

# ***ENERGY FROM WASTE SUSTAINABILITY PROJECT***

## ***NOTES FROM THE PERTH STAKEHOLDER WORKSHOP***

**Held:** Tuesday 1 October 2002

**Time:** 9.00 am until 12.00 pm

**Venue:** Rosie O'Grady's The Irish Pub

71 Canning Highway, South Perth

For more information on the Energy from Waste Sustainability Project please visit the project website:

***[www.wmaa.asn.au/efw/home.html](http://www.wmaa.asn.au/efw/home.html)***

Or contact the Project Manager,  
Matthew Warnken  
Phone: (02) 9571 4800  
Email: [matthew@warnkenise.com.au](mailto:matthew@warnkenise.com.au)

Disclaimer: This project has the support of Commonwealth Government funding through the Australian Greenhouse Office. The Commonwealth Government of Australia holds copyright for this document. The Commonwealth is pleased to allow the reproduction, in part or in whole, of this document provided that the meaning is unchanged and that the authorship of the Waste Management Association of Australia is acknowledged. This document does not necessarily represent the views of the Commonwealth Government of Australia; of other sponsors of the Energy from Waste Sustainability Project or of the Waste Management Association of Australia. This document presents many points of view from differing stakeholder groups that were recorded during workshop sessions. No attempt has been made to confirm or deny any of the statements put forward by workshop participants.

This project is an initiative of the:

***Energy from Waste Division of the  
WASTE MANAGEMENT  
ASSOCIATION OF AUSTRALIA***

*Commonwealth Government funding through the  
Australian Greenhouse Office supports this project.*



## **Introduction**

There are a number of issues and concerns associated with energy from waste projects. On the positive side, recovering energy from waste can generate renewable electricity, reduce the amount of waste disposed of to landfill and reduce greenhouse gas emissions. However, there are also potential negative environmental and human health effects associated with energy from waste projects.

The Energy from Waste Division of the Waste Management Association of Australia, with assistance from Commonwealth funding through the Australian Greenhouse Office, initiated the process of developing a Sustainability Guide to resolve these issues. Part of this process was a national series of eleven stakeholder workshops.

The purpose of the stakeholder workshops was to ensure that all of the positive and negative factors associated with Energy from Waste (EfW) projects were identified and then incorporated and resolved within a Sustainability Guide for EfW. It is intended that the Guide will be used to ensure that Energy from Waste projects maximise benefits and minimise negative impacts in a way that supports the sustainable development of Australian society.

Below are the issues that were identified at the Perth Stakeholder Workshop. These issues will be integrated into a final report, representing all of the issues raised by workshop participants at this and the other ten national workshops.

The issues identified at the workshop will be used as a “yardstick” against which the Sustainability Guide will be measured, both to ensure that all issues have been addressed in the Guide, and to ensure that the philosophical basis of the Guide is correct.

## **Round Table Discussion**

There were 42 participants at the Perth Stakeholder Workshop. (A participant list is included as Appendix 1). Participants were seated around seven tables to discuss issues related to Energy from Waste. The summary of the discussion from these seven tables was recorded onto over-head transparencies and is presented below exactly as scribed.

A catalogue of issues recorded by participants onto flash-cards is included as Appendix 2. These issues are also presented exactly as scribed. The colour of the flash-cards was used to differentiate between tables. Note that there were two tables that used red cards. These have been called “Red A” and “Red B”.

## Yellow Table

### 1. SOCIO-POLITICAL ISSUES

- i. Government responsibility, and control
  - Objectivity
  - Test protocols
- ii. NIMBY
  - Lack of education and leadership
  - Balance between waste management and energy requirements
  - Solution focused not problem focused
- iii. Coordination
  - Regional infrastructure versus local waste
  - Holistic system approach
  - Transparency of processes

### 2. SUSTAINABILITY

- i. Define and measure objectively
- ii. Importance of waste reduction
- iii. Logical role in reducing landfill
- iv. Temptation to wait for “magic bullet”
- v. All waste is a resource

### 3. ENVIRONMENTAL

- i. Emissions (solid, liquid, gas)
  - Heavy metal concentration in residue
  - Need for data
  - Whole systems approach
- ii. Additional transport/infrastructure

#### 4. FINANCIAL

- i. Lack of venture capital
- ii. Tradeable certificates
- iii. Power purchase agreements (or Energy)
- iv. Waste supply agreements

#### Blue Table

##### 1. SOCIAL ISSUES

- i. Public perception
- ii. Education
  - Dissemination of information
  - Clear/understandable
- iii. NIMBY
  - Siting
- iv. Transparency
  - Comprehensive response to concerns
- v. Health concerns
  - Dioxin

##### 2. BIOENERGY

- i. EfW “clearing” residuals.
- ii. EfW versus bioenergy crop.
  - Equal treatment eg. oil mallee bioenergy project.

