



## What is a Best Achievable Technology (BAT)?

A best achievable technology is a technology that has been evaluated for its feasibility, reliability, control-effectiveness, and cost-effectiveness and is demonstrated to be best-suited to meet waste discharge standards for the protection of the environment and human health.

## What is a BAT Assessment?

A BAT assessment is a report that reviews waste control technologies that have been proven in commercial application and whose risks are known. The assessment is a site-specific evaluation of waste control technologies while accounting for any specific operational, environmental, geographic conditions or economic viability. The resulting report will include an evaluation of the relevant technologies or processes in treating contaminants for the protection of the environment and human health, based on the following criteria: feasibility, reliability, control-effectiveness, and cost-effectiveness. The assessment will recommend a waste control technology for a site-specific application based on the results of the criteria.

## Will a BAT assessment be required for my permit application?

After you have entered the application process, the ministry will inform you at your pre-application meeting and within the application instruction document if you need to provide a BAT assessment report as part of your final application. The ministry will also provide the site specific details of needs to be included in the assessment.

## How will the BAT Assessment be used?

The ministry will take the assessment into consideration when reviewing your final application for a waste discharge authorization. The BAT assessment may be used to establish discharge limits and other permit conditions.

## What are the steps of a BAT assessment?

The ministry will determine if a BAT assessment is required for your application. You will be notified of the need for a BAT assessment during the pre-application meeting. If a BAT assessment is needed, the ministry will let you know what information is required for each of the steps to complete the BAT assessment:

- Step 1: Identification of information to be gathered for the BAT assessment
- Step 2: Identify all potential technologies or options
- Step 3: Screening for feasible options
- Step 4: Describe and compare the reliability of each option
- Step 5: Describe and compare the control-effectiveness of each option
- Step 6: Describe and compare the cost-effectiveness of each option
- Step 7: Select BAT



# BEST ACHIEVABLE TECHNOLOGY ASSESSMENT TO INFORM WASTE DISCHARGE STANDARDS

## DESCRIPTION OF STEPS

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After you have entered application process, the ministry will inform you if you need to provide a BAT assessment report as part of your final application. The ministry will also provide the site specific details of needs to be included in the assessment. If a BAT assessment is needed, the ministry will let you know what information is required with respect to each of the steps to complete the BAT assessment in the table below.

BAT Steps	Information required by the ministry
<p><b>Step 1:</b> <b>Identification of information to be gathered for the BAT assessment</b></p>	<p>The format and content of the BAT assessment will be specified by the ministry ahead of the BAT assessment, and may include:</p> <ul style="list-style-type: none"> <li>• Minimum discharge standards or objectives for all contaminants of concern that technologies will need to meet;</li> <li>• Considerations of the receiving environment where the discharge targets or objectives are expected to be met;</li> <li>• The qualifications of the person completing the assessment (e.g., a designated Professional Engineer);</li> <li>• Waste control technologies from comparable facilities that should be considered;</li> <li>• Factors to be considered in evaluating control-effectiveness;</li> <li>• Treatment efficiency;</li> <li>• Ability to verify performance; and</li> <li>• Any other criteria identified by the ministry.</li> </ul> <p>The ministry may stipulate how the assessment criteria (i.e., feasibility, reliability, control-effectiveness and cost-effectiveness) from steps 3, 4, 5, and 6 should be considered to derive the recommended technology. The ministry may specify that one of the criteria has a higher relative importance than another (e.g., the criteria are not considered equally, and reliability is considered with a heavier weighting than cost-effectiveness). If the ministry does not stipulate the relative importance of the criteria, you must explain how the criteria were considered to determine the recommended technology.</p>

