



Making Right Choices:

A Framework for Sustainability Assessment of Technology (SAT)

United Nations Environment Programme
Division of Technology, Industry and Economics
International Environmental Technology Centre

1



Structure of Presentation



- **About SAT Methodology**
- **Key Characteristics of SAT methodology**
- **Use of SAT**
- **Key elements**
- **Methodology / Decision making process of SAT**

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2



Why integrate 'Sustainable Development' in Technology Assessment?



- **Technology plays an important role in Development**
- **The dominant system of decision making in technology selection, focuses on economic considerations and tends to disassociate social and environmental factors**
- **A fragmented approach in making technology choices has implications on efficiency and sustainability of technology**
- **Integration of Economic, Social and Environmental considerations ensures Resource (Economic and Environmental) Efficiency and Social Acceptability**

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3



Sustainable Assessment of Technology (SAT)



- **SAT Methodology ...**
- ... Integrates Environmental, Social and Economic Considerations**
- ... Focuses on environment and development together and puts them at the centre of the economic and political decision making process**
- ... Can be adapted to country specific parameters and constraints**

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4



SAT – Some Key Characteristics




- **It is built on existing Environmental Technology Assessment (EnTA) framework**
- **Undergoes progressive assessment (Tiered) procedure (screening, scoping and detail assessment) thereby optimizing information requirements**
- **It operates on strategic as well as operational level**



SAT – Some Key Characteristics



- **It is a quantitative procedure allowing objective assessment, sensitivity analyses and incorporation of scenarios**
-  **It incorporates Continuous improvement through Plan-Do-Check-Act (PDCA) cycle**
- **It is not an automated process thereby making country specific adaptation possible**



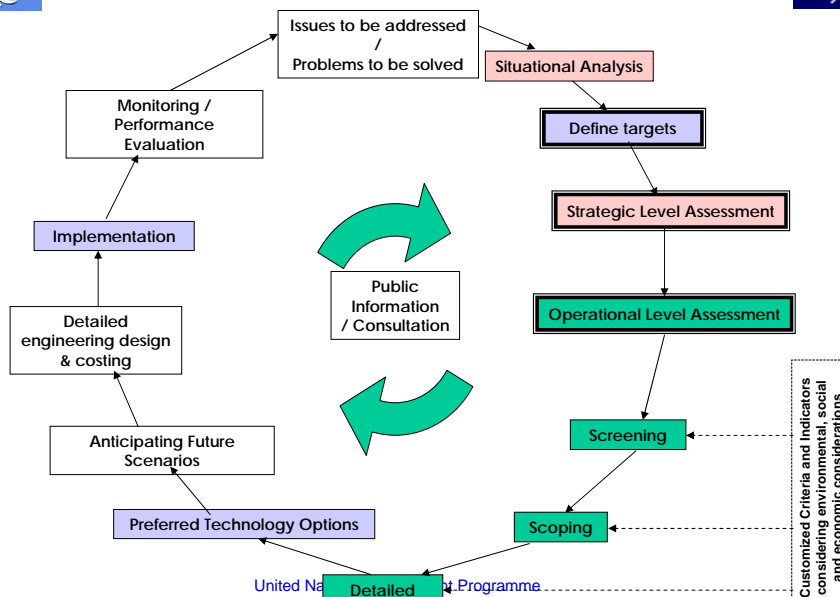
Use of SAT



- Policy and Government Level
For Strategic Planning and Policy making
- Financing Institution Level
For Assessing projects for funding
- Operational Level
For assessment of alternative technologies
- Community and Cluster Level
For assessment and comparison of collective alternative technologies
- Community / Enterprise Level
For comparing technology options



SAT Methodology





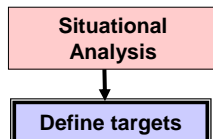
SAT Methodology – Situation Analysis



Situation Analysis and Defining Targets

The Situation Analysis includes:

- **Baseline data collection**
- **Stakeholder consultation**
- **Mapping and analyses**



These two Steps help to identify issues, assess their significance and leads to setting of targets that should be addressed by proper technology intervention.