##### 3. PACKAGING STANDARDS

- i. Process should promote packaging reduction
- ii. Are manufacturers represented?

##### 4. RESIDUALS

- i. What happens with what is left: fly ash, bottom ash, char

## 5. HAZARDOUS WASTES

- i. Can the process be used to destroy hazardous waste?

## 6. SITING

- i. Mobile plant?
- ii. Location, location, location!
- iii. Integrated municipal planning

## 7. STANDARDS/POLICY

- i. Encouraging industrial leadership in developing technology.
- ii. Air emission standards
  - SO<sub>2</sub>, NO<sub>x</sub>, partic, dioxin, odour.
  - Level playing field with bioenergy, conventional.
- iii. What extent or regulation will industry accept?
- iv. Other emissions?
- v. Consideration of hierarchy/adherence of hierarchy.

## 8. WASTE MANAGEMENT HIERARCHY

- i. Use of sustainable tools such as “life cycle analysis” and cleaner production to determine position in hierarchy.
- ii. Make sure EfW keeps appropriate place in hierarchy.
- iii. Ensure EfW does not encourage waste production.

## 9. ECONOMICS

- i. Process must be economically viable i.e. suppliers, rural areas.

## 10. GREEN HOUSE GAS

- i. Green house credits carbon trading.
- ii. Renewable versus fossil based waste (C dating?)

## 11. CO-FIRING

- i. Establishing new facilities versus co-firing in existing.

## 12. ALTERNATIVES

- i. Analysis of all options in transparent manner.
- ii. Lifecycle analysis.

## Green Table

### 1. COSTS

- i. Viability
- ii. Variability in waste stream
- iii. True cost of recycling
- iv. True cost of landfill (including post closure)
- v. Capital cost

### 2. STATE GOVERNMENT

- i. Lack of leadership
- ii. Inconsistent support
- iii. Inertia in decision making
- iv. Bureaucratic delays
- v. Regulatory acceptance
- vi. Clear process for developers

### 3. PERCEPTIONS

- i. Transfer of pollution from ground to air
- ii. Community resistance to waste to energy technologies
- iii. Vocal minority/biased views
- iv. Community preference for recycling.

### 4. COMMUNITY ENGAGEMENT

- i. Fear of emissions
- ii. Early debate
- iii. Band wagons

### 5. LOCAL GOVERNMENT/REGIONAL GOVERNMENT

- i. Landfill infrastructure
- ii. Isolated communities
- iii. Lethargy
- iv. Partnerships

## 6. REGULATORS

- i. Keeping up with technology
- ii. Enforcement of conditions

## 7. TECHNOLOGY

- i. Alternatives
- ii. Sufficient reviews
- iii. Emissions
- iv. Yields
- v. Quantitative Analysis
- vi. Energy rich state
- vii. What's next
- viii. Database/catalogue for comparison

### Red A Table

#### 1. RESEARCH AND DEVELOPMENT

- i. Sustainable
- ii. Funding
- iii. Integration with existing processes
- iv. Alliances between stakeholders
- v. Economic viability
- vi. Process?
- vii. Lifecycle assessment
- viii. Social impacts
- ix. Economic impacts
- x. Support for facility
- xi. Volumes of waste
- xii. Resource impact assessment
- xiii. Hierarchies (waste and energy)

- xiv. Alternatives?
- xv. Market development (non-recyclables)
- xvi. Technology – future alternatives/better options
- xvii. Trialing of new technology
- xviii. Assessment of past/current performance
- xix. All long term costs and benefits
- xx. Impacts of facilities on product research/development for xxx<sup>1</sup> xxx<sup>2</sup>

## 2. PUBLIC RELATIONS/CONSULTATION

- i. Public/community group engagement
- ii. Benefits/drawbacks
- iii. Waste minimisation versus management
- iv. Government bodies ← Stakeholders
- v. Industry involvement ←
- vi. Technical Assistance to community groups
- vii. Open and accountable
- viii. Information made available
- ix. Educational programs
  - Messages (eg. recycling, source separation)
- x. N.I.M.B.Y. phenomena
  - How to deal with this?

