28</sup>.

- 3.76 The Scrutiny Panel has come to a different view after discussions with a number of interested parties. They feel that the situation is not clear-cut and that additional lands, including some agricultural lands, could be available for managing more waste derived compost including food waste derived composts.

### *finding more outlets for compost*

- 3.77 When we discussed the differing views on the extent of land availability, Officers conceded that there is likely to be some further potential in agricultural applications.

<sup>27</sup> ‘black bag’ waste is mixed household waste that has not been separated by the householder into its separate components and which is collected directly from households via a traditional garbage truck, whether via bins or bags. The term derives from the use of other coloured bins or bags for specific fractions of the waste in those many countries which have adopted source separation of waste for separate processing. Composts that derive from black bag waste inevitably have higher levels of contamination, hence the concern about their use in agriculture.

<sup>28</sup> Document 35, see page 3 (section on Potato).

- 3.78 At this meeting, Juniper requested information on the available land-bank in Jersey and particularly information about possible areas on the Island that could have additional capacity for all types of waste derived composts in land restoration, land remediation and agriculture.
- 3.79 In response to this request Officers prepared the “Bio-Solid Land Bank Briefing” [Document 35], which summarised their assumptions related to the land bank. In this document they provide an indication of the type of compost (green, food waste etc.) they envisage being utilised on agricultural and other types of land.
- 3.80 This new analysis by Officers suggests that **more than 40% of Jersey’s land bank could be available for green waste compost, which is sufficient to absorb all of that type of material that could be produced on the Island.**
- 3.81 Officers did point out that storage is sometimes needed because of seasonal variations in access to land and that application rates are also limited by environmental safeguards related to nitrate run-off. Document 35 does give good reasons why certain applications in Jersey might not be appropriate for any bio-solid.
- 3.82 Reaching a definitive position on whether further green waste composting can be accommodated on the Island would require more detailed evaluation than is practical in this review. **Many of the arguments from both sides are, at face value, reasonable, but evaluating the net capacity would require careful study and would require detailed environmental impact assessments.** The scope for co-processing green waste and kitchen waste is considered in section 4.
- 3.83 **It is clear that there is a need for the public authorities to build greater confidence in composting in general**, both in terms of the avoidance of nuisance odours from facilities<sup>29</sup> and in convincing others that all outlets for compost are being pursued.
- 3.84 Document 35 is a positive start. However, interested parties might need to have quantified information about the extent to which compost can be returned to the land in a variety of different applications, its likely environmental impact, its potential impact on the soil and the application for which the land is used. Such a document could also be used to spell out what types of compost can and cannot be used in specific

*T&TS need to persuade public*

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<sup>29</sup> There are understandable concerns about the odour issues associated with the existing windrow composting facility at La Collette. The Waste Strategy seeks to address this by proposing a new In-Vessel-Composting (IVC) plant, with appropriate off-gas abatement measures to minimise odours and bio-aerosols. Such a system is likely to be considered as being in line with EU Best Practice.

applications – and under what circumstances, under what environmental safeguards and quality criteria. We suggest that this should be co-developed with the Environmental Services Department.

*need for sensitivity analysis and financial modelling*

- 3.85 In the absence of such a document it is reasonable, in our opinion, to question whether T&TS has fully explored the practicality of accessing the various potential outlets for waste derived compost in Jersey.

Modelling the need for waste processing capacity

- 3.86 The Strategy outlines a vision in which Jersey moves away from a disposal led culture to a number of initiatives in collection, prevention and minimisation, reuse and recycling, composting, energy from waste and disposal<sup>30</sup>. For this to be successful requires a carefully balanced, integrated and more complex infrastructure, which uses a mix of processes at a number of facilities that are each sized to handle the correct amount of specific fractions of the waste.

- 3.87 It is standard practice therefore for a Waste Management Authority to develop a model that projects forward capacity requirements according to:

- ◆ *the overall growth or decline in waste to be treated taking into account changes in population, economic growth, waste minimisation, etc.*
- ◆ *the impact of specific recycling and composting initiatives on the quantity and type of waste fractions that will require processing; and hence,*
- ◆ *the size of EfW that is required to process the residual waste fraction;*
- ◆ *the size and nature of all recycling and composting infrastructure;*
- ◆ *the quantity and quality of recyclates generated for which offtake contracts are needed and the quantity of secondary wastes that will require management or disposal.*

- 3.88 We would have expected that Officers would have used such a model to conduct sensitivity analysis because experience has shown that there is considerable uncertainty in relation to long-term projections of such parameters. The model would also normally be used to inform the choices that need to be made by political decision makers between options. For this reason we would expect it to include an element of assessment of both

<sup>30</sup> *Solid Waste Strategy, Executive Summary, Section 6.0*



capital and operating cost analysis since some approaches have high up-front capital costs but relatively low operating costs (eg EfW) whereas others (e.g. source separation) involve more moderate capital expenditure but greater ongoing operational costs.

- 3.89 In the specific context of this review, such a tool could also be used to consider the relative merits (in discounted cash flow terms) of building a large plant sufficient to ensure worst-case long-term capacity needs are met at the present time versus the alternative of building a much smaller plant now and only procuring additional capacity if and when it is required.
- 3.90 At our first meeting with Officers we requested a copy of their version of the above model. Officers have provided an Excel spreadsheet that provides historic data<sup>31</sup> (for the period 2003 to 2007) and a consultant's report from 2004 that assessed the capacity requirement for the EfW<sup>32</sup> but we have not been provided with an integrated model that balances the need for different types of plant and that forecasts these over the lifetime of the equipment.
- 3.91 Initially we were informed that this Model existed and was Document 8 in the dossier provided but, as discussed in paragraph 3.7, this was never received. It is not clear whether an integrated technical model does or does not exist that incorporates appropriate assumptions for the balance of infrastructure required to deliver the Strategy and whether or not scenario analysis has been undertaken to assess the supply/demand balance and risk profile under a range of plausible outcomes.
- 3.92 But **the technical evidence made available is insufficient to demonstrate that the investment planned is appropriate.**

### Inconsistency between waste minimisation goals and plant capacity projections?

- 3.93 The Waste Strategy states, quite simply, that the trend towards increasing quantities of waste "must be stopped and then reversed"<sup>33</sup> yet the EfW has been sized to handle a significant increase in waste. This is an inconsistency.

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<sup>31</sup> Document 4

<sup>32</sup> Document 7

<sup>33</sup> Executive Summary, Waste Strategy, p4

*scope for new initiatives*

- 3.94 Since the Strategy advocates waste minimisation in such a clear-cut fashion, we are surprised that it is also proposing spending very significant sums on an EfW that is sized to handle a very significant increase in waste.
- 3.95 We believe that the Strategy is right to place emphasis upon waste minimisation. T&TS frequently point out the particular challenges associated with managing wastes in an island context. **Waste minimisation initiatives could play a significant role** in reducing those challenges and in lowering the cost of service provision. Indeed because waste minimisation is the most attractive solution from a cost and sustainability perspective we would argue for it being given a greater role. For this reason we believe that the Scrutiny Panel's recommendation that "T&TS should establish targets for per capita waste reductions"<sup>34</sup> is a good one.
- 3.96 The "Vision" that prefaces the 2005 Waste Strategy says that Jersey must "become a less wasteful community" and that "to achieve this, wasteful lifestyle habits must change so we produce only the minimum amount of rubbish."<sup>35</sup> Yet the Scrutiny Panel report points out that T&TS have not made any adjustments to the predictions for future waste in Jersey"<sup>36</sup> to reflect this fundamental goal. We agree with this criticism and note that T&TS's rebuttal document<sup>37</sup> did not directly address this point.
- 3.97 This is **a vital issue** from a technical perspective because it could result in much greater expenditure on an EfW plant than is necessary. For this reason we recommend that this matter **should be considered further prior to any contract being awarded for that facility**.
- 3.98 Notwithstanding this **it is important to recognise that any significant new waste minimisation initiatives would require political leadership** to drive this forward. Either 'stick' or 'carrot' measures could be used to influence behaviour by both householders and industry, as discussed in Section 4. Clearly under the current charging structure (or rather absence of any direct charges to either group) there is no financial incentive to encourage waste avoidance. In an island context we regard this as regrettable and it clearly is a factor in waste growth and hence the cost and scale of treatment capacity. **We feel that**

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<sup>34</sup> Document 36 paragraph 1.7.4

<sup>35</sup> Executive Summary, Waste Strategy, p4

<sup>36</sup> Document 36 paragraph 6.7.8

<sup>37</sup> Document 22

**the Strategy could have put forward more policy ideas in this area.**

- 3.99 Even if the island did not adopt its own waste minimisation initiatives, it will still be affected by the adoption of them by its trading partners. Packaging is already being changed in response to political pressure. At the time of writing, the Chancellor of the Exchequer was introducing a UK ban on plastic bags and the confectionary industry was redesigning its Easter Egg packaging to respond to consumer complaints about the former excessive levels. The goods sold on Jersey that largely originate from the UK will have less and different packaging. Companies present on both the mainland and island are quite likely to adopt consistent policies in relation to packaging and return of consumer durables under End-of-Life policies that will be mandatory for them elsewhere.

Is the proposed incinerator sized correctly?

*capacity of the proposed EfW plant*

- 3.100 The proposed capacity for the new EfW plant in the Waste Strategy is 126,000 Tpa. This we understand is the actual throughput that could be achieved based on a desired plant availability of 80%. Thus, the nominal capacity of the proposed EfW plant is nearer 160,000 Tpa. This compares with the existing quantities of residual waste being processed at Bellozanne of about 74,000 Tpa.
- 3.101 Eighty percent availability is, in our opinion, an over cautious assumption for a proven and established technology like incineration. At this availability, the real incineration capacity is significantly down rated. Whilst some down-rating is acceptable considering Jersey's Island context (in getting spares for example), for modern incinerators, operational availability usually averages about 91% in practice. Thus a plant of c. 160,000 Tpa will give nominal throughput of about 145,000 Tpa. Our commentary hereon in refers to this higher availability unless stated otherwise.
- 3.102 It appears that the proposed design capacity is underpinned by projections initially conducted in 2001 by Fichtner [Document 10], who had modelled two waste growth scenarios and three scenarios for waste recycling on the Island. Based on these scenarios they had estimated that the total quantity of waste that may require incineration on the Island could range from about 77,000 Tpa to 156,000 Tpa by 2025 - a difference of more than 100%.

