Economic Regulation of Airports

BP Australia response to the Productivity Commission inquiry

7 September 2018

Contents

1 Executive summary

BP welcomes the opportunity to provide a submission to the Productivity Commission inquiry on the Economic Regulation of Airports.

Air BP is part of a fully integrated jet fuel supply chain – from refinery production of jet fuel in Australia and the sourcing of jet fuel from the Australasian region; to the operation of specialised hydrant systems at major airports. As the oldest supplier of aviation fuels in Australasia, Air BP is well positioned to provide an expert perspective on the Australian jet fuel supply chain and market. In making this submission BP provides a significant body of evidence that supports the current competitive market for secure jet fuel supply in Australia and also the potential risks to that competitive supply in the future. In doing so we examine observations and claims recently presented by some market participants

BP asserts that the supply of jet fuel in Australia is highly competitive. Jet fuel supplied in Australia is either sourced from domestic refineries or imported to Australia from overseas refineries. The Australian liquid fuel supply market benefits from its effective integration in the Asian fuels market. It is highly competitive, and the diversity of available sources of jet fuel means the market is flexible, reliable and cost efficient.

Participation in the Australian jet fuel supply chain involves significant investment in petroleum infrastructure, both on airport and upstream of airport. This infrastructure includes refineries, ports, wharves/berths, discharge facilities, pipelines to terminals and, at major international airports, investment in jet fuel storage tanks, underground hydrant pipeline systems, referred to as a Joint User Hydrant Installation (JUHI), and intoplane refuelling vehicles.

Fuel Suppliers have the technical and operational expertise required to own, maintain and operate jet fuel infrastructure as well as the detailed knowledge on handling and dispensing of jet fuel that meets the high quality standard required in aviation. The development and maintenance of this infrastructure is an investment in specialised physical capital of a transaction-specific nature. The value of the use of this facility, by its very nature, is much smaller for any activity other than the distribution of refined petroleum products.

In recent years, airport owners/operators have moved from a primary focus on facilities to support aviation, to a diversification of their business models to include other services. Airports have been exploring options to purchase JUHI assets and their motivation appears to be increased revenue for its shareholders. In order for airports to achieve a return on investment, infrastructure or throughput fees charged by airports are likely to be substantially higher in comparison to the JUHI cost recovery arrangements where the primary JUHI focus is driven by timely investment and operational efficiency.

These commercial considerations by airports has led to uncertainty around lease tenure for joint venture JUHI participants. Airports are either unwilling to engage on lease negotiations, or offer shorter term lease arrangements with high commercial rent. This uncertainty has led to under investment across the jet fuel supply chain including on-airport infrastructure. With projections of increasing demand for jet fuel at major airports, certainty around lease tenure is required by joint venture JUHI participants, as this informs capital spending and operational planning to ensure efficient, cost effective and timely investment.

2 Key Points

Jet Fuel

- Jet fuel – also known as aviation turbine fuel or avtur – is a kerosene-based fuel used in aircraft powered by turbine engines and is made to standardised international specifications.
- Jet fuel is difficult to transport because it cannot tolerate even minute quantities of contaminants (Sturtz, 2005). The proper handling of jet fuel ensures that it remains essentially free of harmful contaminants during production, transportation and distribution. The safety of air transport depends on it.
- Australia has gone from having a small jet fuel supply production surplus to a substantial jet fuel supply shortfall whereby sales are now in excess of domestic production with the balance made up through imports.
  - Domestic production of jet fuel now only accounts for around 40 per cent of domestic sales.

Jet Fuel Pricing

- In most markets, the marginal source of supply is the highest-cost alternative product source (Farmer, 1991, p. 12). Whenever higher cost supply sources become the marginal source of supply, market prices rise to reflect these higher production costs.
- For jet fuel Australia is dependent on imports to fill the shortfall as domestic supply is unable to satisfy domestic demand. Given imported jet fuel represents the marginal source of supply within Australian markets, this implies the marginal cost for the supply of jet fuel will be determined by the import cost of jet fuel (RBB Economics, 2011, p. 5).
  - As imports determine the marginal cost of jet fuel supply in Australia, pricing will reflect the costs associated with the importation of jet fuel.
- The benchmark price for jet fuel reflects the closest trading market for that airport which is in Singapore. Mean of Platts Singapore (MOPS) refers to the published price quotes for refined petroleum products for Singapore published each weekday in the *Platts Oilgram Price Report*.

Jet Fuel Supply Chain

- Jet fuel supplied in Australia is either sourced from domestic refineries or imported by sea to Australia from overseas refineries. Petroleum product import infrastructure includes ports, wharves/berths, discharge facilities, storage tanks, pipelines, storage tanks at terminals and other remote locations and facilities for loading petroleum products on to road transport (ACIL Tasman, 2009, p. 9).
- Once jet fuel is sourced it is transported by pipeline to a terminal. From the terminal, jet fuel is transported either by pipeline or fuel road tanker to airport jet fuel storage facilities or tank farms.
- In Australia, the jet fuel supply infrastructure at major international airports consisting of jet fuel storage tanks and underground pipeline system and hydrant pits is referred to as a joint user hydrant installation (JUHI).
- With the land leased from the airport operators, the assets of the JUHIs have traditionally been owned, operated and managed as joint venture consortiums consisting of jet fuel suppliers.
- Until quite recently, JUHIs have generally been operated on a Limited Access basis whereby participation in the joint venture owning the jet fuel supply infrastructure has been a necessary prerequisite in order to gain access.

- After a final quality control check, fuel is delivered into the aircraft by *into plane* delivery crews (Caffarra & Kühn, 2006, p. 152). Into-plane providers use fuel distributed from either the hydrant system or bulk tankers (Sydney JUHI, 2011, p. 11).

Economic Issues in the Supply of Jet Fuel

Off-airport storage facilities

- The development of a terminal storage facility is an investment in specialised physical capital of a transaction-specific nature. The value of the use of this facility, by its very nature, is much smaller for any activity other than the distribution of refined petroleum products. Thus owners/operators of terminal storage facilities are 'locked in' to the distribution of refined petroleum products. In order to minimise on the uncertainty associated with such an investment, owners/operators seek to enter into long-term contracts with customers.

Delivery of Jet Fuel

- When airlines tender for jet fuel supplies, fuel suppliers will quote prices to airlines referencing a product benchmark price and a number of 'add-ons' associated with supplying fuel on a 'delivered' basis into the aircraft. The 'add ons' – also referred to as the differential – reflects the various costs associated with delivering fuel into the aircraft. Thus the 'delivered' price for jet fuel includes but is not limited to the following components:
  - the cost of the jet fuel which will be determined by the marginal source of supply which is the import parity price consisting of the benchmark price and the cost of shipping freight to Australia;
  - wharfage rate and other costs related to importing product (eg. demurrage and surveyors' costs) and associated infrastructure used for product discharge (eg. terminals and pipelines);
  - the cost of transporting jet fuel to the airport, whether by pipeline or by fuel road tanker;
  - the cost of storing product at the airport;
  - the cost of moving jet fuel into and through the airport, such as through the pipeline system or by tanker;
  - the cost of delivering fuel from a hydrant or tanker into the aircraft; and
  - the cost of insurance and quality control testing.
- Essentially, the supply of jet fuel is a bundled good that requires the provision of a good (jet fuel) coupled with a number of associated services.
- Incorporated within the cost of storing the product at the airport and moving jet fuel into and through the airport, there are a range of costs imposed by airport operators.
  - Land on which the JUHI facilities are constructed is leased or licensed from airport owners (The Shell Company of Australia Limited, 2006).
  - At most airports the JUHI participants also pay licence fees for the ground through which the subterranean pipelines run.
  - Some Australian airports also charge a fuel throughput levy for each litre of jet fuel supplied.

Jet Fuel Bargaining Process

- The sale of jet fuel to airlines is structured as a bargaining process for supply contracts (Caffarra & Kühn, 2006, p. 148). Each airline periodically issues a call for tender that covers its anticipated fuel requirements for a particular airport or even on a regional basis. The airline solicits bids with two basic components: a *price per unit of fuel* delivered 'into plane', and the *share* of the overall volume requirements each oil company is willing to provide at that price. The initial round of bidding is normally followed by a bargaining process in which the airline seeks to negotiate a lower price from each bidder and to adjust shares so that accepted bids add up to 100 per cent of the airline's volume requirement.

- The countervailing power of airlines should not be underestimated because if they perceive that competition between the existing suppliers is ineffective and that jet fuel prices are consequently above the competitive level, they could take corrective action including building new supply infrastructure and/or sponsoring a new entrant (NERA Economic Consulting, 2011, p. 23).
  - Australian domestic and international airline Qantas (2011) has engaged in self-supply of some of its jet fuel requirements at Sydney Airport.

Excessive Jet Fuel Differentials?

- The Board of Airline Representatives of Australia (BARA) has asserted on several occasions that Australian airports have some of the highest jet fuel differential in the world.
  - Based on figures provided by the International Air Transport Association, BARA (2011a, p. 1) claimed Sydney and Melbourne Airports were characterised by the highest jet fuel differentials in the world in July 2010 at 18.91 and 22.10 US cents per gallon as compared to 1.43 US cents per gallon at Singapore's Changi Airport that had the lowest jet fuel differential.
- Imported jet fuel represents the marginal source of supply for Australia and as such imports will determine Australian jet fuel prices. On the other hand, jet fuel for Singapore's Changi Airport is delivered directly by barge from the oil refinery to its fuel jetty as Singapore is serviced by three major oil refineries.
- Inflating the jet fuel differential at Australian international airports as compared to Changi Airport is the fact that major international airlines often purchase jet fuel effectively underneath the posted ex-refinery daily spot price before the provision of other services associated with the delivery of the product.
- Furthermore, the jet fuel logistic supply chain for Australian international airports is much longer than it is for Changi Airport. In July 2018 sea freight accounted for around 10 US cents per gallon of the jet fuel differential for Australian international airports as compared to Changi Airport.
- Once jet fuel is lands in Australia at port, there are additional costs associated with: wharfage; transports to the terminal; storage at the terminal; transport to the airport; storage at the airport; distribution costs at the airport for final delivery into plane. As such, the jet fuel transport logistics chain is much longer for Australian airports than it is for Changi Airport that involves much greater handling that in turn adds to costs. Labour costs are also generally much higher in Australia than they are in Asia. Higher input costs would also be applicable to the jet fuel logistics supply chain once product lands at Australian ports as it is not delivered directly to the airport.
- Particularly since the privatisation of Australian international airports, participants within the various JUHIs have been at the very least paying a full commercial rate for the leasing of land at airports. The contribution of airport operators through lease costs, licence fees and fuel throughput levies upon jet fuel differentials also needs to be considered. In addition, it is possible that owners of jet fuel infrastructure at major overseas airports where there is majority public ownership may not have been paying a commercial rate for the leasing of airport land.