## 3. OPERATIONAL ISSUES

- i. Quality/Volumes of feedstock
- ii. Disposal of residue
- iii. Access to site
- iv. Pollution controls
- v. Monitoring
- vi. Decommissioning
- vii. Sale of energy

#### 4. PLANNING AND INFRASTRUCTURE

- i. Location
- ii. EIA
- iii. Planning Policy
- iv. Decommissioning of plant

#### 5. LEGISLATION AND CONTROL

- i. Limits of operation
- ii. Monitoring and regulation
- iii. Funding
- iv. Management of impacts
- v. Pollution control
- vi. Reporting
- vii. Waste policy
- viii. Public/private ownership
- ix. Guidelines
- x. Strategic planning -> legislation

### Orange Table

#### 1. DEFINITIONS

- i. What is renewable?
- ii. What is Waste to Energy? (eg. sawmill, bagasse etc)
- iii. Definition of feedstocks. (eg. toxic)

#### 2. TRIPLE BOTTOM LINE

- i. Cost effectiveness
- ii. Social equity issues
- iii. Cost benefit analysis
- iv. Limits for analysis

### 3. ENVIRONMENTAL AND HEALTH IMPACT

- i. Emission control
- ii. Location
- iii. Assessment
- iv. Disposal of by-product

### 4. FEEDSTOCK

- i. Disposal of by-product
- ii. Importance of separation at source
- iii. WfE plant creating demand for waste
- iv. Alternative to recycling?

#### Black Table

EfW Proponents – 2

Community – 2

Landfill Operation – 1

Student/~~xxx~~<sup>1</sup> – 1

Consultant – 1

#### 1. POSITIVE ASPECTS

- i. Resource recovery
- ii. Offsets use of fossil fuels
- iii. Increases recycling opportunities
- iv. Development of new technologies that can lead to new opportunities
- v. Openness for community involvement
- vi. Fuels for transport
- vii. Transport minimisation

#### 2. NEGATIVE ASPECTS

- i. Potential adverse impact on waste minimisation driven by economics
- ii. Cure worse than the disease

- iii. Hazardous waste management
- iv. Emissions
- v. Mistrust by community

### 3. COMMUNITY

- i. Involvement at early stage
- ii. Level of knowledge base available via internet (+/-)
- iii. How does industry deal with “unreasonable” elements?

### 4. OTHER

- i. Can code be adopted by governments?
  - LGAs
  - State
  - Federal?
- ii. Responsibility for products
- iii. Site needs
  - Community
  - LGAs
  - Industry
  - State government

### 5. GENERAL

- i. Scope
  - Exclusion of waste minimisation
- ii. Terminology
  - Clear definition of
    - Energy
    - Sustainability
    - Waste

## Red B Table

### 1. WASTE STREAM

- i. Getting best value for components of waste stream - Method for determining best value.
- ii. Size and location of plant to ensure that waste is used for best value.
- iii. Quality of input waste – mixing.

### 2. ENVIRONMENTAL

- i. Developing appropriate environmental impact standards.
- ii. Meeting standards.
- iii. Consistency in performance.
- iv. Reliability of monitoring (techniques, costs, reliability of tests).
- v. Technology availability to meet standards.
- vi. Waste storage before processing (odour, runoff)
- vii. Buffers
- viii. Consistency in feedstock.

### 3. HEALTH AND SAFETY

- i. Dealing with toxins.
- ii. The unknown toxins.
- iii. Proving a process is safe.
- iv. Long term impacts.
- v. Infectious disease control.

### 4. CHANGES IN WASTE STREAM

- i. Changes in waste – plastics out.
- ii. Reduction of waste.
- iii. Product recycling eg. cars.
- iv. Improvements to waste separation methods.
- v. Increasing use of PVC.

### 5. ECONOMIC

- i. Capital intensity requires long term commitment.
- ii. Is it “green energy”?

- iii. Accessing the electrical network.
- iv. Price for electricity.
- v. Sustainable transport to plant.

## 6. TECHNOLOGIES

- i. Competition from waste recovery processes.
- ii. Competition from other sources of 'green energy'.

## 7. EDUCATION

- i. NIMBY
- ii. Mistrust and credibility of EfW.
- iii. Community engagement
  - Education
  - Perception
  - Credibility
  - Attitudes

**Results of Citizen’s Jury**

<b>Table</b>	<b>Strongly No</b> EfW has <b>no</b> role to play in any form	<b>Contingent</b> EfW has a role to play but that role is determined on case by case issues	<b>Strongly Yes</b> EfW <b>always</b> has a role to play in any form
Yellow table	0	5	0
Blue table	0	1	0
Green table	0	3	3
Red A table	0	3	3
Orange table	0	2	3
Black table	0	2	5
Red B table	0	7	0
<b>Totals</b>	0	23	14

**General comments from the tables regarding energy from waste**Yellow Table

- EfW always will have a role if it is shown to be sustainable.
- EfW should be a prime consideration, but it needs to be shown to be valid for the circumstances.

