

## Appendix 2

# The APO GP Program

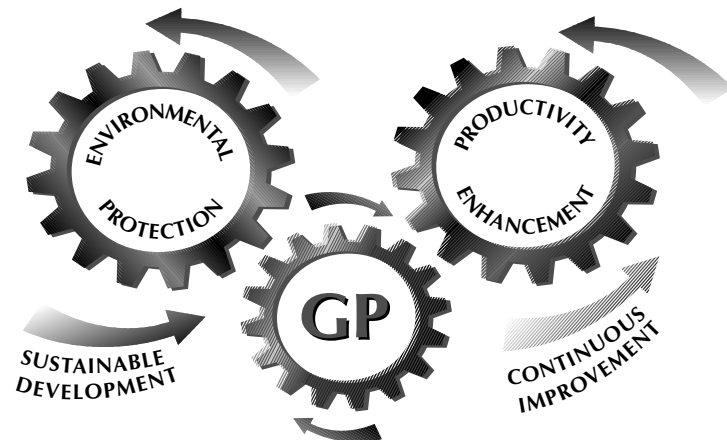
The objective of the Asian Productivity Organization (APO) is to enhance productivity and accelerate economic development in Asia and the Pacific Region. To do this the APO works in close cooperation with the National Productivity Organizations of member countries.

In 1994, the APO created the Office for the Environment (OfE), which subsequently became the Environment Department, to help member countries integrate environmental concerns into their productivity enhancement work. The Department promotes waste reduction and environmental preservation by championing the development of GP. It does this through three main activities: promotion, demonstration and dissemination. It particularly targets small and medium-sized enterprises (SMEs) since such companies generally lack the resources and expertise to undertake the work themselves.

## The Meaning of GP

### Definition & Distinguishing Characteristics

Green Productivity (GP) is a strategy for enhancing productivity and environmental performance for overall socio-economic development. It is the application of appropriate productivity and environmental management tools, techniques and technologies that together reduce the environmental impact of an organization's activities,



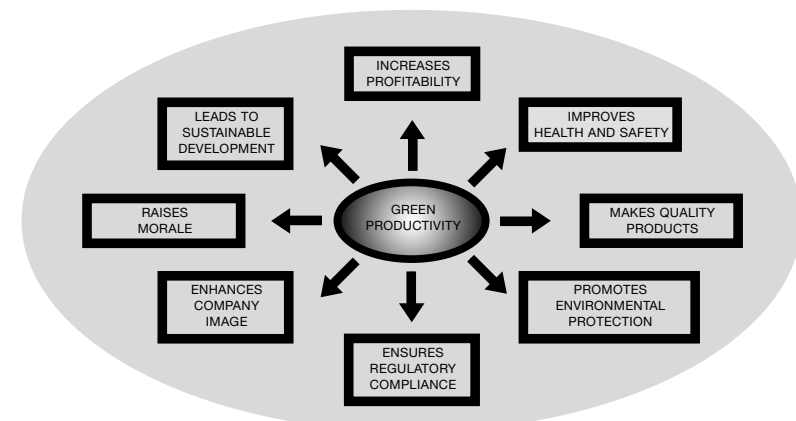
## The Need for GP

Previous approaches to environmental protection have tended to ignore economic performance. Traditional 'end-of-pipe' technology has proved costly and ineffective, while many other preventive environmental management solutions are not productivity-focused. This has reduced the attractiveness of such schemes to environmentally conscious and productivity-oriented businesses. At the same time conventional productivity improvement programs have generally ignored environmental issues and have given companies little opportunity to centralize such issues in their business strategies. GP overcomes the constraints inherent in these old approaches and combines environmental protection with quality, cost-effectiveness and technological innovation to bring significant competitive advantage.

## Benefits of GP

In the industrial sector, improvements in productivity and environmental performance achieved through GP bring many bottom-line savings — everything from reduced fuel and raw material consumption to lower insurance expenses (see Fig. 1). Cost-effectiveness, profitability, competitiveness and an improved working environment are central goals of any GP strategy. Products and by-products are more environmentally friendly, while the changes GP brings to the production process improve both workers' health and safety and product quality.

Because GP encourages creativity and innovation and allows companies to capitalize on markets that demand high environmental specifications, it creates new business opportunities and helps companies to increase their market share. All in all, GP is a multi-dimensional strategy that improves both the performance of business and the overall quality of life.