Economic Rationale for Limited Access JUHIs

- Historically JUHIs have largely been provided by the jet fuel suppliers, not the airport owners (The Shell Company of Australia Limited, 2006). This has reflected the capital costs associated with the refuelling infrastructure on and off the airport site (e.g., industry pipelines on land not associated with the airport itself) and the pool of industry experience available in the operation of this type of facility.
- In its 2011 application seeking declaration of the Sydney JUHI under Part IIIA of the *Competition and Consumer Act 2010* (CCA), BARA (2011, pp. 51-52) contended that

restricting access to the Sydney Airport JUHI to equity holders represented an entry fee that constituted a barrier to entry and was thus anti-competitive.

- In relation to the Sydney JUHI, under the terms of the joint venture (JV) agreement between the owners, any third party can gain access to the services provided using the JUHI facilities on the same terms and conditions as the existing JV participants so long as they meet certain entry requirements set out in the agreement (Frontier Economics, 2011, p. 7). Aside from certain shareholding requirements, the other qualifying criteria primarily relate to the capacity of an applicant to be able to safely supply and deliver jet fuel at Sydney Airport.
- Any party is able to acquire equity in the Sydney JUHI, as Australian domestic and international airline Qantas has clearly demonstrated.
- Other Limited Access JUHIs around the country operate under similar conditions to the Sydney JUHI with outside parties able to join if they can satisfy the qualifying criteria and acquire equity.
- A review of transaction cost economics (TCE) demonstrates the assertion that the requirement of equity for participation in a JUHI is a manifestation of market power that could not be sustained in a competitive market is arrant nonsense.
- Within TCE, the boundaries of the firm will be decided on the basis of whether it is cheaper to internalise the provision of activities within the firm or rely on the market and the price mechanism, or some hybrid type arrangement. This in turn will be determined by transaction costs.
- An investment in a specialised asset creates quasi-rents which provide the potential scope for opportunistic behaviour. A quasi-rent value of an asset has also been defined as the excess of its value over its salvage or its value in its next best use to another renter (Klein, Crawford, & Alchian, 1978, p. 298). The potentially appropriable specialised portion of the quasi-rent is that portion, if any, in excess of its value to the second highest-valuing user (Klein, Crawford, & Alchian, 1978, p. 298).
- Asset specificity creates the scope for opportunistic behaviour that leads to the hold-up problem as outlined by former Industry Commission economist Jim Rose (1999, pp. 81-82):

> *Asset specialisation creates openings for opportunistic behaviour in which one party to the relationship manoeuvres to extract wealth from the other; and that wealth is wealth that could not be extracted in the absence of the interdependence. Specialised assets are vulnerable to hold-ups. When one party to the relationship refuses to pay the other party more than the highest value of the specialised asset elsewhere, we have a hold-up.*

- Airport hydrant fuelling systems is an investment in specialised physical capital of a transaction and site specific nature. The value of the use of this facility, by its very nature, is much smaller for any activity other than for the provision of aircraft refuelling services. Thus owners/operators of such a system are thus 'locked in' to the supply of jet fuel and the provision of aircraft refuelling services.
- The traditional means by which asset owners can protect themselves against opportunism is through contracts specifying all possible contingencies. However, as asset specificity increases, it becomes impossible to draw up complete contracts that cover off on all possible contingencies. Thus asset specificity creates contractual hazards. In response to increasing asset specificity, resort much be given to more elaborate governance structures in order to constrain opportunism (Bensaou & Anderson, 1999, p. 462). This may give rise to relational governance through the development of strategic alliances, joint ventures, franchises, and other close relationships between parties.
- The requirement for access seekers to become equity holders in an airport JUHI needs to be considered in the context of the parties seeking to minimise transaction costs and thus reduce their exposure to opportunistic behaviour and the possibility of hold-ups.

- One potential source of hold-up is paying for site remediation in the event the tank farm associated with an airport JUHI may need to be relocated to make way for the expansion of airport terminals. It is quite common under the terms of JUHI leases for there to be a make good provision at the end of the lease term. Sites contaminated with petroleum compounds include tank sites and can remain at a site for a long period of time (Khaitan, et al., 2006, p. 20).
- The cost of the remediation of the tank farms at airport sites could run into the millions of dollars. However, the imposition of an Open Access regime for JUHIs would ensure that non-equity jet fuel suppliers would escape any future polluter pays obligations and allow them to free ride on equity holders.
- In the case of JUHI facilities owned by consortiums of jet fuel suppliers, there is also the danger of the emergence of another hold-up problem whereby the jet fuel infrastructure supply assets contributed by JUHI consortium members could potentially be taken over by airport owners. The jet fuel supply infrastructure assets will generally have a life well beyond the current JUHI participants' lease term, thereby providing the airport owner with the opportunity to acquire jet fuel supply infrastructure previously contributed and owned by former JUHI consortium members at nominal cost.
- One potential solution to this problem is vertical integration by the airport operator. However, there are numerous potential pitfalls associated with vertical integration by the airport operator.
    - Airport operators do not possess expertise in the management and operation of jet fuel supply infrastructure and the appropriate handling of jet fuel. The proper handling of jet fuel ensures that it remains essentially free of harmful contaminants during transportation and distribution as the safety of air transport depends on it. Any move by airport owners to operate jet fuel infrastructure without obtaining sufficient knowledge and expertise in the handling of jet fuel could have dire and catastrophic consequences.
    - Vertical integration by the airport operator would come at the expense of breaking up the efficiencies already achieved by existing jet fuel suppliers obtained through vertical coordination incorporating the existing on-airport jet fuel supply infrastructure.
    - There may not be any effective mechanisms in place to prevent any subsequent abuse of market power on the part of airport operators.
- Another solution to the potential hold-up problem in this instance is a long-term lease arrangement for the existing owners of the on-airport jet fuel supply infrastructure. Despite the contractual obligation on the part of JUHI consortium members to make long term capital commitments as part of their lease agreements, there appears to be a trend on the part of airport owners towards shorter term lease arrangements or no new leases for JUHIs.
- An airport lease term for a JUHI of anything less than 20 years is problematic in terms of creating the potential for a hold-up as the assets in question have an effective economic life of at least 40 years.
- A long term lease arrangement would be preferable in terms of economic efficiency as it would avoid any additional cost impost associated with double marginalisation or a double mark-up on the supply of jet fuel. For example with jet fuel, if the supplier provides fuel with a mark-up and the airport owner storage operator then receives the fuel and marks it up again, this double mark up will results in higher prices, lower total sales and lower total profit than if the supplier and airport owner storage operator were vertically integrated. Limited Access JUHIs currently operate on a purely cost-recovery basis as jet fuel suppliers take any profit margin from the sale of jet fuel, but that may not be the case if airport owners takeover ownership of the on-airport jet fuel supply infrastructure.
- If there is any move towards structural separation between jet fuel suppliers and on-airport jet fuel supply infrastructure and JUHI operations, it may unwind many of the benefits achieved through vertical coordination of the jet fuel supply chain.

- Despite the move by airport operators to acquire equity or indeed full ownership of jet fuel supply infrastructure on their premises, JUHIs and other associated jet fuel supply infrastructure so far continue to be managed and operated by jet fuel suppliers with the appropriate knowledge and expertise, but there is no automatic guarantee that this will always be the case in the event that airport operators seek ownership and exercise full control.
- An alternative arrangement for the provision of airport jet fuel supply infrastructure by a joint venture providing Limited Access is for the implementation of an Open Access regime for all jet fuel suppliers. However, even with the imposition of an Open Access regime there is still the need to protect the quasi-rents of infrastructure owners from opportunistic behaviour through some mechanism.
- One possible solution to this problem is through non-members paying a higher access price for the jet fuel supply infrastructure than members of the JUHI.
- In the case of LAXFUEL Corporation at LAX, this problem has been solved through non-members paying a higher access price for the jet fuel supply infrastructure than members of the LAXFUEL Corporation. Similarly, at Darwin Airport it was the introduction of a new Infrastructure Fee
- **Limited Access JUHIs are a superior means of providing jet fuel supply infrastructure at major airports because they are the most efficient in terms of minimising transaction costs.**
    - **Alternative arrangements will increase transaction costs and run the risk of introducing double marginalisation into the jet fuel supply chain.**

Energy Security and Adequacy of Jet Fuel Supply Infrastructure

- With projections of increasing demand for jet fuel at major airports, certainty around lease tenure is required by joint venture JUHI participants, as this informs capital spending and operational requirement planning to ensure efficient, cost effective and timeline investment on-airport and to ensure supply security. Without security of tenure, timely investment in upgrades to jet fuel supply infrastructure may be lacking. In turn, this presents a challenge for energy security in the supply of jet fuel.