Blue Table

- Has a role to play but always must be considered.
- Government
  - Department
  - Corporatised
- Consultancy
- Community

- Regional Council
- Corporate
- 12 categories
- Reduce
- Reuse
- Recycle
- Mustn't provide disincentives to design improvements
- Mustn't become the fall guys for people who cannot design their products correctly.

#### Green Table

No comments

#### Red A Table

1 L.G.A.

1 Consultant

1 Business (Recycling Industry)

3 Government agencies

“Case by Case basis” - MOST important
--

#### Orange Table

- YES
  - What may work somewhere may not elsewhere.

#### Black Table

No comments

#### Red B Table

- A real Dorothy dixer!

**Appendix 1 – Perth Workshop Participants**

<b><i>Name</i></b>	<b><i>Organisation</i></b>
David Allan	Sustainable Outcomes
Abraham Azzam	Clough Engineering
David Bills	WRC – Licensing, Waste Management
Lillias Bovell	Department of Environmental Protection
Susy Byers	Student
Philip Calais	Murdoch University
Terry Carter	Western Power Corporation
John Clegg	ACRE
Jason Collins	
Chris Cornish	Brightstar Environmental
Rhys Davies	Global Olivine WA
John Davis	Cockburn Cement
Nahrel Dallywater	Dallywater Consulting
Dr Luis Diaz	CalRecovery Inc.
Steve Drake-Brockman	Recycling Company of WA
Barry Espinos	Meru Landfill Contractor – Geraldton
Ashley Felton	City of Wanneroo
Stephen Fitzpatrick	Eastern Metropolitan Regional Council
Serena Fletcher	SEDO
Thomas Fox	Water Corporation
Johanna Gastevich	WA Sustainable Energy Association
Mark Glover	Renewed Fuels P/L & Chairman of the Energy from Waste Division
Norman Hodgkinson	Sinclair Knight and Mertz Consulting Engineers
John King	Managing Director
Murray Landams	City of Melville
Julia Lawson	DEP

<b>Name</b>	<b>Organisation</b>
Stuart McAll	SMRC
Neil Martin	Entech – Renewable Energy Technologies Pty. Ltd.
Joanna Missen	Parson-Brinckerhoff
Mal Nichols	Department of Industry and Technology
Chris Oughton	Town of Kwinana
Peter Pearson	EMRCWMCRG
Matthew Rosser	Blair Fox Pty. Ltd.
Simon Sandover	Alcoa
Miles Stratford	Global Olivine
Richard Sutherland	DEP – Air Quality Management
William Syme	Green Enviro Technologies
Chris Tallentire	Conservation Council of WA
Ron Wainberg	Biomass Energy Services and Technology Pty Ltd
Matthew Warnken	Warnken I.S.E. P/L - Project Manager and Workshop Facilitator
Terry Waters	TJ Waters Environmental
Matthew Williams	Leighton Contractors

## Appendix 2 – Catalogue of Issues Identified at the Perth Workshop

**Note:** 'xxx' implies that it was not possible to read a word/words on a submitted card, the superscript is for archival reasons to assist the workshop organisers.

### Yellow Table

- If so
  - How?
  - Where from?
  - In what form?
- Do we need any electricity from other sources other than the States Grid?
- Sale of the energy/electricity into the grid at a commercial value
  - Particularly in WA
- Environmental sustainability cannot avoid the reality of economic sustainability.
- Needs to be a tradeable certificate market (eg. REC, xxx<sup>2</sup>) to help projects get to market.
- No venture capital industry.
- Can electricity be produced without pollution to the air we breathe?
- Does anybody know the Australian Emission requirements so that energy produced is safe?
- Capacity of process to accommodate a broad mix of waste types and still be safe.
- Perception versus reality.
- EfW projects generate additional transport burdens around the areas where the projects are built.
- Residue problems i.e. transferring problem to the ultimate disposal site.
- Concentration of heavy xxx<sup>3</sup> in residue.
- Emissions to environment i.e. exhaust gas. Discharge to
  - Land
  - Liquid
  - Solid

