# Purchasing Small To Medium Size Merchant Air Separation Plants

## Introduction

**Cosmodyne** reviews with prospective purchasers the numerous factors to consider when purchasing a small to medium sized merchant air separation plant. While price and efficiency may be the most prominent factors, there are other important less obvious factors to consider.

## Background

Typically, small to medium size plants are defined as plants with total liquid production capacity of 4 to 200 metric tons per day. Merchant Plants are usually defined as air separation plants producing liquid oxygen, nitrogen and argon for packaged gas and bulk liquid applications. Small to medium size merchant plants are popular in growth economies since there are fewer supply scheme opportunities (providing "over the fence" gas to an anchor client). There are numerous reasons for a customer to purchase a small to medium sized merchant air separation plant to meet their market demand. Three most common reasons are: (1) merchant plants can be located at a most favorable site with low land cost and electric power costs since they are stand alone plants that are not tied to any gas supply schemes; (2) a single plant can service a wide customer base, usually, depending on the region, a merchant plant can serve customers within a 300 miles (500 km) radius; and (3) small to medium size merchant plants offer standard designs and modular packaging, allowing for low installation and maintenance costs.

## Factor to Consider 1: Plant Size

One of the critical factors in selecting the right small to medium sized merchant air separation plant is the plant size. Selecting the right plant size requires a detailed evaluation of various factors from future growth rate to transportation distance of the product to the customer.

Figure 1 shows year of operation versus plant capacity. The growth curves represent various annual growth rates. Traditionally, customers purchase merchant plants with initial plant loading of about 50% to account for future growth. However, depending on the growth rate of the merchant business, this simple rule of thumb may not be sufficient. The curve representing an annual growth rate of 15% (red curve) shows that the plant will reach full capacity in about 5-1/2 years. Similarly, with an annual growth of 10% (green curve), the plant will reach full capacity in 8 years and with an 8% growth rate (purple curve), the plant will reach full capacity in a little less than 9-1/2 years. This means for an operation with a 15% annual growth, the purchased plant would reach full capacity by year 6 of operation. Hence, the company would need to make another decision on the future growth plans in about year 4 of plant operation (to purchase another plant) since a new plant requires about 16-20 months from purchase to production.

## Factor to Consider 2: Distance to Customers

Another factor to consider in plant sizing is the transportation distances of the product to the customers. Figure 2 shows Plant Size versus Cost of Product. The different curves represent the Cost of Product at different delivery distances.

Figure 1

Plant Size – Growth Strategy

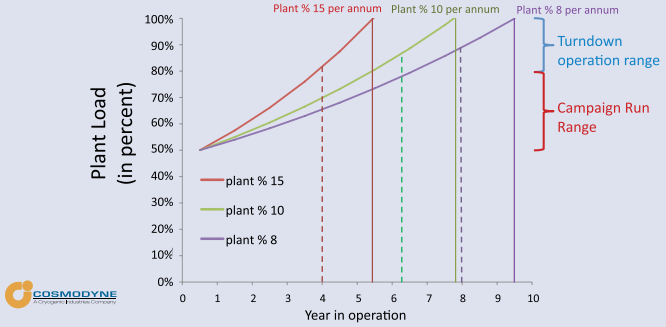
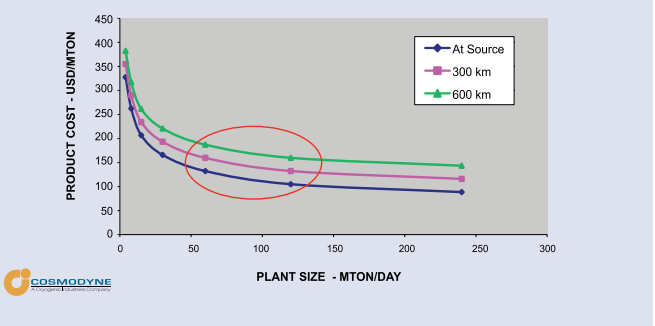



Figure 2

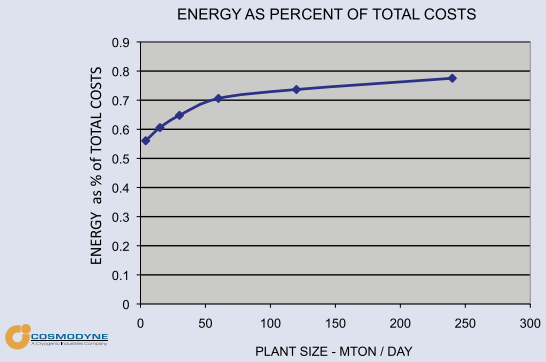
Plant Size vs. Costs of Product



The obvious trend is the larger the plant, the lower the product cost. The slope of the graph shows that there should be a strong incentive to purchase a 50 metric tons per day capacity or larger plant. Another interesting aspect is that in some cases, depending on the distance of the customer base, larger may not always be better. The graph shows that a 60 MTPD plant with a 300 km delivery distance (magenta curve) has the same product cost as a 120 MTPD plant transporting the product 600 km away (green curve). In such a case it may be better to purchase two 60 MTPD plants to cover the 600 km range than to purchase one 120 MTPD plant. The two plants will allow for redundancy, less impact from changing fuel costs, and sharing of spare parts.

Figure 3

Cost of Power




## Factor to Consider 3: Cost of Power

Another critical factor in selecting the right small to medium sized merchant air separation plant is the cost of power. For many customers, the purchasing decision usually comes down to capital versus power. It sometimes means choosing a less efficient plant (higher power consumption) to minimize the capital investment. However, recently there is a paradigm shift in this capital versus power balance due to the escalating energy costs and current low interest rates. Customers are now scrutinizing the plant efficiency and examining the cost of power when evaluating plants, since capital remains relatively inexpensive (low interest rates) while energy cost has soared and will continue to rise.

**Figure 3** shows the energy cost as percent of total plant life cost versus plant size. The graph clearly shows the significance of power consumption for plant evaluation. For example, the energy cost for a 200 Metric Tons per Day plant is about 75% of the total plant life time costs that includes plant purchase price, power cost, maintenance, spare parts, etc. This is significant and is one of the reasons why there is a paradigm shift in the market. It makes considerable sense to invest in a more efficient plant to alleviate the ever-increasing energy costs and utilize the historically low cost capital available.

## Factor to Consider 4: End of Life Cycle Strategies

The next important factor to consider is the end of plant life cycle strategy. What happens to the plant when the plant reaches full capacity or has come to the end of its useful life? There are many options available but considering such strategies during the initial plant purchase can provide for longer plant life and added value. Some of the strategies to ponder are:

1. Design the plant site to allow for easy installation of an additional plant(s) or a liquefier (to liquefy tail gas) to increase the production capacity;
2. Purchase a plant with modular design to allow for easy portability hence allowing the plant to be moved to another location;
3. Negotiate the possibility of a trade in or compare the resale value of the plant between the manufacturers;

## Conclusion:

The above features are just a few of the less obvious factors. There are many more factors to consider when evaluating and purchasing a small to medium sized merchant air separation plant. All factors from plant process operation to installation and after service should be evaluated and considered. Cosmodyne has been in business for over 50 years. We have built over 400 air separation plants installed worldwide. We will be glad to assist customers with our experience and expertise in selecting the best plant for the customer's specific application. Small to medium sized merchant air separation plants are a big investment. Plan well.

The information and data given in this presentation are typical only and does not apply to any specific markets. While thespecific numbers may not apply, the slopes and the trend should generally apply to most situations. Each case should be looked at case by case basis.

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