Competition in the Supply of Jet Fuel

- Jet fuel suppliers compete vigorously in response to supply tenders from airlines and have strong economic incentives to do so. Winning tenders through supplying more jet fuel is the only way for jet fuel suppliers to minimise their operating and production costs.
- Jet fuel suppliers not only compete on the basis of their ability to source jet fuel, but also on the basis of their integrated supply chains. The integrated supply chains and associated infrastructure is usually most comprehensive for those jet fuel suppliers who also operate local refineries or were previously refinery operators.
- Barriers to entry for the imported supply of jet fuel do not appear insurmountable to overcome.
- It is possible for alternative jet fuel suppliers to access Australian airports and it has indeed been done. On this basis, barriers to entry are not insurmountable and thus prospective jet fuel suppliers provide an effective competitive constraint on existing jet fuel suppliers.

Other Avenues to Obtain Access to Jet Fuel Supply Infrastructure

- In its public pronouncements on its perceived problems with jet fuel pricing and supply chains, BARA often refers to 'Open Access.
- While BARA's platitudes may sound superficially attractive, there is not a lot of fine detail provided on what exactly they mean by 'Open Access.
- What BARA overlooks is that there are already avenues available for their members to access jet fuel supply chain infrastructure. Furthermore, in addition to Open Access

regimes already operating at some airport JUHIs, there are two other potential legal avenues available for prospective jet fuel suppliers that could compel access by existing operators of jet fuel supply infrastructure both on and off airport.

- Part IIIA of the CCA establishes a legal regime to facilitate third party access to certain services provided by means of significant infrastructure facilities.
- BARA has previously applied for an access declaration to the Sydney Airport JUHI under Part IIIA in 2011 but was rejected largely on the basis that it failed to satisfy the criterion that access would not promote a material increase in competition in a dependent market (Bradbury, 2012).
- Section 46 of the CCA prohibits the misuse of market power and the type of conduct covered includes:
  - refusal to deal; and
  - restricting access to an essential input.
- For infrastructure that doesn't meet the declaration criteria under Part IIIA of the CCA, section 46 could be used as a fall-back provision to obtain access.
  - Parties can pursue their own private actions for breaches of section 46 in the Federal Court.

3 Introduction

The Productivity Commission (2018, p. iv) inquiry into the economic regulation of airports contains the following item at the very end of its terms of reference:

> *The Commission should also review competition in the market for jet fuel in Australia, including the provision of jet fuel at the major airports.*

This item has its provenience in the view expressed by the final report of the Competition Policy Review (Harper Report) in relation to the aviation sector:

> *Competition in jet fuel supply … should be a focus of further reform efforts in the sector. (Harper, Anderson, McCluskey, & O'Bryan, 2015, p. 206)*

The Harper Report did not outline any specifics regarding 'further reform efforts' in relation to jet fuel supply. The concerns expressed in the Harper Report in relation to jet fuel arise from its following observation:

> *The Board of Airline Representatives of Australia notes that international airlines operating to Australia pay some of the highest 'jet fuel differentials' globally … (Harper, Anderson, McCluskey, & O'Bryan, 2015, p. 206)*

However, the Harper Report failed to critically evaluate the claims being made to it by the Board of Airline Representatives of Australia (BARA). In response to similar claims regarding jet fuel differentials made by BARA in relation to both Melbourne and Sydney airports in 2011, the National Competition Council (NCC) (2012, p. 23) came to the following more considered conclusion:

> *Despite BARA's further submission (and some supporting submissions from various airlines), in the Council's view the critique of the fuel differential issue it initially received in response to these applications remains compelling … The Council agrees with submissions made to it that the fuel differential information it has received has limited, if any, value in establishing (or for that matter rejecting) either excessive pricing or an abuse of market power in relation to supply of jet fuel at Sydney Airport.*

This submission primarily responds to issues raised in relation to jet fuel.

4 Jet Fuel

Jet fuel – also known as aviation turbine fuel or avtur – is a kerosene-based fuel used in aircraft powered by turbine engines and is made to standardised international specifications.
Jet fuel is manufactured through the refining of crude oil. The refining of crude oil involves the separation of crude oil into different categories of hydrocarbons, also known as fractions. Oil refining is a joint production process whereby several products are manufactured simultaneously. The products manufactured during the refining process include petrol, diesel, jet fuel, fuel oil, and a number of other derivative products.

Different hydrocarbons have different boiling points which allows crude oil to be separated into different fractions through distillation. The primary refining process commences when crude oil is heated under vacuum conditions until it evaporates whereby the vapour flows into a distillation tower where it condenses in various stages, with the most volatile or lighter fractions condensing at the top, intermediate fractions condensing at lower levels, and the heaviest fractions settling near the bottom scale (Scherer, 1996, p. 113). Jet fuels have a typical boiling range of 150 -270°C, somewhere between the boiling ranges of petrol and diesel.

In order to increase the yield of higher value products from a given quantity of crude oil, further chemical processing of other fractions is required. The greater a refinery's yield of higher value added products is, the greater will be the refinery's capital costs. Jet fuel typically accounts for around 10 -15 per cent of total refinery production.

Internationally, the two most common grades of commercial jet fuel are:

- Jet A – standard jet fuel used in the United States; and
- Jet A-1 – the most common grade of jet fuel available in the rest of the world outside of the United States.

All of the various jet fuel specifications used internationally are very similar because they essentially describe the same product, i.e. aviation kerosene (International Air Transport Association, 2015, p. 5).
Approved additives are listed in each of the jet fuel specifications as well as the airframe and engine manufacturer specifications (International Civil Aviation Organization, 2012, p. 3.2). The use of additives in aviation fuels is carefully controlled and limited because of the potential for undesirable side effects. For example, under certain circumstances additives can affect the ability to maintain fuel cleanliness during shipment and handling, or they may adversely impact the aircraft fuel system and turbine engine operation or maintenance.

Jet fuel – having enough of it and assuring its steady flow to the engines—is so central to an aircraft's operation that by many measures, the machine is designed around its fuel's inflight storage and delivery (Gamauf, 2016). As a consequence, there are numerous risks associated with jet fuel that can cause major or catastrophic losses.

Jet fuel is difficult to transport because it cannot tolerate even minute quantities of contaminants (Sturtz, 2005). Fuel contamination refers to fuel that is cross-contaminated by other products, including other fuel grades or additives, that could put the fuel off-specification; contains unacceptable levels of particulates or water — fails the visual clear and bright check or exceeds the cleanliness limits or contains unacceptable levels of microbiological growth (International Civil Aviation Organization, 2012, p. ix).

Jet fuel's composition allows water to be easily absorbed and held in suspension (Escobar, 2002). Water can be present as suspended particles in the fuel and in liquid form. The amount of suspended particles varies with the temperature of the fuel. Whenever the temperature of the fuel decreases, some of the water particles that are suspended in the fuel are drawn out of the solution and slowly accumulate at the bottom of the fuel cell. However, whenever the temperature of the fuel increases, it draws moisture from the atmosphere to maintain a saturated solution. Therefore, temperature changes result in a continuous accumulation of water. Water can promote corrosion in fuel system components. If enough water is present, it can form ice crystals in low temperatures and clog fuel lines, filters, or components. This could disturb or even stop the fuel supply to the engine.

Certain bacteria and fungi are capable of existing in the water where it interfaces with the fuel (Escobar, 2002). These microorganisms use alkanes and additives in fuel as foodstuff. These microbes can propagate rapidly. The by-product is a sludge-like substance. In sufficient quantity, this can cause corrosion on steel and aluminium surfaces and attack rubber fuel system components. It can also foul filters and system instrumentation.

Almost anything can cause particulate contamination from rags and bugs to deterioration of fuel system components like corrosion of metal parts or deterioration of rubber fuel cells and lines (Escobar, 2002). Rust can be introduced through pipelines, storage tanks, and road fuel tankers. Dust and sand can be introduced through openings in tanks and from the use of fuelling equipment that is not clean.

As jet fuel travels from the refinery to the wing of the aircraft, it will be transported by pipeline, truck, or ship and may be stored in intermediate storage facilities prior to delivery to the airport tank farm (International Air Transport Association, 2015, p. 11). Prior to delivery to the airport, it is necessary to ensure that the fuel has been certified to the appropriate specification. The proper handling of jet fuel ensures that it remains essentially free of harmful contaminants during production, transportation and distribution. The safety of air transport depends on it.

5 Australian Jet Fuel Supply

BP is the operator of Australia's largest refinery at Kwinana near Perth that has a refining production capacity of 8,650 megalitres per annum. By virtue of its position as the largest Australian refiner, BP is also the largest domestic producer of jet fuel.