- Generally people perceive the production of electricity from a machine treating waste as ok providing that machine is not seen or if so, it is placed well away from mans stream living.
- Sustainability
  - Focus on end rather than beginning (problem)
- Does it meet principles or sustainability? (who controls)
- Size of facility required to make it both economic and sustainable.
- All waste = resource.
- Is the production of extra electricity from private sources sustainable? Will there be legislation to make this sustainable?
- Sustainability
  - The temptation to wait for the “magic bullet”.
- Best application for circumstances?
- EfW would seem to be a logical way to release the residual value of waste and reduce our over dependence on landfill.
- Shifts focus from waste reduction.
- What is sustainable waste management? How do we measure it?
  - Temptation to push toward and focus on “highest” possible us can lead to only partial solutions.
  - Finding common basis for determining what is sustainable.
- Socio/Political
  - Lack of focus on the waste management problems and heavy focus on what problems may be associated with the potential solution.
  - Political agenda
  - Which government departments have the know how in the safe production of energy?
  - No standard test system under which project must be accredited (eg. Australian standard) to sort out the “snake oil” from the real projects.
  - No overall state/federal guidelines, which are needed in the absence of a positive mature “market” structure.
  - Objectivity versus subjectivity
    - What does/does not constitute ESP? Must be an objective assessment

- Balance between need to manage waste and need to produce electricity. What is the driver?
- Public perception of all EfW projects are “incineration”
  - No education about new technologies.
- N.I.M.B.Y. syndrome
  - Need for and size of buffer zone?
- Lack of research into comparable benefits.
- No certainty of process with local council tendering systems.
- Fledgling industry with many players with vested interests.
- Does the waste management community really believe in sustainable waste management or is its focus on “protecting its patch”?
- Need to focus on entire system not on limited part of a process or waste management sector.
- Lack of coordination of waste sources eg. xxx<sup>3</sup> handed by parochial local councils.

### Blue Table

- Identifying the appropriate point in time when energy from waste is a viable option.
- STANDARDS POLICY
- Consideration of waste hierarchy when making decisions on EfW.
- What extent of regulation will EfW industry accept?
- Emission standards
  - Landfill gap
  - EfW
  - Power station (general)
- Gaining industrial leadership regarding technology
- What are the other environmental factors i.e.
  - Air emissions
  - Raw materials in current operations.
- Smoke/air pollutants from energy recovery processes.

- Odour from energy recovery processes
- Must embrace the “no net loss” of environmental values principles.
- SITING
- Integrated municipal planning
  - Scale
- Siting
  - Appropriate locations
  - Generic buffers?
  - Or case by case A.Q. modelling
- EfW plants must be located in suitable areas
- HAZARDOUS WASTE
- Can the process be used to destroy hazardous materials eg. medical waste.
- RESIDUALS
- Residuals
  - Fly ash
  - Bottom ash
  - Char
- What happens with what is left
- PACKAGING STDS
- Packaging standards
  - Are manufacturers represented in the EfW process?
- BIOENERGY
- Bioenergy
  - Comparison and treatment by agencies with purpose grown bioenergy crops.
  - Energy from forest products after final harvest.
- SOCIAL
- Social Issues
  - NIMBY
  - DIOXIN

- Should energy recovery be promoted in the hierarchy in rural areas?
- Education of the general public on benefits and needs
- Inform and educate relevant stakeholders and public about the projects.
- Overcoming social/cultural misconception of projects.
- What is public perception? Maybe a bigger issue than the environmental problems?
- Societies perception of energy for waste projects.
- Encouraging the general public to sort materials.
- Air pollution from:
  - Incineration/combustion
  - Risks too high?
  - Will it ever be acceptable to communities?
  - Concerns
- STANDARDS POLICY
- SOCIAL
- CO-FIRING
- Establishing of new facilities versus cogeneration at established facilities
- Air quality concern must be fully understood and responded to.
- Transparent emissions/gas cleaning standards
- ALTERNATIVES
- Alternatives
  - Unbiased comparison of environmental impact of all alternatives.
- Analysis of all options of what to do.
- G.H.GAS
- Renewable versus fossil based waste
  - C dating?
- Can the process be used for greenhouse credits/carbon tracking?
- xxx<sup>1</sup> BOTTOM LINE
- Most appropriate/viable methods/ways of getting value from waste – ensure sustainable solutions

- Reuse of waste to maximise value rather than destruction – limited resources
- ECONOMIC
- Smaller scale technology for rural areas
- What are the benefits to suppliers
- Optimising energy inputs
- FEEDING THE EFW MACHINE
- xxx<sup>2</sup> and recycling remain principal drivers in waste management, not profits from EfW.
- How will a decreasing waste stream enable sustainable EfW businesses that will have increasing demands for energy supply?
- Once an EfW facility is established, that there are still opportunities for waste reduction, i.e. doesn't create incentive to convert everything to waste.
- Must avoid creating greater demand for waste (because of energy generation contracts)
- HIERARCHY
- Must get greatest value from resources (not just calorific value)
- Need life cycle analysis for particular "waste" to determine appropriate place in waste management hierarchy.
- Complete full life cycle analysis on bulk products prior to use.
- Complementary initiatives –
  - EfW and waste reduction
- Integration of all waste management areas (reduce, reuse, recycle, EfW)
- Resource use reduction must be paramount.
- Industry to use life cycle analysis and cleaner production to maximise products that may be xxx<sup>3</sup>
- Complimentary strategies with waste management.
- Improved segregation/recycling processes
- Reclaiming calorific materials from landfills
- Make sure EfW keeps its place in the waste management hierarchy.