- 3.103 Tonnages for incineration closer to the currently proposed EfW capacity of 126,000 Tpa can be arrived at in the Fichtner model by assuming an “upper growth” rate and recycling levels of around 30%. This appears to be the scenario adopted in the Waste Strategy as the most likely (we are unable to be more precise because we never received a copy of the Officers’ model).
- 3.104 The approach used by Fichtner is a conventional method of waste growth modelling, the accuracy of which is a function of the reliability of historic data and the understanding of how a number of factors such as population growth influence future waste arisings. The impression we got from the various reports we have reviewed as part of this exercise and the meetings held with Officers and members of the Scrutiny Panel is that there was insufficient reliable historical data and definitive waste growth trends.
- 3.105 The accuracy of forecasting appeared to have been further complicated by the fact that a large proportion of Jersey’s waste that is sent for incineration at Bellozanne comes from commercial premises and the arisings of these would be subject to different growth phenomena. Unsurprisingly, Fichtner themselves had pointed out in their 2001 review [10] that “such projections.....are limited by the lack of long term forecasting in population, economic prosperity, waste composition and environmental legislation [and tourism] ”. They cautioned in their report that “actual arisings could vary considerably”.
- amount of waste now being incinerated is much less than forecast*
- 3.106 Indeed, the quantities of waste actually treated at the Bellozanne incinerator in 2005 (72,848 Tonnes) [Document 4] is more than 20% lower than that forecast for the same year by Fichtner. Moreover, the waste currently being treated at the incinerator (2007) seems to be 20 to 30% lower than that forecasted.
- 3.107 In terms of waste growth, the actual amount of residual waste sent for incineration over the last 3 years has risen just less than 1% per annum, with recycling increasing over the same period of time by an average of about 3% per year to 30.4%. This can be contrasted with earlier assumptions [10] that in the short term<sup>38</sup> “historical growth trends [will] continue”. This historic trend is reported to be a growth rate of 3.65%. Clearly between 2003 and 2007 the actual growth in waste sent to Bellozanne was significantly lower.
- the strategy assumes high rates of growth*
- 3.108 The Strategy has adopted a more cautious growth rate of 2.5% until 2010, but even this is greater than current actual waste growth [Document 4]. These differences are not trivial: year-on-

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<sup>38</sup> “short term” is modelled as 2000 to 2005 in an optimistic scenario and 2000 to 2015 in a pessimistic scenario

year growth of 1% means that over 25 years waste could grow from about 75,000 Tpa in 2007 to 95,000 Tpa. For a 3.75% year on year growth rate the quantities requiring treatment in 25 years would be about 180,000 Tpa.

*capacity will remain under-utilised for many years*

3.109 There is a case that a facility of c. 160,000 Tpa (design capacity) might be grossly oversized for dealing with waste on the Island, particularly in the short and medium term and perhaps, also in the long-term.

3.110 If the proposed plant were to be implemented, utilisation of its capacity, based on the levels of waste currently being incinerated at Bellozanne, could be as low as 50% (i.e. 50% redundancy) in the early years. Based on the most recent residual waste growth projections [7], **utilisation of the EfW capacity could be as low as 60% in 2015** and only reach optimum load after 2020<sup>39</sup>.

3.111 Based on the limited information made available a strong case can be made that the proposed plant is grossly oversized.

3.112 Maintaining 100% redundant capacity for sometime into a project is very unusual for EfW projects worldwide. The argument that *“procuring a smaller plant is likely to reduce the turnkey price of the plant by about 14% [which] amounts to a potential saving of about £8.8M of the estimated £75.5M for the new plant”*<sup>40</sup> derives from the fact that moving grate incineration has been preferred for which there are few economies associated with reducing capacity. This would not be the case with other technologies, as we discuss in Section 4.

3.113 There is no certainty of growth as forecasted and **the actual track record of predicting recent rates of residual waste growth in arisings and the need for capacity<sup>41</sup> on the Island is not strong**. Therefore, a strong case can be made that it is unwise, when attitudes to waste minimisation are changing rapidly, to significantly oversize the proposed EfW plant rather than to size for the current and medium term and then to monitor changes.

3.114 Officers, in their concern to ensure that there is a reliable waste treatment plant with the right amount of capacity to handle the island’s waste do not appear to have considered the possibility that the amount of waste requiring processing could reduce

<sup>39</sup> See pg 2 Document 7. Optimum load reported to be between 70 and 100%.

<sup>40</sup> Document 7

<sup>41</sup> It is noteworthy that the existing Bellozanne incinerator has a design capacity of about 150,000 Tpa of which about 50% is being utilised. Whilst this is not unusual for a relatively old plant, the design capacity that was available in 1979 (c. 88,000 Tpa) when the plant was implemented was more than double the arisings at that time (c. 40,000 Tpa).

significantly because of changes in packaging of goods that originate from the UK and elsewhere and because of changes in societal attitudes towards waste. The latter may lead to a choice being made by individual islanders to reduce the amount of wastes that they discard. This could result in a significant reduction in the amount of waste available to be processed. With the current design, each line will require a certain minimum of amount<sup>42</sup> of waste to be fed continuously to operate. Officers told us that in the early years they essentially expect to only operate one line (because of the redundant capacity that is being ordered). There is a risk therefore that the amount of waste could fall below the threshold minimum for that one line within a few years for reasons outside the control of T&TS. To address the very severe operational implications associated with such a circumstance the first step that Officers might be forced to take would be to curtail recycling and composting and instead feed this waste to the incinerator in order to maintain its operational integrity. Beyond this, further reductions could have very severe implications for the Island since there are technical reasons why a moving grate incinerator cannot be operated discontinuously – shutting it down for prolonged periods is technically feasible but this would result in putrescible waste building up with unacceptable public health, odour and vermin implications. It was precisely the need to avoid such an issue that led Officers to oversize the plant so that it could handle this raw waste if one line failed. This scenario does not appear to have been considered by Officers.

*need for risk assessment*

3.115 More broadly, we were not provided with any evidence that a proper risk analysis (that evaluates the sort of contingencies identified above and categorises them according to their probability and level of impact) has been undertaken. Most public and private sector organisations committing to large scale, complex long term investment of this type would regard it as prudent to commission such a review by independent experts other than those that were involved in the original decision making process.

*residual waste composition to EfW*

3.116 In our meetings with T&TS Officers, it was stressed that the black bag waste sent to Bellozanne is similar to UK black bag waste. The significance is that this assumption is used to determine the composition of the residual input material that would need treatment in the proposed new EfW plant.

3.117 Many UK local authorities have come to realise that their waste is not similar to “typical UK waste” as defined by DEFRA and this is likely to be no different for the composition of waste on

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<sup>42</sup> this amount will vary depending upon the specifics of the process selected.

Jersey. Consultants and regulators have had to re-normalise their assumptions using specific local waste composition data.

- 3.118 A higher proportion of commercial waste is co-collected in the Parishes than is typical in the UK. Furthermore, most of the UK incinerators predominantly take household waste and where commercial waste is co-processed, this is usually less than 50% of the mix.
- 3.119 We note that some waste categorisation surveys were conducted over a 12 day period in 2006 [9] to help define the waste composition and facilitate the design of the proposed EfW plant. But this was limited to the bulky waste fraction only and excluded Parish collections. Clearly such short-term analysis has limitations, particularly in that it cannot capture the variability in composition of the residual waste over the course of a year
- 3.120 Further calculations that used the steam output data from Bellozanne have been undertaken by Fichtner [9] to estimate the Net Calorific Value (NCV) of the mixed (black bag and shredded bulky waste) input to the process. But, as the storage arrangements for shredded bulky waste at the proposed new plant are likely to be different from the current arrangements (inside storage rather than outside storage where significant amounts of moisture can be absorbed), there is a risk that too much weight is being put on these estimates.
- 3.121 This is not an abstract matter as characterising the waste to be treated is essential irrespective of the type of process to be implemented and important for plant design and process guarantees.
- 3.122 We therefore conclude that despite the number of studies that have been completed, some many years ago, the input composition is not as well defined as Officers contend.

## Processing Guernsey's Waste

- 3.123 Jersey and Guernsey had planned to work together to implement a single EfW plant to treat residual waste from both Islands. Our understanding is that the joint plant would have been built on Jersey, with Guernsey paying gate fees for guaranteed capacity at the plant, thus reducing the overall costs of implementing and operating new infrastructure for both Islands.
- 3.124 This initial plan appears to have contributed in some manner to the considerations, of oversizing the proposed EfW plant.

- 3.125 We are aware that Guernsey is pursuing other approaches and that the joint procurement of infrastructure is no longer actively being pursued. When this was raised with T&TS officers, they were clearly of the view that Jersey was now procuring new EfW capacity only for itself. Therefore our review of the current plans is in the context of the EfW plant being sized to process Jersey's waste only.
- 3.126 However, if Jersey were to build an EfW plant at the scale planned, our analysis has shown that it will have significant spare capacity for at least some years. In such circumstances it may then be financially attractive to both communities if Jersey accepted Guernsey's waste in return for gate fees that covered only the direct operating costs rather than capital depreciation, since the investment cost would already have been incurred. Moreover if Jersey is short of waste for the incinerator for the reasons explained elsewhere in this report **it may become almost essential to secure alternative feedstock from elsewhere – even at extremely unfavourable prices – to maintain the operational integrity of the facility.**
- 3.127 While we understand that it is unlikely that a contract would be agreed between the two islands in advance of procuring the EfW plant we believe that if it is built at the size envisaged then it is quite probable that the new La Collette facility would process Guernsey waste on terms that would be financially attractive to Guernsey, not least in the context of the earlier relatively high cost of their own EfW plans. We believe that this could still happen notwithstanding Guernsey's aim to achieve high recycling because of that island's acute shortage of landfill void space for that fraction of the waste that cannot be recycled.

## Assumptions about energy

### *Bellozanne*

- 3.128 The Bellozanne incinerator has the capability to generate about 3MW of electricity. When the two on-site turbines are operating under full load, one-third of the electricity generated (c. 100 kWh/T) is said to be exported to the Jersey Electricity Company (JEC) and the remainder utilised for site load at the Bellozanne sewage treatment works and the solid waste processing plant. There is no heat recovery at Bellozanne.
- 3.129 At the current waste throughput, a modern incinerator can generate up to 6 MWe and have a net electrical output equivalent to c. 600 kWh/T and a similar level of heat output.



Therefore, **as an Energy-from-Waste facility the existing Bellozanne incinerator recovers energy very inefficiently**<sup>43</sup>.