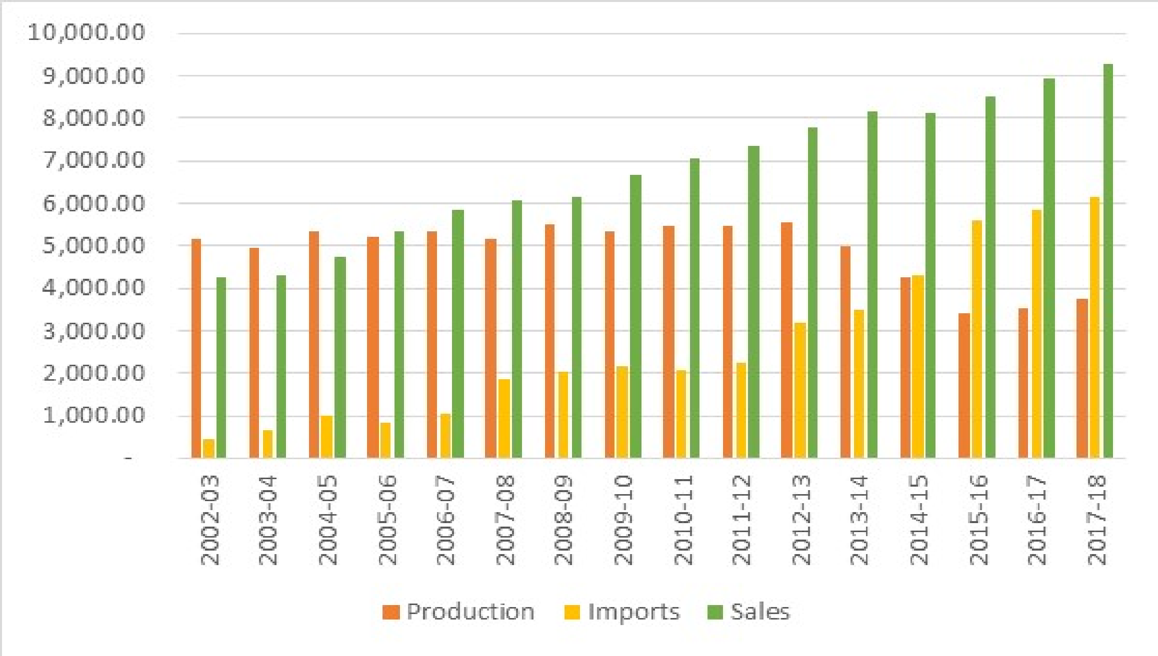
Since 2002-03 Australia has gone from having a small jet fuel supply production surplus whereby production exceeded sales, to a substantial jet fuel supply shortfall whereby sales are now in excess of domestic production with the balance made up through imports. Domestic production of jet fuel now only accounts for around 40 per cent of domestic sales.

The supply shortfall has been principally driven by a substantial increase in jet fuel sales that has more than doubled since 2002-03 with an average sales growth of 5.4 per cent per annum. This increase has been principally driven by the growth in air travel for business and leisure (Australian Institute of Petroleum, 2017, p. 11).

Also exacerbating the supply production shortfall since 2012-13 has been the reduction of Australian oil refining capacity through the closure of three refineries – the two Sydney based refineries in Clyde in September 2012 and Kurnell in October 2014, and the Brisbane based Bulwer Island in June 2015. Since 2012-13 Australian production of jet fuel has fallen from 5.5 gigalitres to 3.8 gigalitres, a reduction of around 30 per cent.

Australian production, imports and sales of jet fuel is outlined in Figure 1 below.

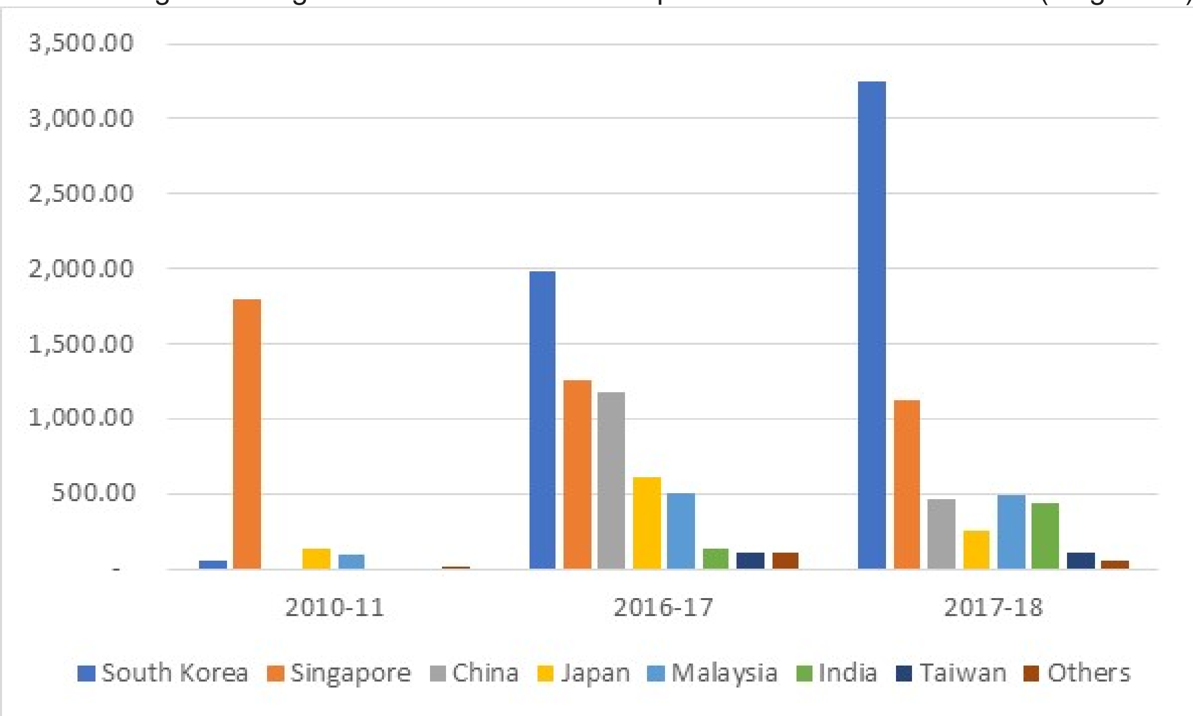
Figure 1: Australian Production, Sales and Imports of Jet Fuel – 2002-03 to 2016-17 (Megalitres)



Source: Department of Environment and Energy (2018).

In 2010-11 Singapore was the origin for most jet fuel imports coming to Australia, accounting for around 86 per cent of all imports. By 2017-18, the origin of Australia's jet fuel imports are much more diverse although more than 50 per cent now originates from South Korea. Of the 6.2 gigilitres of jet fuel imported into Australia in 2017-18, the major suppliers were South Korea, Singapore, China, Japan and Malaysia. This is outlined in Figure 2 below.

Figure 2: Origin of Australian Jet Fuel Imports – 2010-11 and 2016-17 (Megalitres)



Source: Department of Environment and Energy (2018).

6 Jet Fuel Pricing

6.1 Marginal Source of Supply and Import Parity Pricing

In most markets, the marginal source of supply is the highest-cost alternative product source (Farmer, 1991, p. 12). Whenever higher cost supply sources become the marginal source of supply, market prices rise to reflect these higher production costs.

Within all three of the major Australian liquid fuels markets – diesel, petrol, and jet fuel – Australia is dependent on imports to fill the shortfall as domestic supply is unable to satisfy domestic demand. Given imported jet fuel represents the marginal source of supply within Australian markets, this implies the marginal cost for the supply of jet fuel will be determined by the import cost of jet fuel (RBB Economics, 2011, p. 5). As imports determine the marginal cost of jet fuel supply in Australia, pricing will reflect the costs associated with the importation of jet fuel.

In its 2007 petrol inquiry, the Australian Competition and Consumer Commission (ACCC) (2007, pp. 207, 208) endorsed the import-parity approach to pricing as efficient where petrol imports are the marginal source of supply:

> *Evidence presented to the inquiry indicates that imports of refined petrol are the marginal source of supply. Without regular and on-going imports of refined petrol, the refiner-marketers would be unable to efficiently meet the demand for refined petrol in Australia.*
>
> *It is quite appropriate and desirable that wholesale petrol prices are based on the cost of importing petrol.*
>
> *For instance, in order for investors to make efficient decisions concerning the reduction, maintenance or expansion of domestic refining capacity or the expansion of import terminal facilities, the wholesale price should as accurately as possible reflect the cost of the alternatives. For example, a decision by a refiner-marketer to close a refinery will at least partly be based on a comparison of the cost of sourcing petrol by continuing to operate the refinery and the cost of buying petrol on the wholesale market. In order for this decision to be efficient, the wholesale price should reflect the cost of the alternative source of supply —importing refined petrol.*
>
> *…*
>
> *Import-parity pricing is efficient in markets, such as wholesale petrol markets, where imports are the marginal source of supply. …*
>
> *Wholesale petrol prices in Australia should be based on the cost incurred by the refiner-marketers in importing refined petrol.*

Exactly the same rationale applies for jet fuel. If Australian petroleum product prices are based on an import parity price, the obvious question then becomes imports from where?

Given that Australia is currently taking most of its jet fuel imports from South Korea, one could mount an argument that jet fuel prices in Australia should be benchmarked to those in South

Korea. However instead, the benchmark price will reflect the closest trading market for that airport. Given there is no jet fuel trading market in Australia, the closest jet fuel trading market is in Singapore.

Singapore exerts enormous influence as a trading hub for refined petroleum products across the Asia-Pacific region. Singapore is the largest oil and petroleum product trading hub in the Asia-Pacific region, and one of the top three in the world along with the U.S Gulf Coast and Amsterdam-Rotterdam-Antwerp in North West Europe. According to McLennan Magasanik Associates (2009, p. 23):

> *In the Asia-Pacific region, there is nothing that approaches Singapore in terms of its ability to act as a trading hub. Singapore lies within one of the world busiest shipping routes, and has the busiest port and bunkering centre in the region. It has a natural deep water port capable of handling fully laden Very Large Crude Carriers... It is one of the world's largest refining locations, focused on exports of products, and is a major financial centre, with a majority of the first class banks represented in Singapore.*

While various petroleum product price reporting services do report on ex-refinery product prices for South Korea, these prices are provided on the basis of a premium or discount on Singapore product prices. Hence, Singapore serves as the primary product market and all other markets in the Asia-Pacific region are benchmarked to it.

6.2 Components of the Import Parity Price

In relation to import parity pricing for petroleum products McLennan Magasanik Associates (2009, p. 26) has found that:

> *… when it comes to product pricing, based on our discussions with a number of trading companies, reporting services and [multi national oil companies], virtually all products that are purchased in this Asian region, are priced on a Mean of Platts, Singapore (MOPS) basis.*

Mean of Platts Singapore (MOPS) refers to the published price quotes for refined petroleum products for Singapore published each weekday in the *Platts Oilgram Price Report*.[1] While there are other reporting services available, the Platts service is the most widely used in the Asia Pacific region and across the world.