### Green Table

- Low volume of “waste” unviable for large scale operations
- What is the true lifetime cost per tonne of operating a landfill until well (years/decades) after it closes.
- Energy from waste may be better suited to niche applications that are sustainable and cost competitive with conventional energy (gas).
- What are the true costs of recycling – all costs. We don’t tell the community this.
- Abundance of gas in WA as a major source of fuel for power generation. Capital costs of EfW projects may be too high to justify returns.
- Waste versus resource volumes.
  - Residuals – use?
- Waste versus resource view of the organic
  - Not being considered recyclable
- Energy from waste can become a driver in itself rather than a solution to disposal of residual waste.
- Identifying residual wastes suitable for energy from waste projects.
  - Are supplies sustainable?
- Incineration/energy recovery seen as lowest rung on the environmental ladder. More effort placed on elimination/recycling.
- Positive. Could develop niche markets in remote xxx.
- Community engagement.
- Community members on their own band wagons to self importance
- Engaging the community early on in this debate and development of waste sustainability guide.
- Does the guide address greatest community fear of dioxins and other toxics?
- Waste technologies discourage resource recovery and community involvement.
- Local government collaborations
  - Vested interests
- Need local government to work together to bring forth sustainable solutions
- Local government lethargy
  - Stepping out of the old ways is too hard.

- Small population spread over wide distance.
- Too much money tied up in continuing to bury waste
  - Regional and local governments.
- Regulators not viewed as being diligent enough to enforce environmental conditions on W.T.E. operators.
- Limited understanding of technology of waste incineration and issues arising by environmental regulators.
- REGULATORS
- Needs for clear process for developing EfW projects in WA.
- Perceptions
  - Landfill to air rational debate
- Community perceptions appear to be resisting anything to do with 'burning' waste.
- Community resistance to incineration
- Community wants to recycle
  - Have we created a frame of mind (that recycling is good) that we can't now back away from?
- Community perception is negative
- Entrenched negative perceptions versus resource recovery
- Difficult to engage in discussion without local influence
  - Haven't had unbiased or dispassionate debate.
- Transfer of pollution from ground to air.
- How will the guide be sold to the regulators?
- Government policy?
  - Inertia
  - Leadership
  - Clear process for "developers"
- Lack of leadership on the whole issue
- Inconsistent political support for incineration/waste to energy recovery.
- Inertia in decision making process
  - Lack of leadership

- Bureaucracy causes delays that have negative impact on financials
- Technology
  - xxx<sup>2</sup>
  - Alternatives
  - Sufficient reviews
  - Emissions
  - Yields
  - Quantitative analysis
  - Energy rich already
  - What's next
- The guide needs to be quantitative so it can be incorporated into xxx<sup>3</sup>/tender processes.
- How does the guide compare waste technologies?
  - Does it give equal recognition of emerging technologies eg. anaerobic xxx<sup>4</sup>.
- How does the guide address biological diversity and maintenance of essential ecological processes?
- In W.A. we are energy rich so why bother with waste technologies?
- W.A. Energy rich already.
- Opportunity to take high value products from waste stream.
- Technologies changing what's best for W.A.?
  - Is it sustainable?
- Misinformation deliberately put out into the community by groups such as greenpeace, which has a policy position that waste to energy should not be supported because there shouldn't be waste in the first place.
- Is there sufficient review of new technologies being considered in organic waste conversion?
- xxx<sup>5</sup> xxx<sup>6</sup> xxx<sup>7</sup> Japan
  - xxx<sup>8</sup> xxx<sup>9</sup>
  - Waste of the organic fraction
- Does the guide address energy intensity i.e. net energy yield/tonne waste processed.

- Technical aspects of emissions control (eg. heavy metals, organics)
- Need for a catalogue of all the current available approaches
  - Is it readily accessible?
- Costs
  - Viability
  - Variability in stream
  - Capital cost
- Variability of waste stream as fuel source. Costs of processing to reduce variability.
- What is the national cost of waste disposal and the projected increase over the next 10 years?
- Cost of the facility xxx<sup>10</sup> requires large volume waste stream
  - Forcing xxx<sup>11</sup> collaboration
- Commercial viability
  - Transformation of “waste” into “fuel” after capital is spent.
- Commercial viability
  - Waste streams for incineration are not secure
    - If a recycling or elimination opportunity arises, the waste will disappear.