BAT Steps	Information required by the ministry
<p><b>Step 2:</b> <b>Identify all potential technologies or options</b></p> <p>You will identify the potential technologies or options that could be implemented.</p>	<p>This may involve a jurisdictional review to ensure that all relevant technologies are considered. Other types of information that could be considered when exploring technology options:</p> <ul style="list-style-type: none"> <li>• Alternative industrial processes;</li> <li>• Alternative fuels;</li> <li>• Design, operational, maintenance, and decommissioning attributes;</li> <li>• Pollution control equipment;</li> <li>• Energy-efficient equipment and processes;</li> <li>• Best management practices; and</li> <li>• Risks associated with residual contaminants produced by a treatment technology.</li> </ul>
<p><b>Step 3:</b> <b>Screening for feasible options</b></p> <p>You will determine what options are feasible and not feasible.</p>	<p>Examples of what may make an option technically infeasible include:</p> <ul style="list-style-type: none"> <li>• Inability to meet environmental criteria identified by the ministry;</li> <li>• Lack of transparency in either the assessment or the mechanism of treatment;</li> <li>• Technologies that are new and unproven;</li> <li>• No access to inputs (e.g., biofuels, natural gas, wind, nuclear, materials, consumables or products required);</li> <li>• By-products and/or wastes generated and lack of access to appropriate disposal options;</li> <li>• Technologies that are incompatible with the specific needs of a facility or activity (e.g., a waste control technology that is too large for the size of facility or activity identified in the permit application);</li> <li>• State or type of receiving environment (e.g., ocean, fish bearing waterbodies, hydrogeology, stressed airshed, etc.); and</li> <li>• Physical environment of the facility or activity (e.g., topography, limited space/area footprint, climate, geology, hydrogeology, etc.).</li> </ul>
<p><b>Step 4:</b> <b>Describe and compare the reliability of each option</b></p> <p>You will describe each feasible option according to the probability it will operate to its specifications.</p>	<p>Note that the assessment should refer to technologies that are proven through commercial application in similar facilities in the same industry. You should include methodology, data sources and justification for how you determined the reliability.</p>

BAT Steps	Information required by the ministry
<p><b>Step 5: Describe and compare the control-effectiveness of each option</b></p> <p>You will calculate the expected control-effectiveness for each of the feasible options.</p>	<p>This may be calculated in a manner appropriate for the contaminant, such as emissions reductions (i.e., percent pollutant removed) or emissions performance level (e.g., emissions per unit, tonnes per year, kilograms per hour, etc.).</p> <p>For existing facilities, rank the options by the control-effectiveness compared to the baseline technology currently in use.</p> <p>In these calculations, the applicant must be cautious of variables that may be used in other jurisdictions (e.g., units of measurement, monitoring methods) as they may affect comparisons. The following information may be included in the assessment:</p> <ul style="list-style-type: none"> <li>• Energy requirements;</li> <li>• Environmental costs or impacts (such as water or solid waste, hazardous air contaminants); and</li> <li>• Secondary waste discharges.</li> </ul>
<p><b>Step 6: Describe and compare the cost-effectiveness of each option</b></p> <p>You will describe the cost-effectiveness of each feasible option.</p>	<p>One way of determining cost effectiveness is to divide the annual control cost (annualized, capital, operating, and maintenance cost), given in dollars per year, by the expected reduction in contaminants, given in units (e.g., tonnes) per year. If applicable, you may also consider cost per unit volume or mass of waste flow treated. The most cost-effective technology will be the one that is able to reliably lower contaminant concentrations to levels that ensure the protection of the environment at the lowest cost.</p>
<p><b>Step 7: Select BAT</b></p> <p>You will select a technology based on the criteria from Steps 3, 4, 5 and 6, and submit the assessment document to the ministry.</p>	<p>If the assessment is unsatisfactory, the ministry may require that you resubmit it. The assessment must include the following:</p> <ul style="list-style-type: none"> <li>• All technologies that were considered;</li> <li>• Summary tables that clearly present the results of the assessment for each waste control technology considered and each contaminant of concern (see below);</li> <li>• Summary of the reasons why control technologies were deemed technologically infeasible;</li> </ul>

**BAT Steps****Information required by the ministry**

- Justification of the proposed control option and any trade-offs that were made among the rankings (e.g., reliability vs cost-effectiveness); and
- Explanations of any divergences from comparable facilities or technologies that were identified during discussions with the ministry.

**An example of a summary results table:**

	WASTE CONTROL TECHNOLOGIES			
	Technology 1	Technology 2	Technology 3	Technology 4
<b>CRITERIA</b>				
<b>Technological feasibility</b>	Feasible	Unfeasible	Feasible	Feasible
<b>Control-effectiveness</b> <i>(expressed as emission rate)</i>	500 tonnes/year	500 tonnes/year	500 tonnes/year	500 tonnes/year
<b>Reliability</b>	Reliable and used in similar sites	New technology and therefore reliability is undetermined	Low reliability	Reliable and used in similar sites
<b>Cost-effectiveness</b>	100 \$/tonne	50 \$/tonne	50 \$/tonne	125 \$/tonne

<p><b>Applicant's recommended BAT</b></p> <p>A detailed rationale for the selection of the technology must be provided. If not previously determined by the ministry in step 1, you must describe how you considered the criteria to derive the recommended technology (e.g., did the criteria have different relative importances or weightings). You may provide additional information, such as detail about the reliability of a technology and how the control-effectiveness meets discharge standards for the protection of the environment and human health.</p>	
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