The ACCC (2014, p. 41) uses an import parity price (IPP) indicator for regular unleaded petrol (RULP) that represents the notional cost of importing RULP to Australia. For RULP the IPP has three components:

- the benchmark price of petrol at the main source of imports;
- any quality premium required to account for the difference between the price of petrol refined to Australian fuel standards and petrol meeting the benchmark specifications; and
- costs that would be incurred in importing petrol, such as freight, wharfage and other incidental costs.

[1] The *Platts Oilgram Price Report* is a subscription service and the price datasets are proprietary.

The components of a notional import parity price for jet fuel are very similar except there is no quality premium in this case as it is a standardised product in Jet A-1.

Daily spot prices for jet fuel are contained in the *Platts Oilgram Price Report* that is published each weekday (referred to jet kerosene in the publication).

The *Platts Oilgram Price Report* provides price quotes in $US per barrel for jet kerosene for Singapore and on an FOB (free on board) basis as well as on a C+F basis (cost plus freight) to Australia.[2]

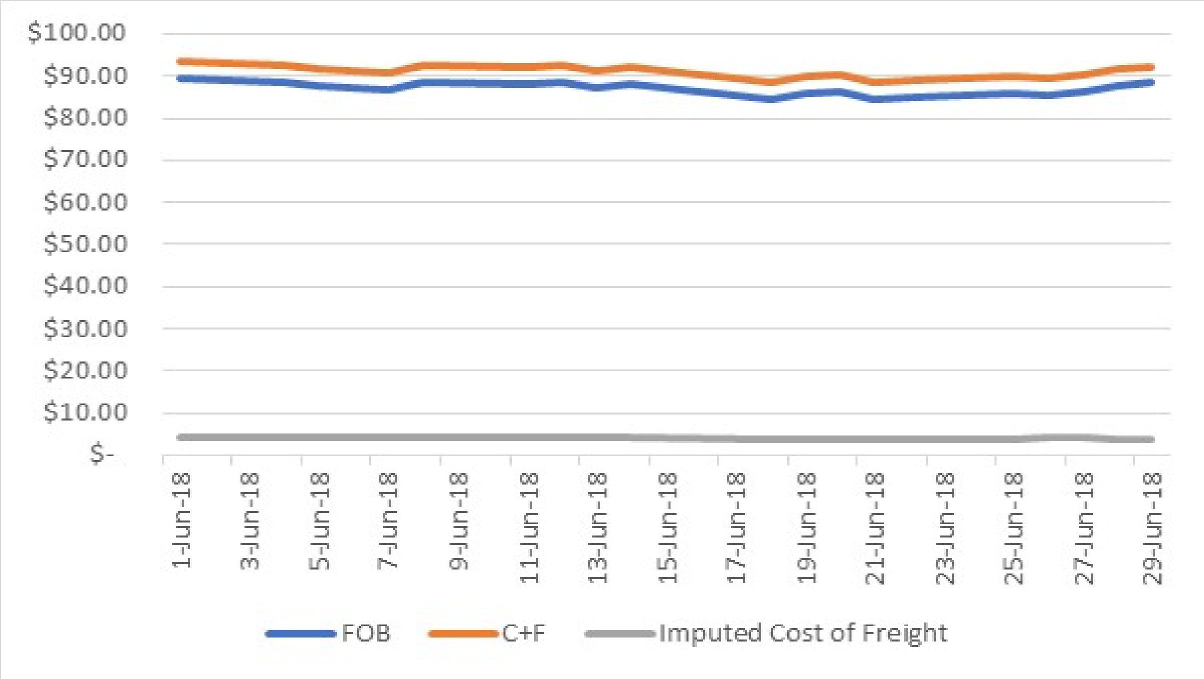
The freight component consists of the cost of shipping jet fuel from Singapore to the relevant Australian port that is expressed in US dollars per metric tonne. The Worldscale index is published online that is used as the basis for calculating tanker spot rates (Stopford, 2009, p. 192). The Worldscale flat rate index is used to estimate the cost of transporting a metric tonne of cargo using a standard vessel on a round voyage. The standard vessel is a tanker with a carrying capacity of 75,000 tonnes with a fixed hire element of $US12,000 per day. The Worldscale flat rates are published each year by the Worldscale Association. For major mainland Australian capital cities, the Worldscale flat rate is largest for Sydney as it is the port that is the furthest distance from Singapore while it is smallest for Perth as it is the closest port to Singapore. For all Australian capital cities, the Worldscale flat rate is largest for Hobart as it is the port that is the furthest distance from Singapore while it is smallest for Darwin as it is the closest port to Singapore.

To adjust for different ship sizes a system of 'points of Worldscale' is used to express market levels of freight in terms of a direct percentage of the scale rates. Refiners use a points of Worldscale based on the Singapore to Australia journey for a 30,000 tonne carrying capacity vessel. The most commonly used index for points of Worldscale is from the Platts *Clean Tankerwire* publication.

The MOPS jet kerosene C+F to Australia price benchmark is based on a basket of Worldscale flat rates on several key routes between Singapore and Australia and the Platts' spot Worldscale assessments of points of Worldscale are applied against this basket to arrive at an average cost. A comparison of the MOPS jet kerosene FOB and C+F for June 2018 as well as the implied cost of sea freight to Australia is provided in Figure 3 below.

Figure 3: Mean of Platts Singapore Jet Kerosene FOB and C+F to Australia Quotes and the Implied Cost of Sea Freight to Australia – June 2018 ($US per barrel)

[2] FOB means that the seller pays for transportation of the goods to the port of shipment, plus loading costs. The buyer pays the cost of marine freight transport, insurance, unloading, and transportation from the arrival port to the final destination. In C+F the 'C' refers to the cost of the merchandise while the 'F' refers to the freight charges to the port of delivery.



Source: *Platts Oilgram Price Report* from 4 June 2018 to 2 July 2018.

Based on the difference between the MOPS jet kerosene quote for C+F to Australia and FOB, the implied cost of sea freight from Singapore to Australia during June 2018 was just over $US4 per barrel, or rounded up to around 10 US cents per gallon.

An allowance for insurance and loss is also included in the formula usually expressed as a small percentage, generally less than half a percentage point, of the benchmark price plus freight.
Wharfage rates are set by the relevant port authority where the product shipment is landed. The 'other items' category refers to incidental costs related to importing product (eg. demurrage and surveyors' costs) and associated infrastructure used for product discharge (eg. terminals and pipelines).

7 Jet Fuel Supply Chain

7.1 Delivery of Jet Fuel to the Airport

Jet fuel supplied in Australia is either sourced from domestic refineries or imported by sea to Australia fr om overseas refineries. Petroleum product import infrastructure includes ports, wharves/berths, discharge facilities, storage tanks, pipelines, storage tanks at terminals and other remote locations and facilities for loading petroleum products on to road t ransport (ACIL Tasman, 2009, p. 9) .

Once jet fuel is sourced it is transported by pipeline to a terminal. Petroleum product terminals are large storage facilities from which bulk fuel is supplied to wholesalers, retailers, distributors and large end users and are usually located near the mai n sources of product supply – namely ports (for imported products) or refineries (for domestically produced products). Import terminals are generally located close to ports, and distribute petroleum products delivered by ship to berths (via pipelines) to storage facilities at the terminals (ACIL Tasman, 2009, p. 9).

From the terminal, jet fuel is transported either by pipeline or fuel road tanker to airport jet fuel storage facilities or tank farms. Pipelines and fuel road tankers are both important modes of jet fuel supply and are needed to support an airport's growth at different developmental stages (Deloitte Financial Advisory Pty Limited, p. 14). Airports are often supplied with jet fuel by road until the demand reaches such a level as to support the large capital investment required for the construction of a dedicated jet fuel pipeline. The planning, approval and construction process for a jet fuel pipeline could take between three and five years and it is highly dependent on a number of variables.

There are six jet fuel pipelines in Australia that supply the four largest Australian airports. Sydney and Brisbane are both supplied by two pipelines, while Melbourne and Perth are each supplied by one pipeline. Currently, only Brisbane and Perth airports are solely reliant on supply by pipeline, while Sydney and Melbourne airports are supplied through a combination of pipelines and fuel road tanker due to capacity constraints associated with existing pipelines. There are airport airside security restrictions but Perth Airport theoretically could be supplied by fuel road tanker as well, although pipeline capacity is usually sufficient for this not to be required. All of the other Australian international airports are supplied by fuel road tanker.

Recent jet fuel supply delivery arrangements at large Australian airports is outlined in Tables 1 below. Details of the pipelines supplying jet fuel at major Australian airports is outlined in Table 2 below.

Table 1: Jet Fuel Supply Delivery Arrangements at Large Australian Airports – 2015-16

Airport	Total Aircraft Movements 2015-16	Estimated Jet Fuel Volume 2015-16 (Megalitres)	Pipelines (number)	Estimated Average Pipeline Volume Megalitres per day)	Estimated Average Fuel Road Tanker Movements per day
Sydney	314,352	3,285	2	8.8	8
Melbourne	234,789	1,785	1	3.8	21
Brisbane	192,917	1,106	2	3.0	0
Perth	94.747	1,030	1	2.8	0
Adelaide	78,695	320	0	0	17
Gold Coast	41,370	220	0	0	12
Canberra	37,147	22	0	0	1
Darwin	27,129	150	0	0	5
Townsville	25,255	45	0	0	2

Source: Deloitte Financial Advisory Pty Limited (p. 32)

Table 2: Pipelines Supplying Jet Fuel to Australian Airports

Airport	Pipeline Owner	Start	Product Sourcing	Distance to Terminal (km)
Sydney	Caltex	Kurnell	Draws imported jet fuel from the Caltex Kurnell and the Vopak Port Botany terminals	17
Sydney	Viva Energy	Clyde	Draws imported jet fuel from the Viva Energy Clyde terminal	25
Melbourne	Viva Energy/Exxon Mobil/BP	Somerton	Draws domestically produced and imported jet fuel from the Somerton Jet Fuel Depot	7
Brisbane	Caltex/Viva Energy	Pinkenba	Draws domestically produced jet fuel from the Caltex Lytton refinery and imported jet fuel from the Viva Energy terminal at Pinkenba	8
Brisbane	BP	Bulwer Island	Draws imported jet fuel supplied from the BP Bulwer Island terminal	4
Perth	BP	Kewdale	Draws jet fuel from the BP Kewdale terminal primarily sourced from the BP Kwinana Refinery	3

Sources: BP and Deloitte Financial Advisory Pty Limited (p. 32)

No Australian airport with a jet fuel demand of less than 2.8 megalitres per day receives jet fuel into on-airport storage via a jet fuel pipeline (Deloitte Financial Advisory Pty Limited, p. 33).