3.130 The Energy Policy for Jersey sets out a framework hierarchy that prioritises:

- a. *decrease in energy use;*
- b. *make sustainable energy choices;*
- c. *prepare for the effects of climate change;*
- d. *ensure that Jersey's energy supplies are secure and resilient.*

3.131 There are a number of factors that need to be considered in relation to the benefits of the potential new Energy-from-waste plant in the context of this Energy Policy.

3.132 These factors relate to:

- ◆ *Energy recovery efficiency;*
- ◆ *Costs;*
- ◆ *Sustainability;*
- ◆ *Climate change impact;*
- ◆ *Security of supply.*

3.133 The Strategy proposes that the new EfW plant will continue to send electricity to JEC to offset some base-load needs. Although we have seen documents [14,15], which indicate that the feasibility of heat off-take has been discussed, we understand from our most recent discussions with T&TS Officers that the proposed EfW plant would not be CHP-ready<sup>44</sup>. However, it appears that Officers have investigated the possibility of a variant system being provided that could operate in certain CHP modes (district heating or steam off-take) if suitable outlets can be found. One such potential outlet for steam is JEC, but we understand that no offtake contract has been agreed with them or anyone else.

*heat offtake from the new EfW*

3.134 T&TS Officers told us that they believe that it is unlikely that a viable offtake contract for CHP will be able to be put in place. This contrast with the clear-cut statement of intent within the Energy Policy: *"the States will ensure that the procurement process for the new EfW plant will include, among other considerations, criteria relating to the thermal efficiency of the process and its recovery for further end uses"*<sup>45</sup>. While the

<sup>43</sup> We understand from our discussions with T&TS officers that this is partly due to the undersized steam turbines available at the site, which can apparently produce a maximum of 3MW when both units are fully operational.

<sup>44</sup> CHP- Combined Heat and Power. This refers to a plant that is configured to generate both electricity and heat for export of site.

<sup>45</sup> Document 28, page 160, policy option 33

approach adopted is compliant with this statement, **it does not seem that the goal will be delivered.**

3.135 The pragmatic current position of T&TS on CHP may be **an opportunity missed** to implement technology that can best exploit the energy value of the waste, which, from an environmental perspective, is clearly undesirable and is inconsistent with the vision expressed in the Energy Policy.

*scope for a more pro-active approach*

3.136 During our recent visits to the Island, we were made aware of the plan for major re-development works at the harbour which is close to the Bellozanne and, in particular, the La Collette sites. We would have therefore expected that a full appraisal of the viability of district heating for this and other potential outlets would have to have been conducted and a more pro-active approach adopted to securing heat offtake by, for example, having a stipulation when granting planning permission for new property developments that the developer is required to install heat pipes at the same time as other services (water, sewerage, electricity etc.) are brought to site, since the cost increment is relatively marginal in this context and can be absorbed in the context of the overall 'planning gain', whereas post-hoc development of district heating is both disruptive and very costly.

3.137 In fact the Energy Policy stated that "*The States will carry out a feasibility study of the potential of CHP/District heating and its end-use as part of the procurement process of the new EfW and the master planning of the East of Albert/La Collette II area*"<sup>46</sup>. We were provided with a study undertaken in 1994 and two brief memoranda from the Department's consultants, which together do not seem sufficient in the context of the above statement. It is unclear whether further investigation is planned. We accept that such a study may support the general impression we got from Officers that CHP/district heating is currently not feasible on the Island, but **we believe that it is important to conduct a balanced review in the context of the new programme of urban regeneration** in the centre of St Helier, for the reasons outlined above.

*significant benefits from CHP*

3.138 The historical feasibility study of district heating and the utilisation of waste heat from the EfW plant was conducted in 1994 [13] had relatively narrow terms-of-reference. It considered the potential for district heating in rental housing developments in the Bellozanne and First Tower areas. Even at that time, CHP was recognised as a potentially significant opportunity. The study had concluded that though setup of the

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<sup>46</sup> Document 28, page 161, policy option 34.

district heating systems would be costly, it was likely to bring “significant benefits to the Island, by reducing atmospheric pollution, conserving fossil fuels and in the long-term increasing the States revenue, while providing a stable and efficient heat source to many properties both States owned and in the private sector”<sup>47</sup>.

3.139 The apparent lack of further analysis or pro-active initiatives after the clear-cut remarks made in the Energy Policy, gives the impression that the proposed new EfW facility will not go far enough to address the need to use waste as a resource. Offsetting some other energy costs could give significant benefits such as lower cost heating for social housing or the many States buildings that are close to La Collette. Possible revenues for the States from other users could also help offset the heavily subsidised costs of waste management services on the Island.

3.140 **The EfW configuration without CHP (the preferred route at the present time) will recover less than 25% of the energy content of the waste.** This can be compared with potentially up to 75% thermal energy recovery for an EfW plant in a CHP configuration with a suitable heat off-take.

3.141 The **climate change** benefit of utilising EfW in a non-CHP configuration is markedly reduced as the CO<sub>2</sub> generated per kWh recovered from the waste will be lower.

*EfW is not necessarily beneficial in climate change terms*

3.142 Since Jersey’s main electricity supply is derived substantially from excess output from pre-existing French nuclear power plants (i.e. with negligible incremental greenhouse gas creation) it could be argued that using the EfW (which, like all combustion processes will release significant amounts of CO<sub>2</sub> into the atmosphere) to produce some of the island’s electricity, displacing an equivalent amount of imported nuclear energy, would have a net adverse impact on climate change.

*security of supply*

3.143 The European interconnects offer considerable flexibility of contracting. So the security-of-supply arguments for EfW are less compelling than in places where such multiple interconnectors do not exist. One on-island point-source – the EfW – is not necessarily more strategically secure than multiple interconnects through which energy can be obtained from numerous facilities in many countries.

*low revenues*

3.144 The electricity from the EfW that is to be sold to JEC is likely to generate little revenues for the States. This we understand is

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<sup>47</sup> Document 13, page 9, Recommendations.

because JEC are only willing to pay the same rate for this off-take as the cost for nuclear base-load, which, we understand, is currently 1.9 p/kWh.

3.145 A plant with a net electrical output of 600 kWh/T, exporting about 400 kWh/T to JEC (adjusting for current levels of other parasitic loads), would generate about £8 in energy income for each tonne of waste treated. Therefore, it seems that, at current waste throughput the EfW plant would generate revenues of c.£0.5 million pa. When one considers the investment cost of the plant versus the marginal cost of nuclear energy, the financial case does not seem compelling.

3.146 **We conclude that the energy benefits from the EfW are not significant and that, as currently planned, there is a mismatch between the spirit of the Energy Policy as it relates to utilising EfW in Jersey and the practicalities of what is being delivered by T&TS.**

## 4 IS THERE AN ALTERNATIVE APPROACH?

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- 4.1 In Section 3 we reviewed the method of handling the Island's waste that is proposed in the Waste Strategy. In this section we consider alternative approaches.
- 4.2 **From our evaluation of the situation in Jersey we believe that there is a range of other solutions that merit consideration.**
- 4.3 These other approaches fall into five broad categories:
- ◆ *substitution of conventional mass burn incineration - in part or in whole – with other technologies<sup>48</sup>;*
  - ◆ *use of a much smaller EfW, deferring decisions about the type and scale of further facilities so that those choices can take into account the impact of rapidly evolving changes in society's waste practices;*
  - ◆ *separate collection and processing of kitchen waste;*
  - ◆ *more pro-active political initiatives to increase recycling and, in particular, minimise waste, so lessening the need for capital equipment;*
  - ◆ *integrated approaches embracing each of the four elements above.*
- 4.4 We cannot, at this time, say that any of these is 'better' than the EfW approach currently proposed, indeed all have significant disadvantages – but, as we have shown, so does the currently planned approach. Comparing the relative merits of each would require more detailed, formal evaluation than is possible in a review of this nature, which we would have expected T&TS and their advisers to have undertaken in reaching their decision to adopt the current approach.

### Use different technologies

- 4.5 There is no shortage of processes being marketed as 'better' alternatives to conventional EfW – Juniper's database includes more than 500 from around the world. In our experience many of these are not better and most are relatively unproven. Indeed

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<sup>48</sup> *in developing the Strategy, the advantages of mass burn incineration were highlighted in the consultants' reviews (Document 16), and a number of alternatives were rejected. The report was accepted by T&TS's predecessor body but the procurement exercise has been careful not to exclude other technologies. T&TS declined to provide us with information about shortlisted processes – citing commercial confidentiality – so we have prepared this analysis on the basis of the technology choices that were made in the documentation was provided to us – and, hence have considered a range of alternatives to the conventional incineration approach favoured in those reports.*

we have already endorsed T&TS's current policy of only considering proven solutions. This significantly reduces the pool of proprietary systems meriting, in our view, serious consideration but it does not exclude all alternatives. For example we believe that the following are worthy of consideration:

- ◆ *use of fluid bed incineration instead of moving grate incineration;*
- ◆ *use of high temperature slagging gasification instead of incineration;*
- ◆ *use of smaller scale EfW technologies such as oscillating kiln incineration and close-coupled gasification;*
- ◆ *use of a two stage system combining waste sterilisation / fuel preparation with combustion or gasification.*

The advantages and disadvantages of each of these are described below.

- 4.6 Many other particular variants of technology or combinations of technology have been considered by us. In the interests of brevity we have not reviewed all of these; explaining each and outlining their individual advantages and disadvantages. It is clear that **many options that are worthy of consideration for projects elsewhere are not suitable for the particular circumstances that pertain on Jersey**. For example, we believe that most but not all of the variants of MBT that have attracted much attention elsewhere are applicable for Jersey. Thus, the list above is not supposed to be comprehensive, nor is it necessarily indicative of those that would be the best options. It would be quite wrong to reach definite conclusions on a complex topic of this sort without a more thorough evaluation of technical, operational, economic and environmental factors. However we do believe that the discussion indicates that there are alternatives that merit consideration.

*reasons for considering fluid bed incineration*

- 4.7 **Fluid bed incineration has a fundamental technical advantage** for Jersey that appears not to have been taken into account in the deliberations so far: it can operate intermittently and so could more easily accommodate T&TS's objective of having spare capacity to meet eventualities (than would the moving grate technology which they favour).
- 4.8 Plants **can be operated on a two-shift basis**, where the plant is shut down daily and restarted for the next day's operation. This is possible because of the high heat capacity of the fluidised bed medium (usually sand), which retains heat for considerable periods of time, thereby facilitating stop-start operation without negative impacts on refractory. Thus fluidised bed technology provides the possibility of operating the plant at lower throughputs without significantly affecting process performance

(this is because the level of fluidisation can be controlled as a function of the feedstock input, thereby avoiding issues of poor waste 'burnout' often associated with attempts to operate moving grate incinerators in a similar manner). With such possibilities of turndown each of the two lines can be smaller than T&TS propose since it is more practical to have fractional utilisation of an individual line or both lines. Thus the Island could still have the security offered by two lines that is so important to T&TS but with less expensive over-capacity than is currently planned or with a single larger line, because that is likely to be significantly cheaper, with the desired 'security' being provided by using the fuel preparation concept outlined later (see paragraph 4.45).