# Overview of GP Methodology

## The Six Step GP Methodology

The central element of the GP methodology is the examination and re-evaluation of both production processes and products to reduce their environmental impacts and highlight ways to improve productivity and product quality. Implementation of these options leads on to another cycle of review and so promotes continuous improvement (see Fig. 2). The six principle steps of the GP methodology are:

### 1. Getting Started

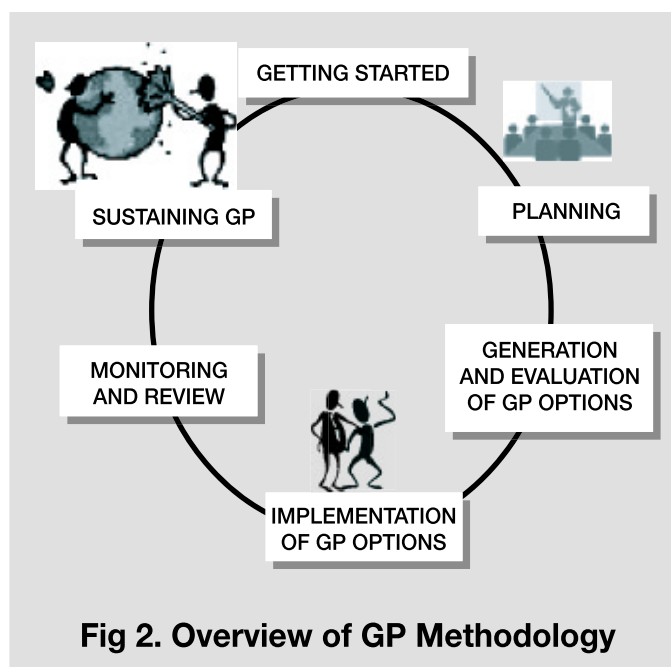
The beginning of the GP process is marked by the formation of a GP team and a walk-through survey to gain base-line information and identify problem areas. At this stage it is vital to get the support of senior management to ensure that adequate manpower and resources are available for successful GP implementation.

### 2. Planning

Using the information gained in the walk-through survey along with a number of analytical tools such as material balance, benchmarking, eco-mapping and Ishikawa diagrams, problems and their causes are identified. Following this, objectives and targets are set to address the problem areas. Performance indicators are also identified.

### 3. Generation and Evaluation of GP Options

This stage involves the development of options to meet the objectives and targets formulated in the planning stage. It involves both a review of pollution prevention and control procedures that have already been devised or implemented and the development of new options. Options are screened and prioritized in terms of their economic and technical feasibility and their potential benefits. They are then synthesized into an implementation plan.



### 4. Implementation of GP Options

The implementation of the selected GP options involves two steps: preparation and execution. Preparatory steps include training, awareness building and competence development. This is followed by the installation of equipment and systems along with operator instruction and hands-on training.

### 5. Monitoring and Review

Once the selected GP options have been implemented it is vital to check whether they are producing the desired results. This involves monitoring the overall GP system to ensure that it is proceeding in the right direction and that targets are being achieved as per the implementation plan. Findings are reported for management review.

### 6. Sustaining GP

In light of the findings of the GP evaluation, corrective actions can be taken to keep the GP program on target. In some cases targets and objectives themselves will have to be modified.

As the program progresses a feedback system should be implemented so that new problems and challenges will be highlighted and dealt with. In this way the GP cycle will loop back to the relevant step to implement a process of continuous improvement and ensure the continuing relevance and effectiveness of the GP process.

## GP Tools and Techniques

Implementing the GP methodology requires integrating and applying a number of key environmental management and productivity improvement tools and techniques. GP tools and techniques provide clues and directions for the generation of options and enable their systematic implementation. Different tools and techniques are used at different steps of the GP implementation process (see Table 1).

### Tools

#### Starting Out

At the start of the GP process, flowcharts and process flow diagrams provide a graphical method of representing activities, processes and material flows. A material balance — based on a process flow diagram — allows for the quantitative assessment of material inputs and outputs.

#### Highlighting Problems

Benchmarking is often used to identify gaps in performance by comparing the current achievements of a department or company against

what others have done. Brainstorming and concentration diagrams help in the identification of the possible root causes of problems and for data collection. Ishikawa cause and effect analysis is another problem-solving tool used to uncover the reasons behind problems. It gives a graphical representation of cause and effects, so allowing a problem to be fully analyzed.

Environmental problems can be identified using eco-mapping — a simple and practical visual tool that provides a bird’s eye view of a company’s operations and thus a quick inventory of practices and problems. Pareto analysis is another graphical tool used to isolate key problems that are causing the most significant impact. Check sheets are used for collecting data over time to show trends and recurring problems and control charts are used to show deviations and variability in performance.