It is estimated that road fuel tankers accounted for 3 per cent of total supply volumes (equivalent to approximately 100 megalitres per annum) at Sydney Airport, with the remaining 97 per cent supplied from three terminals (Vopak at Port Botany, Caltex Kurnell terminal and the Viva Energy Clyde terminal) (Deloitte Financial Advisory Pty Limited, p. 34). Jet fuel can also be supplied by fuel road tanker supplied from the Caltex Banksmeadow terminal, the Viva Energy Parramatta terminal and the Vopak terminal at Port Botany.

Melbourne Airport is supplied with jet fuel from two refineries and can access imports from a number of terminals. Melbourne Airport is connected by pipeline to the Somerton Jet Fuel

Depot that is a joint venture owned by Mobil, Viva Energy and BP. The Somerton Jet Fuel Depot is supplied by the Somerton Pipeline that is in turn connected to terminal/refinery infrastructure at Newport and Altona.

Viva Energy's Geelong refinery is connected to a Viva Energy pipeline which is used to transport finished jet fuel from Geelong (both imported and locally refined product) to Viva Energy's terminal facilities in Newport. The Viva Energy Newport terminal is connected to the Somerton pipeline.

The Exxon Mobil Altona refinery is connected into the Somerton Pipeline. A planned 2.7km pipeline connection from the Mobil and BP joint venture Yarraville terminal to the Somerton Pipeline has been announced.

Viva Energy, Mobil, BP and Caltex each have access to terminal facilities that can transport jet fuel to Melbourne Airport by fuel road tanker (Deloitte Financial Advisory Pty Limited, p. 46). The capacity to receive jet fuel by truck at the airport has been upgraded to a capacity of 3.5 megalitres per day.

Most of the jet fuel supplied to Perth Airport is sourced from the BP Kwinana refinery. Jet fuel from the Kwinana refinery travels through a 49 km pipeline to the BP Kewdale terminal, from where it is transported via another pipeline to the storage tanks at Perth Airport. During periods of excessive, unplanned demand, such as the MH370 search crisis, road receipt can be configured to supplement pipeline supply.

7.2 Storage at the Airport

Historically, Australian airports had separate on-site jet fuel storage and reticulation facilities owned by different fuel suppliers (Sydney JUHI, 2011, p. 14). However, space and efficiency considerations drove development decisions, and the then government owners of Australian airports began to mandate single facility arrangements. In Australia, the jet fuel supply infrastructure at major international airports consisting of jet fuel storage tanks and underground pipeline system and hydrant pits is referred to as a joint user hydrant installation (JUHI). JUHIs operate at Adelaide, Brisbane, Cairns, Darwin, Gold Coast, Launceston, Perth, Melbourne and Sydney airports.

With the land leased from the airport operators, the assets of the JUHIs have traditionally been owned, operated and managed as joint venture consortiums consisting of jet fuel suppliers. BP is part of unincorporated and incorporated joint venture arrangements for the operation of JUHI facilities at many of Australia's major airports.

However, there has been a move towards airport ownership of jet fuel supply infrastructure. At Adelaide Airport ownership is split between joint venture consortium members who own the jet fuel storage tanks while the airport owns the underground pipeline system and hydrant pits. There is also a move towards full ownership of the Darwin Airport JUHI by the airport operator.

The supply of jet fuel to aircraft at airports has two distinct logistic components: *storage* of fuel at the airport, and *delivery into plane* (Caffarra & Kühn, 2006, p. 151). At large airports, a *hydrant* distribution system (a system of underground pipelines) is used to transport jet fuel to hydrant pits adjacent to aircraft embarking positions, thus eliminating the need to transport the fuel from storage to aircraft via bowsers or tank trucks. It is operationally and economically efficient to have one common hydrant system for aircraft refuelling therefore the JUHI structure is ideal for co-ownership of hydrant assets.

The demand for jet fuel at large airports is often subject to unforeseen variations (e.g. arising from last-minute changes to flight schedules, or temporary delays in the pipeline or other means of supplying fuel to the airport) (Caffarra & Kühn, 2006, p. 151). For this reason, and the need to avoid flight delays, typically a buffer of approximately two days' supply is held in storage on site. Airport storage activities involve significant economies of scale, as a result of which it would be less efficient and much more costly for each supplier to install and manage their own separate storage facilities.[3] For reasons of space and security, airport authorities frequently allow only a single storage services operation.

If each jet fuel supplier had to operate their own separate storage facilities they would not be able to exploit the available economies of scale and would also forego the opportunity of pooling their storage requirements, so that more storage capacity would be installed than was actually required (Caffarra & Kühn, 2006, p. 151n). Availability of space for such facilities at large airports is also a significant factor, since many airports are land-constrained and cannot spare acreage for the construction of multiple tank farms.

In reflecting on storage in the petroleum industry in general the German Federal Cartel Office (Bundeskartellamt) (2009, p. 12) has observed:

> *In comparison with joint storage, individual storage is expensive and less efficient, as ultimately it is not nominal capacity but throughput that is decisive for the economic efficiency of a storage company, i.e. how often a storage tank can be refilled and emptied within a certain period. This frequency is generally higher in the case of joint storage than when fuel is stored by just one trader.*

Due to economies of scale and lower costs, fuel storage facilities at many airports throughout the world are common facilities, owned by joint ventures that are operated on a cost-sharing basis (Caffarra & Kühn, 2006, p. 152). Without these, jet fuel distribution costs at many airports would typically be much higher.

At large airports, jet fuel taken from storage for delivery travels through an extensive underground pipeline system to hydrant pits adjacent to parked aircraft, where *into plane* delivery crews connect final filtration and testing equipment located on hydrant service vehicles and the *into plane* loading lines (Caffarra & Kühn, 2006, p. 152). Economies of scale and requirements of the airport authorities typically imply that only a single hydrant system is built. The joint airport storage and the hydrant facility are typically managed by the same operator.

[3] Economies of scale occur where the average cost per unit of output decreases as output increases.

Various models for the management of jet fuel supply infrastructure at large airports have been developed. According to the Sydney Jet Fuel Infrastructure Working Group (2010, p. 19), no model can be referred to as 'world's best practice' for jet fuel supply infrastructure ownership or third party access arrangements. Access to jet fuel supply infrastructure at large airports has been described as closed, limited or open:

- *Closed Access* is defined as no third-party access to privately owned infrastructure
- *Limited Access* is defined as requiring participation in a joint venture (JV) owning the supply infrastructure in order to access fuel. Access is readily achieved by the applicant meeting the reasonable operational, safety and financial JUHI criteria set by the JUHI JV and by investing capital and buying into the JUHI assets.
- *Open Access* is defined as allowing all parties access to refuel through the airport fuel supply infrastructure upon payment of a throughput based fee (Sydney Jet Fuel Infrastructure Working Group, 2010, p. 19). The capital, operational and safety risks are borne by the asset owner, or as is often the case in Europe, owned by the state. The asset owner sets a rate of return that remunerates the cost of capital, its risk and a profit margin returned to its shareholders.

In Australia all fuel storage facilities at large airports have traditionally operated under a Limited Access arrangement. Prominent examples of this exist at:

- Sydney Airport;
- Brisbane Airport; and
- Perth Airport.

This model is not unique to Australia and prominent international examples of Limited Access jet fuel infrastructure airports include Singapore's Changi Airport and London's Heathrow Airport.

Jet fuel suppliers at Changi Airport have formed a company called the Changi Airport Fuel Hydrant Installation Pte Ltd (CAHFI) (Parliament of Singapore, 2006, pp. 1988-1989). The CAHFI consortium consists of Air Total, BP, Chevron, ExxonMobil, Shell, Sinopec and the Singapore Petroleum Company. The infrastructure includes the fuel hydrant system, the fuel jetty (where jet fuel is delivered), storage tanks, underground pipelines and other infrastructure used to store and deliver jet fuel to airline customers. Although fuel suppliers share common infrastructure within CAHFI, they compete against each other, with pricing and services provided to airlines by each jet fuel supplier contracted separately with airlines free to engage any of the CAHFI jet fuel suppliers. Any new oil company interested in doing business at Changi Airport can do so by joining the CAHFI consortium. The admission criteria for new entrants are outlined in the CAFHI's Head of Agreement. Any reputable oil company that can meet the admission criteria will be eligible to join the consortium by buying an equity shareholding from the existing shareholders.

Jet fuel supply arrangements at one of the world's busiest airport, London's Heathrow Airport, are also Limited Access. The jet fuel supply and storage infrastructure is owned by two separate joint venture companies (Sydney Jet Fuel Infrastructure Working Group, 2010, p. 20). The Heathrow Hydrant Operating Company (HAPCO) owns and operates the hydrant system and the Heathrow Fuel Company (HAFCO) owns and operates the on-airport jet fuel storage system. Ownership of both joint venture companies comprises oil companies while HAPCO also includes an airline. Access to the infrastructure is available, but dependent on participation in the joint venture.