4.9 Fluid bed technology has another significant advantage: it is conducive to relatively large variations in input CV. The high level of mixing between the fluidisation air, waste and bed medium serves to distribute heat load throughout the reactor thereby minimising 'hotspots', which is a problem in grate-based incinerators, particularly those that do not have water-cooling<sup>49</sup>. As a result, fluidised bed combustors can process residual MSW or RDF-like inputs (as would be produced by the fuel preparation systems discussed below) without the need for any significant alterations to the core technology.

4.10 This is significant in the context of a more integrated waste management approach on the Island, which could result in more low CV materials: green waste; food waste; glass; inerts being removed from the waste stream prior to residual waste processing. The resulting residual waste, if such source segregation was to take hold in Jersey, would be of higher CV than it is today, which could be an issue for conventional moving grate technology (assuming an air-cooled grate is selected on cost grounds) if this is what is built to treat waste on the Island for the next 25-30 years. The **greater flexibility to accept a wider range of input CV and to operate the plant with turndown would act as less of a dis-incentive for recycling or waste minimisation initiatives** than the selection of a moving-grate technology which does not offer such advantages.

*are the claimed disadvantages valid?*

4.11 In eliminating fluid bed incineration from consideration, two reasons were given in the consultant's report<sup>50</sup>:

- ◆ *the technology is insufficiently proven; and,*
- ◆ *it requires pre-processing of the waste.*

<sup>49</sup> We had contradicting information about the type of EfW technology that could replace Bellozanne. We feel it is pertinent to the States whether the bids received include proposals for water-cooled grate technologies.

<sup>50</sup> Document 16, page 6

4.12 Fluidised bed combustion of MSW is more proven than is implied in paragraph 3.2 of Document 16. **There are more than 100 fluidised bed facilities operational worldwide** processing MSW or RDF. Scale varies and plants of capacities from about 3,000 to over 500,000 tonnes per annum are in operation.

**Figure 1: Main suppliers of Fluidised Bed Incineration for MSW/RDF**

Supplier	Country	No of plants	Scale of plants, kTpa
Aker Kvaerner	Norway	15	50 - 120
Ebara	Japan	76	6 - 300
EPI	USA	5	up to 100
Foster Wheeler	Finland	2	200 - 450
Lentjes <sup>1</sup>	Germany	24	16 - 500
<b>1. now part of Austrian Energy – licensee of Ebara’s FB technology</b>			

Source: Juniper database

4.13 The assertion in Section 5 of Document 16 that fluidised bed technologies are unsuitable for Jersey because they require preparation of the waste input ignores the fact that such pre-processing, whether it takes place before a fluidised bed or moving grate technology, could offer **significant opportunities for the Island to boost recycling and implement integrated infrastructure**. The potential benefits of which include:

- ◆ *The recovery and recycling of ferrous and non-ferrous metals would take place before rather than after combustion, significantly improving their quality (and hence marketability). Recovery post-combustion is a big downside of the current incinerator at Bellozanne;*
- ◆ *The recovery of non-combustibles such as glass, which can be used as aggregate on Jersey rather than ending-up as part of the ash stream that may need landfilling. The lower quantities of ash (as much as 10% lower) will reduce the pressure on landfill void space or avoid the need to find viable outlets for this material.*
- ◆ *Full integration with more innovative bulky waste screening and preparation that could result in more of this fraction being recycled;*
- ◆ *Integrating the segregation of mixed kerbside recyclables with the pre-treatment of MSW in a single facility.*

4.14 Therefore rather than being a reason to reject fluidised bed incineration, the need for preparation of the feedstock for this technology could be synergistic with other initiatives that would



significantly improve the sustainability of the island's waste management methods. We therefore feel that this approach merits more detailed evaluation in the specific context of increased recycling and 'joined-up' infrastructure for the future.

4.15 Fluidised bed systems have no moving parts and consequently tend to require lower levels of maintenance compared with moving grate technology. We are unaware of the actual maintenance record at Bellozanne and the related cost of this to the Island, but the impression we got while visiting the facility is that maintenance requirements are high and this may have been the case for some time, even when the lines were newer.

*disadvantages of fluid bed incineration*

4.16 Fluidised bed incineration of household waste has a relatively poor market image in the UK. Operational issues at the plant in Dundee and recent commissioning problems at Allington in Kent have led to concerns about the robustness of this technology.

4.17 It is widely believed that short-cuts in the technical specification for Dundee led to operational problems which were then exacerbated by disputes between the various parties involved. We understand that the plant, which has a design capacity of 120,000 Tpa has been processing about 105,000 Tpa of MSW since 2003. Allington has had issues in the gas cleaning system and a catastrophic failure of the turbine seems to have been caused by a contractor by-passing an electrical system. Project management errors were made in the installation of the refractory in the fluidised bed combustor, which is reported to have failed just after commissioning.

4.18 These issues have to be seen in the context of the overall track record of the technology: there are significant numbers of fluidised bed combustors that are currently processing MSW in the EU and in Japan and these plants have not suffered from the issues experienced by the two plants in the UK.

4.19 There are only a **limited number of suppliers** with strong track records with MSW fluidised bed incinerators that are actively promoting their technology in the UK market. This could potentially be an issue in attracting a wide cross-section of bids for a relatively small project in Jersey and therefore may impact upon the Island's negotiating position in terms of the price for new waste treatment infrastructure.

*slagging gasification: a valid alternative?*

4.20 Slagging gasification is largely been overlooked in the Technology Review<sup>51</sup> conducted by the consultants to T&TS. In our view this is an oversight, since it can offer some particular

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<sup>51</sup> Document 16. The report mentioned three proprietary gasification processes that produce slag output rather than ash, there was little evaluation about the pros and cons of this approach for Jersey.

benefits in the specific circumstances that apply on Jersey, making it a more attractive option for use on the Island than, for example, mainland UK.

4.21 There are essentially two type of slagging gasification technologies on the market:

- ◆ *those that utilise the chemical energy of the waste supplemented by the addition of oxygen or oxygen enriched air to provide the high temperatures required for slagging*
- ◆ *those that are based on plasma<sup>52</sup> technology*

4.22 Whilst the former is proven with municipal waste, there is only one relevant commercial scale facility that utilises plasma to process MSW. A few other plasma processes have been implemented for non-MSW feeds or at demonstration scale. So **plasma processing of MSW is not yet commercially established and is, in our opinion, not sufficiently proven for implementation in Jersey at the present time.** For this reason, we do not recommend this variant be considered.

4.23 The other type of slagging gasification is much more proven. There are more than 10 technology suppliers with relevant processing experience who have implemented 99 plants processing a total of approximately 5.4 million tonnes of waste per annum. Some of these technologies are on their second or third generation and **there are reference plants at the scale relevant to Jersey's needs that have operated successfully for more than 20 years.** The rest of this section relates to this variant only since we have rejected plasma-based systems as insufficiently proven.

4.24 We agree with Fichtner's assessment that one of the main disadvantages of slagging gasification is that the net energy yield is low; but, as we have seen (paragraphs 3.140 - 3.146), the value, in both economic and environmental terms, of greater energy production is relatively small in the particular circumstances that pertain to the Island and the route adopted by Officers has, itself, a relatively low energy efficiency. Furthermore, **slagging gasification offers some other benefits for Jersey that do not seem to have been considered.**

4.25 There are nearly **100 plants** of this type in operation in Japan, but few elsewhere. The technology fits the particular circumstances in Japan, which is why it has been so widely used there, but is less suited for use in, say, the UK. This is because

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<sup>52</sup> *These technologies utilise plasma energy sources (a high energy electrical discharge that results in temperature of thousands of degrees being generated) to treat waste. Plasma can be configured to incinerate or gasify wastes.*

**the primary feature of this type of process is that it sacrifices electricity output to minimise use of landfill and maximise recovery of the inorganics for use in aggregate and construction applications.** Thus, it is most useful where there is little landfill, where there are significant benefits from avoiding the import of aggregates and where the value of electricity is low.

4.26 The main attractions of this process option for Jersey would be:

- ◆ *rather than generating a low quality land reclamation material (ash from the incinerator) the process would provide a higher quality, inert aggregate that could reduce imports or quarrying of primary raw materials, which is beneficial from a sustainability perspective;*
- ◆ *this additional resource recovery could potentially boost the overall on-island recycling by more than 15%;*
- ◆ *the risk of leaching of contaminants from slag vs ash is very greatly reduced;*
- ◆ *the technology could co-process some of the Island's 'inert wastes' that currently go to landfill;*
- ◆ *this technology has greater 'turndown' in input CV and throughput than conventional incineration, thereby offering more flexibility to adapt to changing circumstances;*
- ◆ *most of the commercial reference plants for this technology are at a much more relevant scale to Jersey's needs than those for moving grate incineration, so it may be more suitable to the island's capacity requirements.*

4.27 The main disadvantage of this technology is that it is expensive. Other disadvantages are: the leading suppliers of this type of process are not currently offering it in Europe and, as mentioned, it has relatively low energy efficiency.

4.28 Although there have been attempts to commercialise the technology in Europe, this has largely been unsuccessful<sup>53</sup>. During the 1990's a number of companies were promoting a variety of technologies in Europe, and several projects were announced. Few of these went ahead and there were high profile issues. One reason for the disappointing track record in Europe is that local companies under-engineered solutions in an effort to reduce cost. This resulted in significant technology risk and, paradoxically, increased processing costs. Yet when these same

<sup>53</sup> A slagging gasification plant built by British Gas and Lurgi (the BGL gasifier) is operational at Schwarze Pumpe in Germany.

technologies were engineered by Japanese companies, under licence, they resulted in successful, multiple reference plants.