SAT Methodology – Strategic Level Assessment



Strategic level assessment

Strategic Level Assessment

This is done by planners, decision-makers, elected representatives through participatory sessions

The outcomes are important as it

- **Helps to develop customized criteria and indicators for operational level from generic level.**
- **Facilitates short-listing and identification of suitable options**
- **Provides leads to future scenario building (e.g. population growth, tighten legal requirement) there by putting more light on technology choice.**



SAT Methodology – Operational Level Assessment

Operational Level
Assessment

Operational level assessment

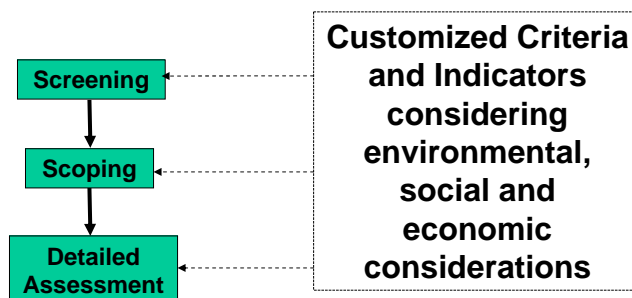
Engineers and technical staff assess the available technology options

In community or enterprise level, operational level assessment can be the first step

The level of expert opinion and technical information is very important



SAT Methodology – Three -Tier Assessment





SAT Methodology - *Screening*



In this Step:

- The short listed systems from Operational level Assessment, undergoes objective **YES/NO** type answers
- Options which do not qualify one or all conditions, are directly eliminated.

E.g.: Compliance to legal requirements or Use of non-hazardous substances



MSW: Operational level assessment - *Screening*



Criteria	Mass burn	Modular incineration	Fluidized bed incineration	RDF	Sanitary land filling combined with aerobic composting	Sanitary land filling combined with bio-methanation	Manual land filling combined with vermicomposting
Compliance with local env. Laws	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Compliance with national env. laws	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Compliance with MEA's	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Safe to Use	Yes	No*	Yes	Yes	Yes	Yes	Yes
Provides savings on resources	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* There has been widespread concerns over the consistency and adequacy of air pollution controls.



SAT Methodology - *Scoping*



- It is a Comprehensive and Qualitative type (High/Medium/Low) assessment
- Various technology options are assessed against generic or customized criteria and indicators with use of computational methods such as:
 - *The weighted sum technique*
 - *Sensitivity analysis*
 - *Multi Criteria Decision Making (MCDM): By 'Expert choice', a software using Analytical Hierarchy Process (AHP) to carry out MCDM*

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15



MSW: Operational level assessment –

Scoping



Criteria	Weight (Wt.)	Mass burn		Fluidized bed incineration		RDF		Sanitary land filling combined with aerobic composting		Sanitary land filling combined with bio-methanation		Manual land filling combined with vermicomposting	
		Score	Wt.*score	Score	Wt.*score	Score	Wt.*score	Score	Wt.*score	Score	Wt.*score	Score	Wt.*score
Suitability of waste characteristics to technology application	10												
Past experience (under similar condition)	10												
Land requirements	10												
Overall pollutant removal efficiency	10												
Acceptability (to the public)	10												
Income generation potential	7												
TOTAL (Weight * Assign score)													

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16



MSW: Operational level assessment -



Scoping

Rank Number	Score	Technology system
1		Sanitary land filling with bio-methanation
2		Manual land filling with vermicomposting
3		Sanitary land filling with aerobic (windrow) composting
4		Fluidized bed incineration
5		RDF
6		Mass burn

The first three ranks of technology systems are short listed for Detailed Assessment