Despite both Changi and Heathrow airports having Limited Access to the JUHI facilities, neither are usually associated with comparatively high jet fuel prices. There is no evidence that the Limited Access model leads to higher jet fuel costs.

A prominent international example of an Open Access jet fuel supply arrangement is Los Angeles Airport (LAX), also one of the world's busiest airports. At LAX the on-airport jet fuel supply infrastructure is operated by the LAXFUEL Corporation (2011), a nonprofit mutual benefit corporation that is owned by consortium of airlines with the operation and management contracted out to an independent operator. Member airlines are charged a fee based on fuel volume and cost of operations. The fee charged to member airlines is adjusted at the end of the year to reflect the actual cost of operations. Non-member airline users are charged a fee based on fuel volume and are also charged for usage of certain off-airport storage and pipeline facilities. In the case of LAX, the jet fuel refuelling system operator, LAXFUEL Corporation, received tax-exempt bond financing of US$250 million by 2005 for the upgrade of jet fuel infrastructure (Briones & Myers, 2008, p. 19). Beneficial funding of this quantum makes it difficult to compare jet fuel prices with other airports; regardless of whether they have Open Access or Limited Access models.

7.3 Delivery of Jet Fuel into Planes

After a final quality control check, fuel is delivered into the aircraft by *into plane* delivery crews (Caffarra & Kühn, 2006, p. 152). Into-plane providers use fuel distributed from either the hydrant system or bulk tankers (Sydney JUHI, 2011, p. 11).

Where an aircraft is fuelled via a hydrant, a hydrant truck is used which connects to the hydrant system via a ground pit connection and to the aircraft (Sydney JUHI, 2011, p. 11). Pressure from the hydrant enables the fuel to be pumped on to the aircraft. Refuelling a major commercial jet aircraft requires one operator between 20 to 90 minutes to complete, depending on the size of the aircraft and the volume of fuel required to be uplifted (Airport Fuel Services Pty Limited, 2011, p. 4).

Where an aircraft is fuelled via tanker, a truck will load at the tank farm through a dedicated location connection and the fuel will be metered onto the truck (Sydney JUHI, 2011, p. 11). The truck is then driven off the tank farm site to an aircraft. These trucks typically have a capacity of between 8,000 to 22,000 litres. Fuel is then delivered into the aircraft and is metered into the plane via equipment and metering measures carried in the truck itself. Fuelling via a tanker is a slower process than fuelling via a hydrant and volumes are limited to the capacity of the truck.

The main cost component for the provision of into-plane services is labour. This activity also has some economies of scale because the cost of delivery declines the more deliveries are carried out by any given crew. However, the size of such scale economies is not as large as in the case of storage facilities (i.e. the minimum efficient scale is not as large). At medium-to-large airports, there can be multiple into plane delivery operations, though for safety considerations (to limit the number of trucks from different companies on the tarmac at the same time) into plane delivery is also typically organised in the form of joint ventures.

8 Economic Issues in the Supply of Jet Fuel

8.1 Off-airport storage facilities

The development of a terminal storage facility is an investment in specialised physical capital of a transaction-specific nature. The value of the use of this facility, by its very nature, is much smaller for any activity other than the distribution of refined petroleum products. Thus owners/operators of terminal storage facilities are 'locked in' to the distribution of refined petroleum products. In order to minimise on the uncertainty associated with such an investment, owners/operators seek to enter into long-term contracts with customers.

In its 2007 report of its inquiry into the price of unleaded petrol, the ACCC (2007, p. 214) found that import terminal operators were reluctant to invest in large-scale terminal facilities without a long-term contract from an importer. On the other hand, the ACCC also found that independent importers were generally unable or unwilling to enter into long-term arrangements without some certainty that they had markets for their product imports.

Given the vital importance of having jet fuel supply contracts in place for jet fuel terminal storage capacity, it is unremarkable that most of the off-airport terminal storage facilities used for jet fuel storage are owned and operated by incumbent jet fuel suppliers. However, there are exceptions.

Vopak is an independent tank storage provider for the oil and chemical industry. Vopak operates a major common-user import terminal at Port Botany close to Sydney Airport. The Vopak Port Botany terminal is connected to the Caltex pipeline (for jet fuel only) that runs from the Caltex Kurnell import terminal which runs to Sydney Airport. According to the current Sydney Airport Masterplan:

> *The majority of jet fuel imports are currently handled by Vopak through the liquids berth at Port Botany. (Sydney Airport Corporation Limited, 2014, p. 110)*

Vopak leases tank space at its Botany terminal under long term lease agreements (ACIL Tasman, 2009, p. 29). Vopak has previously advised that there are no constraints on access by new entrants, however, the company requires long term agreements with companies that have established distribution contracts to markets (ACIL Tasman, 2009, p. 35).

Vopak also owns and operates a terminal at the Port of Darwin. Vopak's Darwin terminal was established to rationalise the fuel storage facilities on the Darwin waterfront into a single location (Australian Competition and Consumer Commission, 2007, p. 61). Vopak's Darwin terminal is a co-mingled facility in which the fuels imported by different operators are stored in the same tanks. The Vopak terminal is available for lease to all importers with the main requirement being long term agreements and users must have distribution contracts to market (ACIL Tasman, 2009, p. 92).

8.2 Delivery of Jet Fuel as a Bundled Good

When airlines tender for jet fuel supplies, fuel suppliers will quote prices to airlines referencing a product benchmark price and a number of 'add-ons' associated with supplying fuel on a 'delivered' basis into the aircraft. The 'add ons' – also referred to as the differential – reflects the various costs associated with delivering fuel into the aircraft. Thus the 'delivered' price for jet fuel includes but is not limited to the following components:

- the cost of the jet fuel which will be determined by the marginal source of supply which is the import parity price consisting of the benchmark price and the cost of shipping freight to Australia;
- wharfage rate and other costs related to importing product (eg. demurrage and surveyors' costs) and associated infrastructure used for product discharge (eg. terminals and pipelines);
- the cost of transporting jet fuel to the airport, whether by pipeline or by fuel road tanker;
- the cost of storing product at the airport;
- the cost of moving jet fuel into and through the airport, such as through the pipeline system or by tanker;
- the cost of delivering fuel from a hydrant or tanker into the aircraft; and
- the cost of insurance and quality control testing.

Incorporated within the cost of storing the product at the airport and moving jet fuel into and through the airport, there are a range of costs imposed by airport operators. Land on which the JUHI facilities are constructed is leased or licensed from airport owners (The Shell Company of Australia Limited, 2006). In addition to the leases of surface land occupied by the fuel suppliers, at most airports the JUHI participants pay licence fees for the ground through which the subterranean pipelines run. Lease and licence fee amounts are at a market rate, adjusted by CPI and market reviews. On top of lease and licence fees, some Australian airports also charge a fuel throughput levy for each litre of jet fuel supplied. Currently Sydney, Darwin, Archerfield, Alice Springs and Tennant Creek all impose fuel throughput levies.

Essentially, the supply of jet fuel is a bundled good that requires the provision of a good (jet fuel) coupled with a number of associated services.[4] Bundling is pervasive practice throughout the economy that gives rise to substantial efficiencies (Ahlborn, Evans, & Padilla, 2004, p. 339). Although bundling can potentially have anti-competitive effects, the circumstances in which bundling would lead to anticompetitive effects are very restricted, and not only are those conditions hard to verify, but also any attempt to balance efficiency gains against possible anticompetitive effects will prove a complex exercise.

Prominent US competition economist Gregory Sidak and Professor Daniel Spulber of the Kellogg School of Management at Northwestern University (1998, p. 131) have warned that unbundling can increase transaction costs:

> *Excessive unbundling eliminates the reduced transaction costs that result from bundling features that increase consumer convenience.*

Similarly, the European Commission (2007, p. 16) has observed:

[4] Bundling generally refers to the situation where two or more products or services are sold as a single package.

> *… consumers may have a preference for a bundle if there are significant transactional costs. In this case, consumers may prefer to purchase the services as a bundle and from a single supplier. Hence the bundle may become the relevant product market.*

8.3 Jet Fuel Bargaining Process

The sale of jet fuel to airlines is structured as a bargaining process for supply contracts (Caffarra & Kühn, 2006, p. 148). Each airline periodically issues a call for tender that covers its anticipated fuel requirements for a particular airport or even on a regional basis. The airline solicits bids with two basic components: a *price per unit of fuel* delivered 'into plane', and the *share* of the overall volume requirements each oil company is willing to provide at that price. The initial round of bidding is normally followed by a bargaining process in which the airline seeks to negotiate a lower price from each bidder and to adjust shares so that accepted bids add up to 100 per cent of the airline's volume requirement.

In its 1994 report on petroleum products, the Industry Commission observed (1994, pp. 52, 65):

> *… the AVTUR market is dominated by a small number of large airlines. In these circumstances, the buyers are in a strong negotiating position and have the potential to themselves wield a degree of market power. This can act as a 'countervailing force' to the misuse of market power by refiners.*
>
> *… the AVTUR market is dominated by a few large airlines who have substantial buying power to countervail any excessive power wielded by the oil majors.*

According to NERA Economic Consulting (2011, p. 23), the countervailing power of airlines should not be underestimated because if they perceive that competition between the existing suppliers is ineffective and that jet fuel prices are consequently above the competitive level, they could take corrective action including building new supply infrastructure and/or sponsoring a new entrant. Because most international airlines arrange for the supply of jet fuel using tenders for supply to multiple airports around the world, airlines are likely to have greater bargaining power through the prospect of reprisals in other geographic locations against international oil companies if prices in Australia are perceived as excessive.

Australian domestic and international airline Qantas (2011) has engaged in self-supply of some of its jet fuel requirements at Sydney Airport. Qantas has achieved this through purchasing equity in the Sydney Airport JUHI as well as one of the delivery agents, negotiating access to a jet fuel supply pipeline to Sydney Airport, and through having its jet fuel supplier (Q8) lease jet fuel storage at the Vopak terminal at Port Botany.