**Figure 2: Main suppliers of slagging gasification processes**

Current Suppliers (all Japan based)	Plants in operation	Plants under construction	Scale of plants operated, kTpa <sup>1</sup>
Ebara	10	2	19 – 165
Hitachi Zosen	7	1	15 – 122
JFE - NKK	9	1	11 – 95
JFE -Thermoselect	7	-	29 – 167
Kobelco	7	1	18 – 69
Mitsui	6	2	42 – 120
Nippon Steel	26	3	20 – 216
Takuma	3	-	38 – 49

<sup>1</sup>. assumes 300 days per year operation

Source: Juniper database

4.29 We are aware of at least one European organisation (which has relevant experience with this technology and boasts one of the leading Japanese suppliers as a technology partner) that is promoting this type of process in Europe. This company is currently building a plant in Rome that has a capacity of 250,000 Tpa plant (using 3 lines), which we understand is nearing completion.

4.30 **This process type has specific advantages for Jersey.** It is important to recognise that this technology option has some significant disadvantages – but so does the one favoured by Officers. On balance, we feel that it merits consideration.

*use EfW technologies designed for small scale?*

4.31 While most incineration technologies have been engineered to be most economical at large scale but some developers have optimised their systems to be commercially viable at smaller scales (c.10,000 to 100,000 Tpa).

4.32 Of the many companies that are promoting systems that can be classified as small scale EfW, only a few have a sufficiently strong track record processing relevant waste streams in a configuration that would be practicable for Jersey. Two stand out as strong contenders.

4.33 Cyclerval (owned by Tiru) has built a 55,000 Tpa facility in Grimsby and is constructing a second plant in Exeter using their oscillating kiln technology, which has operated at a number of reference plants in Europe and North America. A few plants configured for small scale combustion are also being built in Scotland.

- 4.34 The UK-based Ener-G group promotes the Energos close-coupled gasification technology, which has operated at 6 reference plants in Norway and Germany processing MSW and industrial waste. A new plant is in its commissioning phase on the Isle-of-Wight. It will process 60,000 Tpa RDF from an adjacent MRF. They have also announced a further order for a plant in Norway.
- 4.35 Both of these technologies are included in Fichtner’s Technology Review [Document 16] and are recommended for further consideration.

**Figure 3: Suppliers of small scale EfW that have relevant experience**

Ener-G (Energos)	
Total number of reference plants	7
Scale of plants operated, Tpa	10,000 – 75,000
Single line capacity implemented, Tpa	10,000 - 40,000
Cyclerval (Tiru)	
Total number of reference plants	> 20
Scale of plants operated, Tpa	15,000 – 150,000
Single line capacity implemented, Tpa	15,000 – 75,000

Source: Juniper database

- 4.36 **Because of the smaller capacity of each line it would be possible to implement the EfW facility in a phased manner – only commissioning additional capacity if and when it was needed**, as discussed in paragraph 3.113. **We see this as a major advantage as it would mean that there was no need to oversize the plant**, which has been much of the focus of our comments in Section 3.

*prepare a fuel*

- 4.37 The option of making a fuel from residual waste using specific variants of MBT or MHT<sup>54</sup> systems<sup>55</sup> – rather than directly combusting the waste - does not appear to have been considered fully in any of the documentation we have reviewed.
- 4.38 This type of process has been implemented at a significant number of projects in Germany, Italy and Belgium and, more recently, in the UK.

<sup>54</sup> MHT = Mechanical Heat Treatment: processes that are functionally similar to MBT but lack the biological element, most notably autoclave technologies

<sup>55</sup> It should be noted that many types of MBT process will generate a by-product (loosely referred to as RDF) that can be considered as a fuel, the quality (CV, moisture content, levels of contamination, ash) of this material are often uncontrolled and therefore widely variable. This RDF is not the type of fuel being considered here. We are focused on those MBT and MHT systems that are designed specifically to make a ‘good quality’ fuel.

4.39 **The main aim of such processes is to stabilise the waste in a sanitised form that can be stored and transported.** By reducing its volume, making it less heterogeneous, increasing its energy density and lessening contamination, the goal is to make the fuel suitable for use in conventional energy applications, thus avoiding the need to build an incinerator.

4.40 This opens up two options:

- ◆ *make a fuel on-island that is exported to an off-island user – and, therefore, avoid the need to build an EfW;*
- ◆ *make a fuel that is then processed on-island in a much smaller EfW.*

4.41 Considering the first of these, there are obvious attractions but, unfortunately, significant disadvantages:

- ◆ *experience elsewhere has shown that it is not easy to secure off-take contracts for such fuel;*
- ◆ *producing a fuel of the requisite specification on a consistent basis is not straightforward, because of variations in the nature of the input waste;*
- ◆ *the need to obtain a tight quality of fuel can result in more rejects, that would have to be landfilled, which on Jersey, which lacks a suitable landfill, would be a major disadvantage;*
- ◆ *even when a cement kiln or other user agrees to take the fuel this is normally on relatively short-term contracts that may not be renewed;*
- ◆ *these ‘customers’ expect, under current market conditions, to be paid for accepting such waste-derived fuels, rather than paying for them, which makes this solution expensive (though quite possibly no more expensive than the cost of processing in the EfW that is planned by T&TS);*
- ◆ *shipment off-island would arguably not be consistent with the Proximity and Self-sufficiency Principles that are internationally accepted as Best Practice in managing a community’s waste;*
- ◆ *there would also be a need to comply with International Regulations on the trans-frontier shipment of waste under the Basel Convention.*

4.42 Turning to the second option, **there is one big advantage associated with this concept that makes it attractive: it**

**offers more security than the approach favoured by Officers while reducing the scale of the infrastructure needed and increasing flexibility to adapt to evolving needs.**

- 4.43 When we first met with T&TS Officers we were immediately struck by how much emphasis they placed on ensuring that there was always an outlet available for the island's waste. We fully support this objective but were surprised at the route they have chosen to achieve this objective: procuring a plant with two lines and almost double the capacity that is currently needed. As previously explained our surprise stemmed from the fact that this is a very expensive approach which is rather inflexible and not particularly secure. **Pre-processing the waste into a stable, transportable fuel offers more security**, since for example, one real risk is that of a fire at the plant, which in all probability would take out both lines for a period of months. Under the Officers' proposal this would cause real issues. Whereas pre-processed, sanitised waste could be stored until the damage had been repaired or transported off-island far more easily and hygienically in this type of emergency.
- 4.44 The pre-processing plant reduces the volume and weight of the waste. There is moisture loss (and, in some cases, some CO<sub>2</sub> as well), some recyclables and some rejects. The amounts of each fraction vary depending upon the specific process but typically the fuel is roughly 50%, by weight, of the input. One disadvantage of this type of process for Jersey would be the reject fraction since, in other projects, this would normally simply be landfilled. On Jersey this would have to be handled in the same way as Officers propose to handle the materials that are unsuitable for incineration.
- 4.45 Because storage without significant odour and public health concerns during unforeseen minor outages is much more practical there is **no need for a back-up line**. The EfW can be constructed with a single line (one line plants are cheaper than two line ones with identical total capacity), or with much smaller lines that are no longer required to be oversized. This combined with the reduction in tonnage associated with pre-processing means that the **EfW would be much smaller**<sup>56</sup> than currently planned, resulting in a significant cost saving (though this is, of course, offset by the cost of the fuel preparation plant).
- 4.46 We share Fichtner's view<sup>57</sup> that a number of the proprietary systems currently being marketed for this type of application are not yet commercially proven and hence are unsuitable for

<sup>56</sup> . Although the energy output per tonne of waste treated would be greater.

<sup>57</sup> Document 17 pages 61 – 63

Jersey. We also concur with Fichtner that these type of process produce a number of other outputs in addition to a fuel fraction that require managing and this could limit the attractiveness of this approach to Jersey. But, in our view, the potential benefits of this approach merit further consideration to determine whether this technology can have a role for managing ‘non-inert’ waste on the Island.

**Figure 4: Suppliers with proven technology for making fuel**

Suppliers	Country	Plants in operation	Scale of plants operated, kTpa
Ecodeco <sup>1</sup>	Italy	9	60 - 180
Elliniki/Helector <sup>2</sup>	Greece	7	90 - 180
<p><b>1.</b> Processed licensed to Shanks in the UK</p> <p><b>2.</b> Owners of the Herhof technology developed in Germany</p>			

Source: Juniper database

- 4.47 **We recommend that the relative merits of this approach should be evaluated before any contract for a larger EfW is awarded.**

Use a much smaller EfW, deferring decisions about the type & scale of further facilities

*the scale of EfW envisaged by T&TS would discourage further recycling*

- 4.48 The Scrutiny Panel has pointed out that if there is more recycling, more waste minimisation and more targeted treatment of food waste on Jersey then logically there is a need for a smaller EfW plant than that currently in place at Bellozanne and a very significantly smaller plant relative to that proposed for implementation on Jersey.
- 4.49 The feeling is that if the currently proposed EfW plant is built, then there might be little political will for further waste minimisation initiatives and efforts to boost recycling over and above the modest 32% target set out in the Waste Strategy. It is envisaged that the large amount of redundant capacity that seems highly likely to exist for a number of years after plant start-up would be a ‘sink’ for significant quantities of materials present in the non-inert waste stream that could potentially be recycled. As we have previously explained T&TS have built their case for an oversized plant on the premise that not only will waste arisings continue to grow (i.e. waste minimisation efforts will fail) and that recycling will be relatively modest by international standards. The Scrutiny Panel has challenged this view.
- 4.50 We have already commented in Section 3 on the sizing of the proposed EfW. We see some significant advantages in using



technology optimised for smaller unit capacity per line and have already identified a number of technology options that could facilitate the implementation of a smaller plant.

4.51 The key advantages that we see in building a smaller EfW are:

- ◆ *avoids the risk of potentially significant operational difficulties if there is insufficient waste available to feed the new EfW (since this would not be able to operate reliably if the volume of waste input fell significantly below current quantities);*
- ◆ *avoids the need to project accurately at the present time what Jersey's waste processing needs will be in twenty years time;*
- ◆ *if waste minimisation is successful, avoids a 'white elephant' built far too big to meet what may seem in a few year's time to be 'old-fashioned' ideas about waste treatment rather than resource recovery;*
- ◆ *doesn't act as a dis-incentive for recycling;*
- ◆ *doesn't commit the States to capital investment until it is sure that it is required;*
- ◆ *offers scope for an overall reduction in investment cost (especially on a 'net present value' basis), since reductions in the scale of facility needed could offset the nominally higher cost of step-wise investment;*
- ◆ *allows time for potentially more attractive new technologies (that are being developed but which are not yet sufficiently proven) to build a successful track record;*
- ◆ *ensures that any new capacity is optimised to the requirements that pertain at the time (for example, as we will explain, there may be need for biological, rather than thermal, processing capacity).*

4.52 Thus **step-wise investment in capacity, using more modular technologies, increases flexibility and avoids the risk that the Island procures an over-costly, white elephant** (we understand that some perceive the new Terminal at the airport in this light).