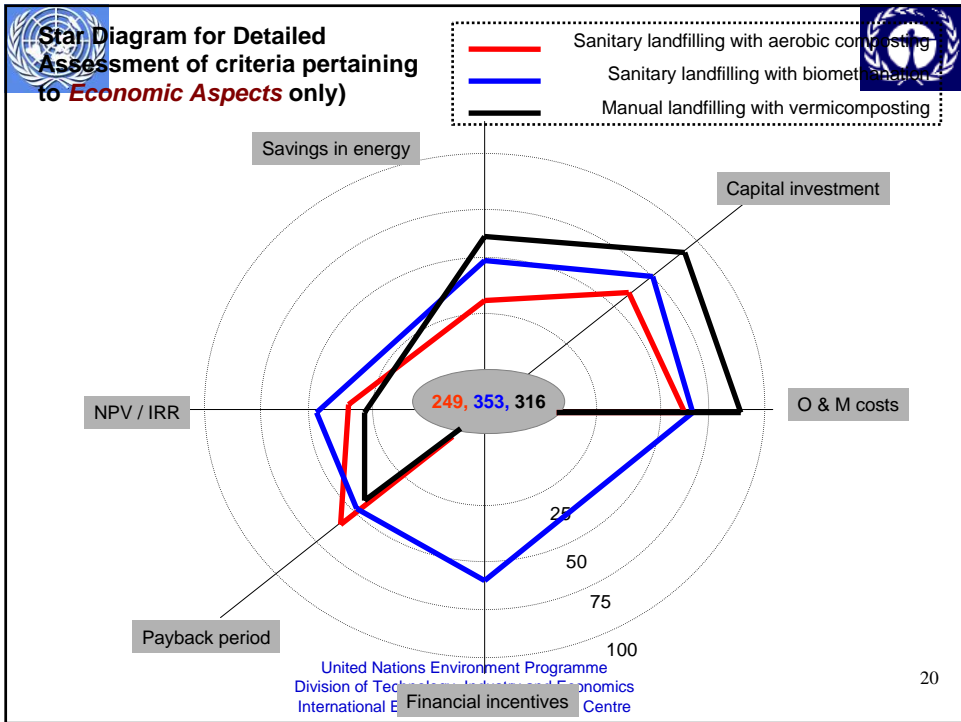
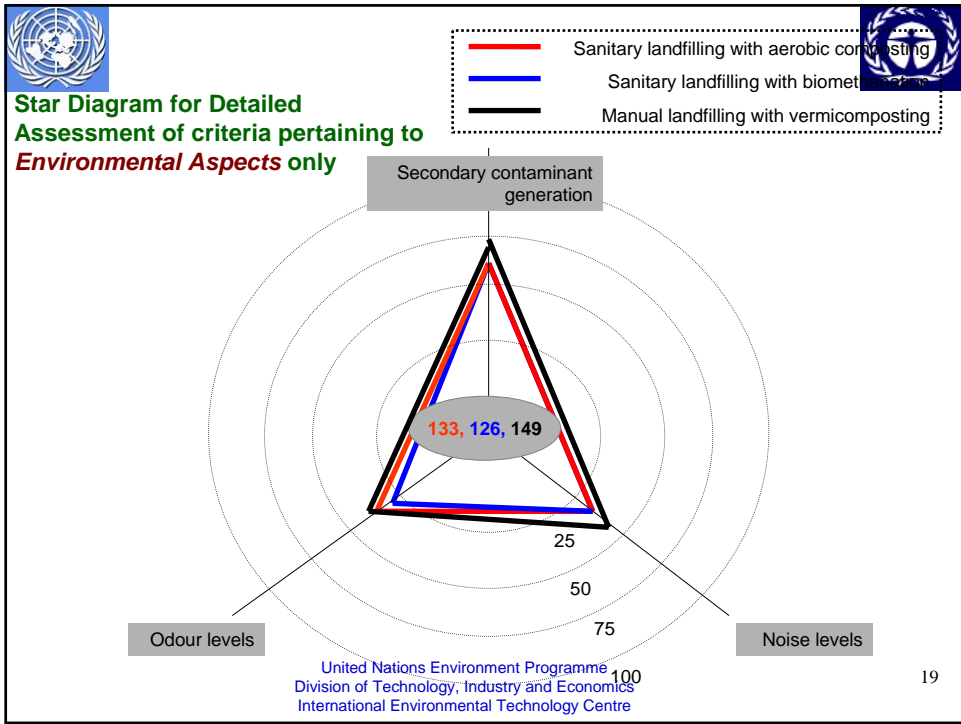