#### Red A Table

- Guidelines
- Legislation
- Public/private operation?
- Waste police
  - Framework
  - Research
  - Initiation
- Monitoring and reporting
  - Compulsory

- Pollution
  - (perceived/real)
- Environmental impacts and management
- Environmental monitoring and regulation
- Types of waste
  - eg. reduce number of waste types to make them more recyclable/energy options.
- Defining boundaries i.e. types of wastes
- Appropriate monitoring of emissions from sites to ensure that they are with EPA standards
- Emissions and management of environmental impacts
- Disposal of residue
- Sustainable wastestream?
- Sufficient volumes of waste to run facilities
- Waste segregation
- Decommissioning of plants
- Implementation
  - Putting it in place
- Quality of feedstock
- Sale of energy/materials
- Community attitudes
- Public perception and relations
- Proving support to community groups (i.e. technical assessment)
- Waste minimisation
- Wrong message for waste generators? (prevent at source)
- Education
  - Community
  - Government (especially local)
  - Industry
- Education

- Planning
  - Planning
    - Policy development
    - Research and development
  - Legislation
  - Operation
  - Regulation
  - PR/Education
- Legislation
- Impact of facilities on product research and development for non-recyclables
- Sustainability – long term perspective
- Looking at the issue from a fairly broad perspective, energy from waste projects may be preferable to coal-fired power stations, from emissions/greenhouse gas point of view.
- Need for some strategic planning to determine where the most appropriate sites are for projects.
- Vehicular access
- Physical location
- Site locations
  - Community concerns versus cost of transportation
- Efficiency/Cost effectiveness
- Long term costs and benefits
- Performance of existing facilities and lack of trial of some facilities.
- Assessment of past performance of EfW facilities.
- Research and trialing
- RESEARCH
- Are there more and cleaner effective technological options that may emerge in the next decade or so?
- What do we really have?
- Will it have the support of the major energy producers?
- Alternatives

- Market developments
  - What happens if new markets become available for recycling wastes if destined for waste to energy facility?
- Europe
  - Recovery of previously disposed materials due to lack of raw resources
- Environmental impacts
  - Conservation and recovery of raw materials
- Maintaining hierarchy and priority to reduce, reuse and recycle
- Alternative forms of sustainable energy – need for hierarchy in energy industry
- LIFECYCLE
- ECONOMIC IMPACTS
- SOCIAL IMPACTS
  - Health
  - Education
- PLANNING
- The need to carry out a full life cycle cost analysis, including social and environmental aspects, to determine the best (most sustainable) use of the waste.
- What process is used?
- Economic viability
- Integrating the waste and energy hierarchies in the decision-making process.
- Will it xxx<sup>1</sup> make an impact on the use of natural resources?
- Planning and strategy
- Integration/working together
- Regulation

#### Orange Table

- Entry of toxic waste into stream
- Definitions
  - What is waste to energy Bagasse?
  - Saw mill waste?

- COST-EFFECTIVENESS
- Definition of boundary conditions or limits for analyses
- Size of WfE system
  - When assessing the extraction of energy how wide is the assessment of benefit? i.e. cost of health impacts etc.
  - Triple bottom line.
- WASTE HIERARCHY
- AFFORDABILITY
- Waste treatment
  - Resources
  - Recovery
  - Balance
- Negative public health and environmental impacts?
- Location
  - Benefit or not
  - Close to energy market but emissions also closer.
- Community concerns over emissions.
- Method of waste separation.
  - Importance (role) of separation at source
- What kinds of waste will be allowed to go to the Waste to Energy plants
  - i.e. just municipal, toxic etc.
- Emission Control required
  - Fossil fuel -> one xxx<sup>1</sup>
  - Renewable another ->
- Reduce, reuse, recycle.....LANDFILL
- Waste treatment xxx<sup>2</sup> all out (pollution)
- Extraction of resources before WfE process
- Disposal of EfW by-product.
- Whether these plants will be seen as an alternative to recycling?