4.53 If T&TS are right and the Island largely fails to get a grip on the generation of residual waste requiring processing, it is true that the total expenditure in cash terms associated with adopting the approach advocated in this section may be greater, but we have pointed out that there would still have been clear financial,

operational and environmental benefits from building a smaller unit first.

## Separate collection and processing of kitchen waste

4.54 Separate collection and treatment of food waste - using anaerobic digestion - could play a significant role in managing Jersey's waste, not least by helping remove the need to procure an EfW plant that is almost twice the capacity currently needed by the Island.

*should AD have been rejected?*

4.55 In many of the reports we have reviewed as part of this study, dating back to 2001, anaerobic digestion (AD) has been mentioned as a potential option for treating waste in Jersey. The technology was broadly eliminated from further consideration on three grounds:

- ◆ *“the technology cannot treat all of the Island's residual waste” [Document 16];*
- ◆ *“the current [2001] position regarding the ban on the use of compost and digestate on land where the waste contains meat” [10]*
- ◆ *“guidance” from supermarkets, apparently in the form of a letter, that suppliers of Jersey Royal potatoes should refrain from utilising compost derived from food waste on agriculture lands. [Document 35]*

4.56 In our interviews Officers said that they had not excluded AD but there did not seem to be any active re-evaluation of the merits of using AD. **In our opinion, separate collection and processing of kitchen waste should be under more active consideration.**

4.57 Segregation of kitchen waste at source is widely practiced in a number of European countries and it is gaining traction in the UK.

*advantages of separate processing*

4.58 Organisations responsible for the management of residual waste are increasingly recognising that the segregation of food waste is desirable on a number of fronts. Those advantages that are of particular relevance to Jersey include:

- ◆ *it removes a component of the waste that can be handled in a more appropriate manner rather than by incineration;*
- ◆ *it encourages recycling;*
- ◆ *it allows a troublesome component of the waste to be managed separately: since the vermin, odour and public health issues associated with managing wastes derived*

*largely from food, their removal greatly reduce this issue for the other fractions;*

- ◆ *it allows this component of household waste to be managed alongside similar commercial wastes such as those from restaurants;*
- ◆ *following fractionation to remove food waste, there will be smaller quantities of residual waste that require thermal treatment, so less EfW capacity is required;*
- ◆ *it can help to reduce the overall cost of waste collection, since it can allow fortnightly collection of the residual fraction.*

*is separate collection viable?*

- 4.59 Island-wide separate collection of food wastes is very limited<sup>58</sup> at the present time and this is seen as a key barrier to implementing this option on the Island.
- 4.60 We have heard differing views from Members of the Scrutiny Panel and Parish representatives on the feasibility of source segregation of food waste. We recognise that **such schemes are not usually straightforward to implement** on a large scale and with high capture and compliance rates, but the uniqueness of waste ownership and collection on the Island (as discussed in paragraph 3.55 to 3.72: “Implications of the way waste is collected in Jersey”) may present certain more immediate opportunities.
- 4.61 T&TS Officers were broadly unconvinced that such source segregation schemes can be implemented Island-wide without significant additional costs to the States and the Parishes. They identified a number of hurdles, from the size limitation of vehicles on the Island’s roads to the overall higher collection costs that would have to be borne by individual Parishes (and hence that some would not want to adopt such an approach). If the community, as a whole, is committed to more recycling (as discussed in paragraphs 3.19 to 3.31) then adding an additional stream to collection of the dry recyclables should not be a major cost increment (though of course it is not yet certain, by any means, that separate collection of recyclables will happen). Moreover, there does not appear to have been an economic and logistic evaluation of the scope for weekly collection of kitchen waste and recyclables with fortnightly collection of residuals, which would probably be cheaper.

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<sup>58</sup> Parishes customarily collect restaurant waste, which is sent to the Bellozanne incinerator.

4.62 The impression we got from discussion with some senior Parish representatives is that they feel, based on their particular local experience and preliminary local efforts with waste segregation, that barriers to source segregation schemes are not 'stoppers' and in some instances could be overcome relatively quickly. However we recognise that they may be more motivated than others and, hence, not indicative of the broader range of viewpoints.

4.63 In summary, **we accept that there are logistic and economic issues associated with adoption of pan-island separate collection of food waste, but we still believe that Jersey should not give up on this idea, because of the considerable advantages that it would bring** in terms of the reduction in scale of the EfW, the significant increase in the level of recycling that would be achieved and the greater sustainability of such an approach.

*AD is not suitable for processing all the island's waste ...*

4.64 However, we agree that AD alone cannot be used to process all of Jersey's waste arisings. Although it is used integrated into one variant of Mechanical Biological Treatment (MBT) to treat residual waste in many EU Member States, we do not consider that to be a desirable solution in Jersey. The main reason for this is the mix of household and commercial waste that makes up the residual waste stream currently processed on the Island. Thus, for example, it would be foolhardy to sanction AD to process the large quantities of shredded bulky waste (mainly wood, plastics and carpets) and indeed scrap tyres that are currently processed at Bellozanne.

*... but is very suitable for food waste*

4.65 AD technology offers a proven means of co-processing commercial food wastes and household kitchen wastes.

4.66 By design, **AD can effectively process the readily biodegradable component of the waste stream (i.e. food wastes)** and is doing so at numerous reference facilities, large and small, in Continental Europe. This is the role the technology can play on the Island. By processing food waste through an AD facility it is possible to reduce the scale of the EfW, (contrary to the assertions of Officers during our meeting with them). They contend that removing the kitchen waste from the EfW would have no benefit because it would not reduce the energy load significantly (due to the low energy content of kitchen waste). While it is true that the boiler load might not be significantly reduced, many other costly elements of the facility (not least the bunker and quite probably the processing vessels and emissions abatement equipment) could be smaller. It seems surprising to us to argue that because material has a low energy/mass ratio, it should be put through an EfW. Keeping the low calorific value putrescible materials (both commercial kitchen waste and

household kitchen waste) in the feed to the EfW has few benefits and some disadvantages (they limit the storing of waste, are a source of odours and vermin and their low CV means they provide little beneficial energy recovery efficiency).

4.67 Another significant benefit of incorporating an anaerobic digestion element into the overall integrated solution for the island is that it can serve as a means of potentially accommodating a significant fraction of any future waste growth on the Island, particularly as it is envisaged that *“an expansion in tourism could be one foreseeable cause of this”*. AD is highly modular, in contrast to moving grate incineration, and it is easier to expand capacity on an as-needed basis.

*the trend in food packaging may favour AD rather than incineration*

4.68 Recently, more sustainable biodegradable packaging has been introduced in the UK and there is considerable pressure to increase its usage. T&TS Officers pointed out to us that since most of the consumer products sold on the island come pre-packaged from the UK, they cannot easily reduce the amount of packaging waste that they have to handle. We accept this point, which was made in the context of needing to have the capacity to process this packaging, but it does not seem to us that Officers have considered that it is possible that in the near future a significant proportion of that packaging may be better handled in an AD process than an EfW.

4.69 While we accept that it would be imprudent to assume, at the present time, any specific percentage switch by a particular date, we believe that if the EfW were sized for the short-to-medium term needs, then if waste volumes grew – and biodegradable packaging had been introduced in response to consumer pressure and political incentivisation within the UK – then it would have been prudent **not to have irrevocably committed to excess EfW capacity in 2008**.

4.70 The broader implication for Jersey is that the size of the proposed new EfW plant is linked to the composition of the waste input. If a significant portion of food waste and plastics are diverted from EfW, not only might the proposed design capacity be further under utilised (see our earlier commentary on sizing of the EfW plant in Section 3), the efficiency of the plant may also be adversely impacted since the reduction of plastics in the residual waste stream would reduce the waste CV. The combination of reduced volumes of packaging and lower energy content could cause operational issues with the plant specification envisaged - we feel this needs careful re-evaluation.

4.71 Because the AD process can be targeted to particular constituents of Jersey’s waste, the initial scale of plant can be

relatively small, possible less than 17,000 Tpa and modules added to accommodate any significant growth of materials that may be best suited for this type of waste treatment technology.

*synergies between AD and other established practices*

4.72 There are particular synergies between the maturation of AD digestate and the composting of green waste that could be considered. Key advantages of this approach include:

- ◆ *the need for only one bio-waste treatment plant;*
- ◆ *opportunity for a state-of-the art facility with improved output quality controls and improved emissions performance;*
- ◆ *synergies between the heat and electricity requirements of composting (maturation) and the heat and energy output from an anaerobic digestion process;*
- ◆ *the need for 'structure' material in the maturation of AD digestate, which could be provided by woody green waste;*

4.73 There are advantages in blending/co-processing digestate with green waste compost. While the quality of the various compost outputs currently being produced at La Collette are well established through many years of experience in developing them to current standards, **co-processing may foster the development of newer products that have different 'fertiliser' properties**. Indeed, co-composting a quantity of green waste with digestate could be considered, since this might result in a material with a better balance of structure properties and fertiliser properties than either material alone, which could be of considerable benefit for improving soil quality and agricultural yields.

4.74 Synergies also exist between AD and sewage sludge digestion, which is currently part of the activities at the Bellozanne site. This was the subject of an earlier consultant report [10] that explored the possibility of utilising the existing sewage sludge digester capacity to treat separated food waste which concluded that this *"poses an opportunity worthy of further investigation"*, but went on to point out that *"successful implementation is dependent on establishing an acceptable final disposal route for digested sludge on land"*. This remains challenging.

*outlets for AD outputs*

4.75 The issues of finding sustainable on-island outlets for the outputs from an AD facility are complex. In our discussions with Officers much emphasis was being placed on historic information about available on-island outlets for waste derived materials. As indicated in paragraph 3.78 we specifically requested up-to-date analysis about the potential for 'good quality' source segregated waste derived compost in land reclamation, soil remediation and in agriculture on Jersey.