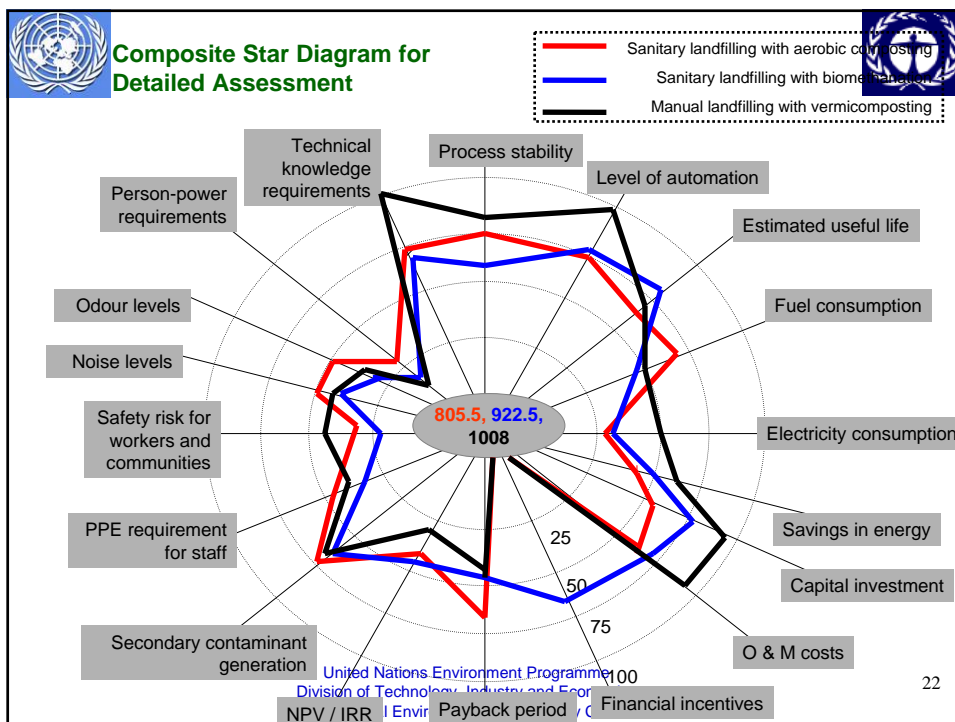
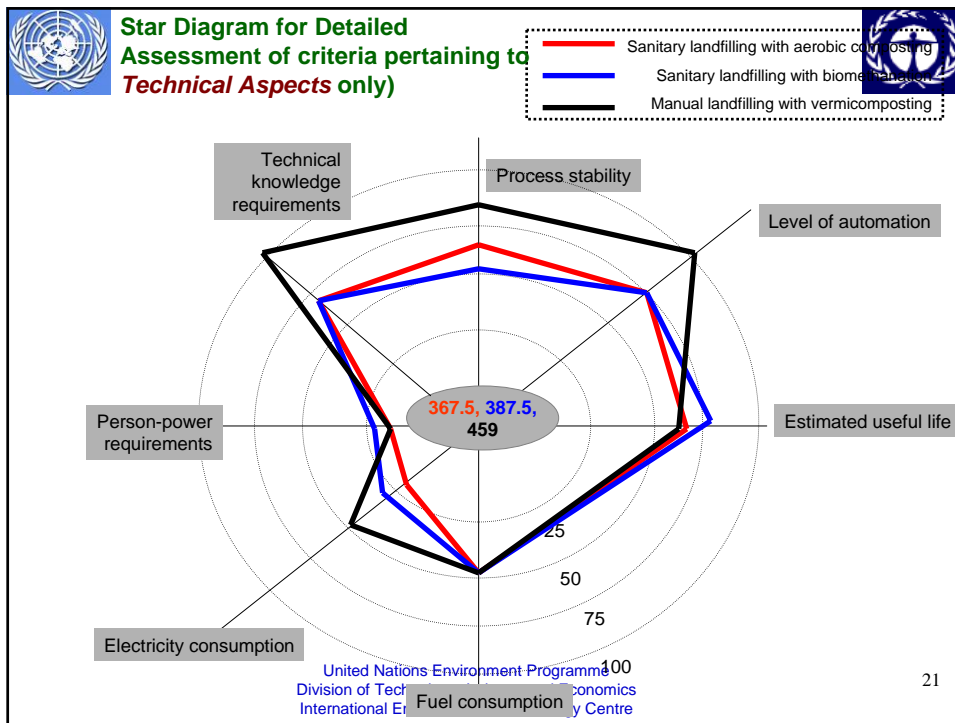
SAT Methodology –



Detailed Assessment

- The options with best overall ratings from *Scoping* are selected for **Technical and Economic feasibility Assessment**
- The Assessment level is situation specific and requires *detailed and quantitative information.*
- The outcome is a list of technology options *ranked* as per their scores







Ranking of Technology Options



At this stage the ranking of technology system options is as follows:

- Option 1: Manual land filling with vermicomposting**
- Option 2: Sanitary land filling with bio methanation**
- Option 3: Sanitary land filling with aerobic composting**



SAT Methodology – *Anticipating Future Scenario*



In order to check the robustness of selected technology options, same methodology with simulated future scenario's to be applied so as to confirm that the technology stands the test of time.



SAT Methodology – *Preferred Technology Options*

Before discarding low scoring options and/or final decision on selection of technology one must keep in mind

- *Highest score technology option for current scenario needs to be carefully reviewed for different scenarios as it may not be equally eligible as feasible option in other scenarios*
- *On the other hand, the technology options with less score may qualify for different scenarios with suitable technology transfer/capacity building efforts.*



SAT Methodology – *Implementation and Monitoring*

Once the decision on Suitable Option is made, this step covers the following:

- *Engineering design*
- *Tendering*
- *Actual construction and commissioning*

Evaluation of technology during operational phase ensures meeting of desired objective against criteria considered in SAT process



SAT Methodology – *Reporting, Monitoring and Feedback*

- **Reporting the outcome of monitoring and evaluation to stakeholders, govt. agencies and decision makers acts as basis for situation analysis for future projects and helps in making informed decisions**
- **It helps refine and build the Methodology by -**
 - *Inclusion of additional criteria*
 - *Disqualification of technology in future for similar situations due to negative experiences.*



THANK YOU

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information:
<http://www.unep.or.jp>