- LICENSING
- Control of emissions

### Black Table

- Total Energy generation/consumption on a site.
- Energy consumed by transport
- Energy
  - Definition
  - Fuel product or energy product
- Terminology
  - Energy
  - Waste
  - Sustainable
- Scope
  - Waste productivity minimisation excluded
- POSITIVE
  - **xxx**<sup>1</sup> issues (perceived and **xxx**<sup>2</sup>) in relation to landfill.
- Resource recovery
- Can code of practice be adopted by governments?
  - LGAs
  - State
  - Federal
- Offset **xxx**<sup>3</sup>
- How does EfW industry deal with “unreasonable” elements of community?
- Level of knowledge base available to community.
- Community involvement at early stage.
- Air emissions
  - Contribution to **xxx**<sup>4</sup>
  - Other contributions

- Community lack of awareness of transport.
- Air emissions
  - Technical difficulties
  - Mistrust
- All emissions
  - Gaseous
  - Solid
  - Liquid
- Concern about hazardous waste management
  - Degrees of risk
- The cure worse than the disease?
- Lost opportunity aspects.
- Adverse effect on waste minimisation driven by economics.
- Site needs
  - Community
  - LGAs
  - Industry
  - State government.
- Proponents being able to provide correct answers.
- Responsibility for products produced.
  - Environmental and social.

#### Red B table

- Determination of best value for product recovery
  - Methodology (of best value) from waste stream.
- Determination of “which” item of the waste stream are best value for waste to energy.
- Social
  - NIMBY

- Incineration has been seen as the convenient process for producing energy from waste which has created a negative image. Any other process is seen to be a dressed up version of incineration.
- A lot of misinformation/hype surrounds the technologies that process waste to energy creating a degree of mistrust on information available.
- Community engagement in decision making process regarding EfW.
- Determination of the Communities needs for waste recovery products. Community must have impact on:
  - Energy
  - Compost
  - Steam/heat
  - Fuel
- Public perceptions, education, credibility
- Community concerns with safety of waste to energy facilities
  - Perceived technical complexity of waste to energy facilities.
  - Lack of community control of waste to energy facilities.
- Current knowledge and ATTITUDE of community to waste to energy.
- Public concern about environmental impacts.
- Social
  - Community perception
- Air emissions:
  - How to ensure that they are within environmental acceptable limits.
- Environment
  - State to state emission issues.
- Meeting acceptable emission standards consistency.
- Environmental difficulty in measuring xxx emissions.
  - Nationality standards for more exotics are simply underdeveloped.
- Gas emissions combustion prevention of toxic production.
- Monitoring performance of plant.
- Combustion emissions removal.

- Environmental emission control technology hard to rely on to “get everything”.
- Odour from waste facilities.
- Siting of facilities
  - Buffers
- Waste storage prior to processing land use, odour, runoff.
- Transport to collection stockpile in sustainable manner.
- Price that customers will pay for energy produced.
- Access to electrical network for energy produced.
- Access to electricity transmission
- Is it “green energy”?
- Linkage to future carbon tax legislation
  - How green is it?
- Economic carbon tax issues need resolving.
- Waste to energy greenhouse credits – are not xxx<sup>2</sup> and possibly will be lost in the next 10 years plus.
- Capital intensity of waste to energy facilities – limiting future flexibility.
- Economic capital intensive.
- Economic
  - Risk high.
- Environment
  - How can you run PVC free thermal processes when PVC use still increasing?
- Need for improved waste separation methods.
- Reduction in green waste
  - Regulation.
- Reduction of waste
  - Packaging.

- Product recycling
  - Computers
  - Cars.
- Change of waste
  - Plastic out
- The fact the EPW processes tend to be an alternative to composting or recycling processes is a waste of resources
  - It should be a process of last resource.
- EfW is competing against more environmentally friendly energy generating processes such as solar or wind.
- Development of gasification technology finance
  - Projects versus established alternatives.
- Sustainability
  - How can you get right sizing of facilities with so many players vying for market share with the “best technology”
- Economic
  - Drivers “more fuel is better” mindset, or perception of it.
- Sewage to oil fuel.
- Cofiring – cement kilns introduction
- Using greenwaste/organics for EfW as against composting.
- Social
  - Extraordinary range of compounds possible in emissions – which will front page next.
- The difficulty in proving that a process is safe for community.
- Long range health risks are not identified/studied give concern to community particularly when dealing with MSW or industrial waste.
- Dealing with toxins in conversion processes.

- Benefit from EfW that is not mentioned in opening presentation, namely infectious disease control.
  - **xxx<sup>3</sup>** (mad cows disease, human variant JCD, etc.) are temperature resistant (to = 320 °C). Abattoir waste, food processing waste, treated medical waste disposed at landfill are a potential source of serious infectious diseases. EfW greater than 320 °C may resolve this potential problem.
- Separation of waste sewage – mixing of waste from sources.
- Onsite versus central treatment.
- Volume of waste to produce energy in marketable quantities.
- Number and distribution of EfW plants in Perth.
- Pressure to supply waste to meet energy/plant needs leading to inappropriate disposal of material.