- 4.76 The Briefing Note provided by the T&TS [Document 35], has already been referenced in paragraph 3.80 in regard to the potential availability of land suitable for further green waste composting.
- 4.77 In relation to the availability of land suitable for compost derived from food waste, T&TS' estimates indicate that of the 76,676 vergées<sup>59</sup> (c.14,000 hectares) of land available on the Island, only about 5% of this may be available for source segregated food waste derived compost.
- 4.78 Their Briefing Note provides a land requirement assessment if all of the Island's food wastes were to be composted. This estimate suggests, that even at the 5% availability, **there could be adequate land for spreading all of this type of compost.**
- 4.79 Based on the information contained in the T&TS Briefing Note, we have noted that there is an additional 29,000 vergées (c. 38% of the land bank available on-Island) that are classified as currently unsuitable because of the stated land administrator's preference not to accept food waste derived compost<sup>60</sup>. If this and the "unregistered" non-agricultural lands were to become available in the future, then up to 75% of Jersey's land bank could become an outlet for waste derived composts (green, food and others).
- grounds for optimism?*
- 4.80 We believe that there are grounds for assuming that this may be the case within a relatively short period of time because initiatives that are already underway at EU level and within the UK should have a beneficial impact on the marketing of Jersey's potato crop, since they are very likely to result in a change (discussed below) in the established position of the supermarkets towards constraining the use of waste-derived composts on land used to grow crops that are sold in their stores.
- 4.81 In the same document [35] T&TS stress, as they had done in the face-to-face meetings with Juniper, *"that there is no guaranteed land available for the disposal of any bio-solids wastes in Jersey"* and by implication, compost derived from food waste will have to compete with other materials such as green waste compost and 'enhanced treated sludge' that also need to find outlets. Thus if the island produces more CLO or AD digestate, from new plants, they argue that putting this on land could just

<sup>59</sup> Unit of area used on Jersey. 1 vergée ≅ 0.17986 metric hectares

<sup>60</sup> It is indicated in Document 35 that "Jersey Royal Limited have stated in writing that they are not prepared to accept ABPR compliant composted food waste".

displace sewage sludge that would then have to find an outlet, creating in effect a new problem for T&TS.

- 4.82 Moreover the “ban” about which T&TS and Jersey Potato are concerned (on the use of compost generated from waste that contains food: see paragraph 3.75 ) is historical in that it relates to levels of sterilisation that pre-date now-mandatory ABPR regulations. The situation in relation to the desirability of food waste compost is not as clear-cut as Officers imply. Information we have seen suggests that there is scope that this material could be utilised in the agriculture industry on Jersey.
- 4.83 Nevertheless we do accept that, at the present time, consumer confidence and supermarket purchasing preferences remain a significant concern.
- 4.84 The **general attitudes throughout the EU to the recycling and use of compost generated from AD facilities treating source segregated biowaste (including food wastes) have changed considerably.**
- 4.85 The European Union introduced the EU Animal By-Products regulation in 2002, which stipulates how wastes containing meat are to be collected and treated. This regulation also controls the application of composted materials derived from catering (food) wastes. The Animal By-Products Regulations 2005 adopted by the UK are even more stringent: in addition to controls on collection, treatment and disposal of animal by-products and catering waste, products that are to be used on land which derive from the treatment of household waste in, for example, MBT facilities, must also comply with the Regulations. This stringency is linked to the recent history in the UK with diseases such as BSE and foot-and-mouth.
- 4.86 From a regulatory or product quality standpoint many of the potential issues (such as levels of contamination, product quality and certification), associated with mixed waste ‘compost’ are not relevant to suitably processed segregated green or food waste compost. In fact, **segregated waste derived compost that is ABPR and PAS 100<sup>61</sup> certified can be used in a wide range of applications in the UK, including agriculture**, and throughout the EU this is currently regarded as “Best Practice”.
- 4.87 Whilst AD is established in many EU States for treating segregated biowastes, including food waste, the UK government

*new initiative designed to make reuse easier*

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<sup>61</sup> Publicly Available Specification - PAS 100 is a UK-specific voluntary quality standard for compost derived from source segregated household and other biodegradable waste. This standard has been incorporated in the Quality Protocol for Compost developed and issued by the Environment Agency, in cooperation with WRAP in spring 2007. The purpose of this protocol was to define a point where this waste material may become a product that could be utilised beneficially.



is putting significant effort into stimulating wider take-up of this technology for processing biowastes.

- 4.88 As part of this they have announced the publication of a draft Publicly Available Standard (PAS) for consultation, PAS 110, which is expected to become the protocol for solid outputs from anaerobic digestion that are intended to be used in agriculture and land restoration. It is envisaged that AD outputs meeting this standard will no longer be classified as “wastes” but instead be regarded as “products”. One of the key drivers for this proposed change is to encourage the supermarkets to then remove their restrictions on the use of suitably certified PAS110 compliant materials on land used to grow crops for their stores.
- 4.89 We feel that **this could have a potentially significant bearing on agricultural practices in Jersey**, engendering greater understanding amongst stakeholders of the potential benefits of such recycled materials.
- 4.90 Despite the hurdles that may have to be overcome in relation to the separate collection and treatment of food waste and utilisation of the outputs, we believe that these should not be regarded as ‘stoppers’ that exclude this option from being considered for managing a fraction of Jersey’s waste.
- 4.91 This is a **rapidly evolving situation** and clearly Officers have to take decisions in the context of current practices and regulations, but we have shown that there are good reasons for expecting that the situation could change significantly within a short period of time.
- 4.92 In this context **a smaller, less costly EfW plant could be built using technology sized for current needs, thereby keeping open the option to increase food waste treatment via AD, whereas if the larger EfW proposed by Officers were built, it would probably be impractical to separately process the kitchen waste** – closing out an Option that could, within a very few years, seem very desirable.
- 4.93 Our main concern, therefore, is that **the route forward that has been selected by Officers lessens the flexibility to respond to rapidly evolving circumstances**.

## Political initiatives to minimise the quantity of residual waste requiring processing

- 4.94 It is against the backdrop of the Waste Strategy's call for "change in attitudes towards waste production" and "to produce less [waste]"<sup>62</sup> that the Scrutiny Panel sees the need for more ambitious initiatives to minimise waste growth and boost waste recycling to higher levels than those targeted: levels that are now being considered the norm in many parts of the UK and Europe.
- 4.95 The view is also that certain components of the waste, like food, can be better dealt with separately using relatively modest cost technology that is more appropriate to treat this waste fraction.
- 4.96 Therefore whilst advocating more aggressive and integrated initiatives that are in line with the spirit of the Waste Strategy, the Scrutiny Panel has placed the emphasis on recycling materials that provide added-value and that could potentially lower the carbon impact of waste treatment on Jersey.
- 4.97 We understand that both businesses and residents can deposit unlimited amounts of waste at the Bellozanne site without restriction and at no cost. There are obvious benefits associated with such a policy (not least the discouragement of fly-tipping); but there are also disadvantages. In particular **there is no financial incentive for the community to minimise waste creation**. We believe that the States should give consideration to adopting initiatives which give a greater incentive to the community at large to reduce the amount of waste that they discard. Such initiatives could be either of the "stick or carrot" type style and there are lots of ideas being trialled by different national, regional or local governments around the world that could be evaluated and considered by the States.
- 4.98 For example, many communities have introduced charges for waste collection or treatment. Numerous variants of such systems exist: some allow a certain amount of bags or weight at no cost with charges thereafter; others use bar-coded receptacles for waste and charge every household or business for all their waste; many make no charge for separated recyclable materials but do charge for the residual waste. Some offer exemptions for those on low incomes, pensioners or other groups that are considered to need help. It is important to remember that each householder and business in Jersey is already paying for its waste services (through general taxation –

### direct charging for waste

<sup>62</sup> Document 27, Foreword.

and the new infrastructure will increase this cost). The choice between direct or indirect charging for this service must be made by politicians but we do not feel that the documents that we reviewed whilst preparing this report identified the link between direct charging and reducing the amount of waste with sufficient emphasis.

*changes in collection frequency*

4.99 Policy initiatives do not always have to revolve around charging householders or businesses for waste collection. International experience shows that simply changing the frequency of collection and varying this depending upon the type of waste (more frequent collection of biological waste and recyclables than residual waste) can have a dramatic impact on the total tonnage of waste as the community becomes more aware of the need to reduce waste.

4.100 Thus, initiatives that promote source segregation tend to be advantageous in minimising the amount of household residual waste requiring treatment.

*initiatives in the commercial sector*

4.101 Businesses can be made more responsible for managing the wastes that are associated with their commercial activities – most notably the packaging in retail outlets, as is already the case in many countries. This is a direct financial incentive for them to reduce unnecessary packaging and hence lower the overall amount of waste on the island requiring expensive processing (and hence reduce the size of treatment facilities).

4.102 In the EU, there is considerable focus on so-called End-of-Life initiatives, under which manufacturers and retailers are obligated to take back or pay for the recycling of consumer durables (such as fridges, TVs, mobile phones, PCs, batteries and tyres). This not only incentivises intelligent design, ‘closed-loop’ manufacturing and extensions to product life, but it can also divert significant tonnages of waste away from public waste management services. Extending such initiatives to the Island would have a big impact on the more intractable elements within the waste and, since they are the source of many of the more toxic constituents within the waste, reduce the environmental challenges (and hence costs) associated with ensuring the new facilities are designed and operate well.

4.103 A decision to adopt any of these types of initiative is essentially a political one and hence is a matter for the States. **If Jersey does not adopt policies that aim to more actively reduce waste and enhance the sustainability of the Island then there is a risk that the image of the Islands would be adversely impacted, since such policies are being increasingly seen as a vital part of a more sustainable community.**

## Concluding comments: should Jersey adopt a different combined and integrated approach to managing the island's waste?

- 4.104 The vision outlined in the Strategy is to implement a combination of recycling and green waste composting and residual waste processing in order to reduce the Island's dependency on landfill. Minimising waste going to landfill means also minimising residues from waste processing activities. Thus, by implication, the less waste that is sent for thermal treatment the lower the quantities of residues<sup>63</sup> that will have to be disposed of, so **reducing pressure on the relatively small and diminishing landfill void space on the Island.**
- 4.105 Although the Waste Strategy is careful to say that the "final decision on the detail of the technology will be made within the formal tender process"<sup>64</sup>, it is clear that there is, to some degree, a presumption by everyone on the Island that the favoured option for managing the residual waste is a replacement incinerator that utilises conventional moving grate technology operating in mass-burn mode. A key part of our review has therefore been to consider whether or not the arguments being made for and against this approach are reasonable: for example, is it too costly when compared with alternatives; is the energy recovered a valuable resource or of little use; and is the proposed plant too big?
- 4.106 Unfortunately because Officers did not provide quantitative analysis of mass flows, energy balances or relative economics it has been impossible for us to fully assess their preferred solution and, therefore, it has also not been possible to compare alternatives in a quantitative fashion.
- 4.107 Nevertheless, we have concluded from our initial evaluation that **an integrated approach<sup>65</sup>, encompassing a range of political initiatives and several technologies – both biological and thermal - would be better.**
- 4.108 Yet we understand that of the eleven Expressions of Interest that were received in response to the Invitation to Tender, none were for integrated solutions (three were from contractors rather than process companies and, of the four technology-based submissions selected for detailed evaluation, three use

<sup>63</sup> 20-35% (by weight) of the material treated in an incinerator ends up as ash that requires disposal. About 20,000 Tpa of ash from Bellozanne is being sent to a quasi-landfill on the Island.