### Finding Solutions

GP options are generated and assessed using techniques such as brainstorming and cost-benefit analysis which facilitates the comparison of alternatives in terms of the monetary costs involved and the benefits that can be obtained. Typically the tool is used in feasibility studies — often in conjunction with audits — for the selection of alternative options. As options are implemented spider web diagrams provide a visual way of showing progress and performance against several targets at once.

### Techniques

GP techniques are used to bring about the changes that will result in better environmental performance and improved productivity. They range from simple housekeeping techniques to designing ‘green’ products.

### Good Housekeeping

GP techniques include awareness programs and the 5S management techniques which focus on keeping processes, equipment, workplaces and work forces organized, neat, clean, standardized and disciplined. Other good housekeeping techniques relate to measures that prevent the loss of materials, minimize waste, conserve and save energy and improve operational and organizational procedures.

### Design Change

The environmental impact of a product is to a large extent determined by its design. By taking environmental considerations into account during product planning, design and development — and so designing environmentally-compatible products — a company can minimize the negative impact of its products and process on the environment.

### Process Modification

Process modification is a key GP technique which encompasses both simple and more complex changes — from replacing inefficient or old

processes with new technology to totally changing the production process used. Such alterations can also involve energy conservation techniques such as the use of efficient appliances and the re-use and recycling of heat.

### Waste Management

W a s t e stream segregation and the promotion of recycling, reuse and recovery are two broad techniques used to reduce the amount of waste a company produces and to improve waste disposal. Off-site recycling is often implemented if on-site recovery and reuse of resources is not feasible. Often substantial improvements can be made in the nature and quantity of waste produced by the substitution or purification of some material inputs.

**TABLE 1: GP STEPS, TASKS AND TOOLS**

STEPS	TASKS	TOOLS
<b>STEP I:</b> GETTING STARTED	<ul style="list-style-type: none"> <li>Form a GP Team</li> <li>Walkthrough survey and information collection</li> </ul>	<ul style="list-style-type: none"> <li>Brain storming</li> <li>Attribute analysis</li> <li>Needs analysis</li> <li>Responsibility matrix</li> <li>Checklists, tally charts</li> <li>Flowcharts and process flow diagram</li> <li>Material balance</li> <li>Benchmarking</li> </ul>
<b>STEP II:</b> PLANNING	<ul style="list-style-type: none"> <li>Identification of problems and causes</li> <li>Setting objectives and targets</li> </ul>	<ul style="list-style-type: none"> <li>Brainstorming</li> <li>Cause and effect analysis (Ishikawa)</li> <li>Critical path analysis</li> <li>Eco-mapping</li> <li>Gantt chart</li> <li>Force field analysis</li> </ul>
<b>STEP III:</b> GENERATION AND EVALUATION OF GP OPTIONS	<ul style="list-style-type: none"> <li>Generation of GP options</li> <li>Screening and evaluation of GP options</li> <li>Preparation of implementation plan</li> </ul>	<ul style="list-style-type: none"> <li>Brainstorming</li> <li>Cost benefit analysis</li> <li>Eco-mapping</li> <li>Failure mode and effect analysis</li> <li>Pareto charts</li> <li>Program Evaluation Review Technique (PERT)</li> </ul>
<b>STEP IV:</b> IMPLEMENTATION OF GP OPTIONS	<ul style="list-style-type: none"> <li>Implementation of selected options</li> <li>Training, awareness building and developing competence</li> </ul>	<ul style="list-style-type: none"> <li>Training need analysis</li> <li>Team briefing</li> <li>Responsibility matrix</li> <li>Critical path analysis</li> <li>Gantt chart</li> <li>Spider web diagrams</li> </ul>
<b>STEP V:</b> MONITORING AND REVIEW	<ul style="list-style-type: none"> <li>Monitoring and evaluation of results</li> <li>Management review</li> </ul>	<ul style="list-style-type: none"> <li>Solution effect analysis</li> <li>Eco-mapping</li> <li>Failure mode and effect and analysis</li> <li>Charts (control, tally etc)/spider web diagram</li> </ul>
<b>STEP VI:</b> SUSTAINING GP	<ul style="list-style-type: none"> <li>Incorporate changes</li> <li>Identify new/additional problem areas for continuous improvement</li> </ul>	<ul style="list-style-type: none"> <li>The tools are repeated here, since the activities are looped back to the previous steps</li> </ul>