<sup>64</sup> Waste Strategy Section 5.4.2, page 79

<sup>65</sup> the concept underlying an "integrated" approach is to use several different types of process, each optimised to handle a specific type of waste rather than one single process that tries to manage all of the waste. In this way one tries to maximise resource recovery and minimise environmental impacts associated with the widely different components of the waste.

incineration and one uses gasification). When we spoke with T&TS Officers, they stressed that the EU Invitation for Tenders had not specified any particular technology and that, therefore, suppliers of novel systems could offer compliant bids. However, the commercial reality is that most potential bidders would have taken soundings locally about the underlying preferences of the T&TS Officers and their advisers to ensure that they only incur the very significant costs of submitting a proposal if they have a level of confidence that it will not be rejected for being out of line with the underlying preferences of key decision makers.

4.109 We have concluded that the optimal approach is likely to include:

- ◆ *a recognition by the Administration that the practical steps adopted so far are insufficient to deliver, and on occasion, at odds with the Vision outlined in the Waste Strategy;*
- ◆ *a political consensus between Parishes and the States to adopt a more pro-active, integrated approach towards the collection of waste on the island involving source-separation, separate collection of dry recyclables and kitchen waste; possibly offset by less frequent collection of residual waste;*
- ◆ *a more positive attitude towards driving forward recycling (stressing the opportunities rather than the barriers, however real the latter may be);*
- ◆ *more consideration of political and practical initiatives towards waste minimisation;*
- ◆ *more encouragement of the private sector recycling initiatives, perhaps in conjunction with the parish collection system.*
- ◆ *more consideration by the States of their policies on commercial waste pricing and new obligations on businesses to be responsible for their own wastes;*
- ◆ *more focus on boosting rates of commercial waste recycling through more effective source separation;*
- ◆ *a re-evaluation of the policy of accepting unsorted commercial waste free of charge that is delivered to the Bellozanne site;*
- ◆ *a move away from mass burn incineration towards source separation and, in relation to the residual fraction, a combination of a simple fuel preparation/sanitisation process and a far smaller EfW using, modular, small scale technologies;*
- ◆ *separate processing of commercial and household kitchen waste at an AD facility;*
- ◆ *re-engagement with Jersey Potato and UK supermarkets to bring up-to-date policies on landspreading of properly certified, high quality composts that derive from source-separated feeds;*
- ◆ *institution of trials on co-processing green waste compost and AD digestate to make a soil improver optimised for Jersey soils and agricultural practices*

*more quantitative and financial analysis*

4.110 The choice of a particular approach should be informed by more formal analysis of mass flows and relative economics as well as

a proper evaluation of the relative environmental benefits and an independent risk assessment.

4.111 In general we believe that initiatives that reduce the amount of waste that needs to be combusted and inert wastes that need to be landfilled will give the island greater flexibility in how it implements new waste infrastructure to manage waste now and into the future.

*cost can be reduced*

4.112 Such an integrated approach will lower the cost burden to the States of committing to a large EfW plant, which would have significant redundancy for a number of years and possibly be permanently over-sized.

*improvement in sustainability*

4.113 Integrated waste management will certainly enhance the environmental sustainability of the island; particularly at a time when the focus is on measures to mitigate climate change via higher levels of recycling, waste minimisation and limited combustion of non-renewable materials.

*greater flexibility*

4.114 The approach could also provide the Island with operational flexibility: new infrastructure is added in a modular manner only when needed and the technologies procured would obviously be selected to match more closely the actual situation on Jersey at the time when they are required.

*other approaches*

4.115 It is quite possible that there are other approaches than those outlined here that may merit further consideration. Many other ideas are being suggested by a variety of parties, including Scrutiny Panel members themselves. We have not evaluated these individual proposals or ideas. Some of these originate from commercial companies with obvious vested interests who are keen to engender interest in their new 'wonder solutions' – in this respect we believe that T&TS and their advisers are right to reject many because they do not meet the provenness criteria to which we have already referred (see paragraph 3.41). Many others would, in our view, not meet reasonable procurement, technical, environmental or economic thresholds. But, we believe that **some options have been eliminated on dubious technical grounds and without any clear economic justification.**

4.116 **T&TS needs to make a financial case for their chosen approach** to justify what seems, at face value, to us an excessive investment.

4.117 We have been careful to stress that there are disadvantages associated with all of the alternatives we have outlined. We are not saying that any one approach is 'better' – it is not that simple, nor are we recommending a straight switch from the

current policy to a different one. But since the solution being proposed has some disadvantages, we believe that it is wrong to dismiss those other options just because one can find individual disadvantages with them. Instead we feel that a proper comparative evaluation of the options should be carried out (it does not appear to have been done so far) even though this will involve a delay, which we accept is undesirable. However, focussed evaluation of certain attractive alternatives might help the States to procure a more appropriate system and avoid:

- ◆ *failure to deliver the Vision outlined in the Waste Strategy;*
- ◆ *a costly plant that might be a poor fit with rapidly changing societal practices;*
- ◆ *the possibility that the EfW plant is grossly under-utilised for many years; or even ...*
- ◆ *that the EfW may face fundamental operational difficulties if residual waste volumes decline (as they did in Germany when it implemented similar policies to those contained in Jersey's Waste Strategy);*
- ◆ *damage the Island's international image by being perceived as a laggard in environmental and sustainability terms.*

## 5 APPENDIX 1 : DOCUMENTATION REVIEWED

Information requested by Juniper from T&TS	Documents provided by T&TS	Documents not provided	Assigned document number as referenced in this report
Specification documents relating to tenders for the proposed EfW facility	OJEC Notice		1
Detailed version of specification provided to shortlisted bidders	Part 2, Section 1 – General Description of the Works, Babtie Fichtner		2
	Part B2, Section 2, Bulky Waste Facility (Babtie Fichtner)		3
Any Clarification question from bidders regarding the waste specification		Deemed by T&TS not to be applicable	
Excel spreadsheet or similar that summarises the amount of each waste type produced and how it is managed	Total Waste and recycling figures (Excel spreadsheet) Jan 2003 to Jan 2008		4
Model used to determine the sizing of the EfW plant	Jersey PSD – Bellozanne Energy From Waste Plant – Development Strategies (July 2001) Fichtner		5
	Jersey TTSD – Directly Delivered Waste Categorisation Summary Report (31 Aug 2006) - Fichtner		6
	Jersey PSD – Energy from Waste Plant, Assessment of Capacity (Fichtner)		7
		Updated (2007) Solid Waste Strategy Model:  <i>Although this document was put in a list of documents that were to be provided to Juniper for review, we did not receive this document despite multiple requests via the Scrutiny Panel</i>	8
	Solid Waste Model Explanatory Notes. <i>These notes were received as notes to explain modelling of waste growth on Jersey from 2001 to 2020</i>		37
	Jersey TTSD – Directly Delivered Waste Categorisation summary report (Fichtner)		9
Assumptions on waste growth by type of arising	We were referred to document 5.		
Evaluation of energy utilisation options	Review of Waste Strategy (Babtie Fichtner) – 21/6/2001		10



Information requested by Juniper from T&TS	Documents provided by T&TS	Documents not provided	Assigned document number as referenced in this report
	Waste Strategy Summary Report (PSD)		11
	Juniper Report for Guernsey		12
Any evaluation of heat off-take possibilities for the La Collette or Bellozanne sites	Feasibility study of a District Heating Scheme Utilising Incineration Plant Waste Heat (PSD) 23/11/1994		13
	Memorandum for District heating (19/02/2007) Fichtner		14
	Memorandum on the Requirements for 'CHP Ready' plant 10/01/2008 (Fichtner)		15
Any evaluation of the usage of RDF on or off-Island	States of Jersey – Solid Waste Strategy Technology Review (Babtie –Fichtner)		16
	Resource Recovery Forum Report: RDF Opportunities: Coal and Cement Industries		17
	The viability of advanced thermal treatment of MSW in the UK (Fichtner)		18
Cost Model	Solid Waste Strategy- Changing the way we look at waste – 10/05/2005 (includes a financial assessment of the cost of capital projects within Document 27)		19
		<i>Officers told us that they would not provide the current cost model - for reasons of bid confidentiality</i>	20
Any evaluation of the feasibility of the recycling markets	Review of Waste Collection System, April 2002 – Babtie Fichtner		21
	T&TS Response to the environment scrutiny panel; report on waste recycling- Presented to the States on 3/07/07		22
Any quality analysis for waste derived compost		T&TS Composting Association- Certificate of Compliance, 02/02/07  <i>This document was promised by T&amp;TS, but not received</i>	23

Information requested by Juniper from T&TS	Documents provided by T&TS	Documents not provided	Assigned document number as referenced in this report
		Transport and Technical Services – Soil Association – Certificate of Registration, 20/06/07.  <i>This document was promised by T&amp;TS, but not received</i>	24
		Eclipse – Pesticide and Quality Analysis.  <i>This document was promised by T&amp;TS, but not received</i>	25
Timeline for award of contract for the proposed EfW plant, project implementation and commissioning of plant.	EFW Project plan		26
Information on outlets for compost on Jersey	Biosolids Landbank document		35

Documents provided by the Scrutiny Panel	
States of Jersey Solid Waste Strategy 10/05/05	27
Draft Energy Policy, Consultation Document, September 2007	28
States of Jersey Solid Wastes Management Strategy, Vol 1: Review of Strategy and Recommendations – April 2000 (Carl Bro Group)	30
States of Jersey Solid Waste Management Strategy Review – Vol 2: Technical Report and Appendices (January 2000,)	32
Energy from waste and bulk waste facilities – Environmental Impact Statement, Vol 2 – Main Report and Appendices, Jan 2007, Babtie Fichtner	33
Energy from waste and bulky waste facilities – Environmental Impact Statement Vol 1- Non Technical summary, Jan 2007 (Babtie Fichtner); Energy from waste and bulky waste facilities – Environmental Impact Statement Vol 1- Non Technical summary, Jan 2007 (Babtie Fichtner)	34
Environment Scrutiny Panel Report: Waste Recycling, Presented to the States on 3 <sup>rd</sup> July 2007	36