8.4 Excessive Jet Fuel Differentials?

The Board of Airline Representatives of Australia (BARA) has asserted on several occasions that Australian airports have some of the highest jet fuel differential in the world. Based on figures provided by the International Air Transport Association, BARA (2011a, p. 1) claimed Sydney and Melbourne Airports were characterised by the highest jet fuel differentials in the world in July 2010 at 18.91 and 22.10 US cents per gallon as compared to 1.43 US cents per gallon at Singapore's Changi Airport that had the lowest jet fuel differential. Specifically in relation to the Sydney JUHI, BARA (2011, p. 53) commented:

> *… given the Limited Access arrangements that apply, it is not unreasonable to expect that the Sydney JUHI takes advantage of its monopoly supply and Limited Access arrangements in setting the fees paid by the Participants.*

Similarly in 2014, based on figures provided to it from the International Airport Association, BARA (2014a, p. 7) claimed that international airlines operating to Australia pay some of the highest jet fuel differentials globally.

As already discussed above, imported jet fuel represents the marginal source of supply for Australia and as such imports will determine Australian jet fuel prices. On the other hand, jet fuel for Changi Airport is delivered directly by barge from the oil refinery to its fuel jetty as Singapore is serviced by three major oil refineries:

- Shell operates a refinery at Pulau Bukom with a crude distillation capacity of 500,000 barrels per day coupled with a petrochemical manufacturing facility.
- ExxonMobil operates an integrated refinery complex at two sites - one on the mainland (referred to as Jurong) and another on Jurong Island (referred to as Pulau Ayer Chawan or PAC) with the two sites connected by a series of pipelines. This integrated refinery complex has a crude distillation capacity of about 605,000 barrels per day.
- Singapore Refining Company Private Limited (SRC) operates a refinery with a crude distillation capacity of 290,000 barrels per day on Jurong Island. SRC is a joint venture between Singapore Petroleum Company Limited and Chevron.

Inflating the jet fuel differential at Australian international airports as compared to Changi Airport is the fact that major international airlines often purchase jet fuel effectively underneath the posted ex-refinery daily spot price, the mean of Platts Singapore (MOPS) for jet kerosene, before the provision of other services associated with the delivery of the product.

Furthermore, the jet fuel logistic supply chain for Australian international airports is much longer than it is for Changi Airport. In July 2018 sea freight accounted for around 10 US cents per gallon of the jet fuel differential for Australian international airports as compared to Changi Airport.

Once jet fuel lands in Australia at port, there are additional costs associated with: wharfage; transports to the terminal; storage at the terminal; transport to the airport; storage at the airport; distribution costs at the airport for final delivery into plane. As such, the jet fuel transport logistics chain is much longer for Australian airports than it is for Changi Airport that involves much greater handling that in turn adds to costs.

The ACCC (2007, p. 100) has also previously noted in relation to oil refining that domestic input costs, particularly labour and environmental compliance costs are much higher than overseas. Labour costs at Asian airports are generally considerably lower than those at Australian airports (RBB Economics, 2011, p. 8). Higher input costs would also be applicable to the jet fuel logistics supply chain once product lands at Australian ports as it is not delivered directly to the airport.

Particularly since the privatisation of Australian international airports, participants within the various JUHIs have been at the very least paying a full commercial rate for the leasing of land at airport. The contribution of airport operators through lease costs, licence fees and fuel throughput levies upon jet fuel differentials also needs to be considered. In addition, it is possible that owners of jet fuel infrastructure at major overseas airports where there is majority public ownership may not have been paying a commercial rate for the leasing of airport land.

Singapore's Changi Airport, Kuala Lumpur International Airport, John F Kennedy Airport (JFK) in New York, Tokyo Narita International Airport, Hong Kong Chek Lap Kok International Airport, the Los Angeles International Airport (LAX) and *Bangkok International Airport* (Suvarnabhumi) have majority public ownership. In the United States publicly owned airports have access to tax-exempt bond financing. According to a 2008 report on the airline industry in the United States:

> *Due to its close relationships with publicly owned airports, the airline industry has benefited from billions of dollars worth of tax-exempt bond financing around the country...*
>
> *Tax-exempt bonds represent a subsidy to the airlines because the interest rate is lower —and the cost of financing is less —than what they would receive in the private market. Because the proceeds from the bonds are tax-exempt, investors are willing to receive a lower rate of return than they would otherwise. The cost to the taxpayer is the foregone tax revenue that the bond investors would have paid on the interest earned on their investment. Because the public cost of the bonds derives from foregone tax revenue, the taxpayer subsidy does not appear in state or local budgets. (Briones & Myers, 2008, pp. 18-19)*

In the case of LAX, the jet fuel refuelling system operator, LAXFuel Corporation, had received tax-exempt bond financing of US$250 million by 2005 for the upgrade of jet fuel infrastructure (Briones & Myers, 2008, p. 19). Part of the alleged jet fuel differentials for Australia compared to other countries may in part be due to hidden subsidies being provided for airport jet fuel refuelling systems in other countries.

It would appear that one of BARA's primary concerns over jet fuel pricing is that some airlines are receiving more favourable pricing outcomes than other airlines from their jet fuel tendering. According to BARA (2012, p. 2):

> *Qantas, by achieving a degree of self supply from Q8 Aviation, is likely to obtain jet fuel on more favourable terms than International Airlines. Qantas is estimated to account for about 38% of jet fuel demand at Sydney Airport.*
>
> *Virgin Australia, through mechanisms unknown to BARA, is also likely to be obtaining jet fuel on more favourable terms than International Airlines, but perhaps is paying higher prices than Qantas. Virgin Australia is estimated to account for about 18 % of jet fuel demand at Sydney Airport.*

Such concerns would appear to be related to an objection based on price discrimination. Price discrimination occurs when like goods or services are provided to different persons at different prices, the difference in price being unrelated to the cost of providing the goods or services (Dawson, Segal, & Rendall, 2003, p. 89).

There is a general presumption that price discrimination can be detrimental to welfare because it can only occur in the presence of some degree of market power[5] and thus is at odds with the model of perfect competition which is used by economists to assess the welfare implications of real world market situations.

The objective of any monopolist or participant in a tacitly collusive agreement is to reduce output and raise the product price in order to increase profits. For this reason, Professor Hal Varian (1996) of the University of California at Berkeley has commented in regard to the welfare effects of price discrimination that:

> *… if price differentiation allows more consumers to be served it will generally increase welfare... Market segmentation that allows markets to be served that would otherwise be neglected is also a case where overall welfare can be expected to be enhanced.*
>
> *On the other hand, price differentiation that merely shuffles prices paid by pre-existing customer groups and that does not result in an increase in the number of customers served, or the amount that they consume, will tend to reduce overall welfare.*
>
> *...*
>
> *The key concern in examining the welfare consequences of differential pricing is whether or not such pricing increases or decreases total output.*

According current Commissioner Dr Stephen King (2011) of the Productivity Commission:

> *Price discrimination may not be a bad thing. To the degree that it puts a wedge between consumers' marginal valuations for the same product (in other words, different consumers face different prices) price discrimination leads to a loss in economic surplus. But price discrimination also changes the quantity of product sold. To the degree that total sales rise with price discrimination, there may be an overall economic benefit.*

In its 2008 grocery inquiry, the ACCC made the following observations in regard to price discrimination:

> *The ACCC considers that there can be significant economic efficiency and competition benefits resulting from price discrimination … (Australian Competition and Consumer Commission, 2008, p. 552)*
>
> *The ACCC recognises that there can be genuine economic efficiency reasons for price discrimination. (Australian Competition and Consumer Commission, 2008, p. 553)*

According to distinguished American economist William Baumol Baumol (2005, p. 31):

> *... it should be noted that the market's imposition of discriminatory pricing in a wide range of circumstances is not necessarily to be deplored. It has long been known ... that discriminatory prices can enhance output and increase economic welfare.*

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[5] A firm possesses market power when it can behave persistently in a manner different from the behaviour that a competitive market would enforce on a firm facing otherwise similar cost and demand conditions. (Kaysen & Turner, 1959, p. 75)

Professor Varian (1996) has observed that price discrimination is ubiquitous in industries that exhibit large fixed costs, as is definitely the case in regard to the downstream petroleum industry. Where fixed costs are high, pricing at short-run marginal cost would prevent firms being able to fully recover their fixed costs which would have a detrimental impact on future investment decisions as well as product provision. Under these circumstances, price discrimination that enables firms to recover their fixed costs can be beneficial. According to Professor Damien Geradin and Nicolas Petit of the University of Liege (2006, pp. 484-485):

> *A key insight of economics is that price discrimination is most likely to expand output where the seller has declining average total costs. Expanding output through price discrimination is an essential strategy for firms facing problems of fixed cost recovery. Price discrimination allows firms facing large fixed costs (in practice all firms that make substantial investments) to expand their output and thus spread fixed costs over a large number of units. When marginal costs are low … any positive price allows the firm to contribute to its fixed costs. Prohibiting price discrimination would thus prevent efficient recovery of fixed costs and would, in the long run, have a negative impact on investments.*

The concept of price discrimination should not be unfamiliar to BARA's members as airlines practice price discrimination extensively in their ticketing arrangements. Airlines price discriminate among their customers by attaching certain ticket restrictions to cheaper tickets, thus making them unattractive to consumers with higher valuations of time and convenience (Stavins, 2001, p. 200).

8.5 Economic Rationale for Limited Access JUHIs

Historically the jet fuel supply infrastructure referred to as a JUHI has largely been provided by the jet fuel suppliers, not the airport owners (The Shell Company of Australia Limited, 2006). This has reflected the capital costs associated with the refuelling infrastructure on and off the airport site (eg industry pipelines on land not associated with the airport itself) and the pool of industry experience available in the operation of this type of facility. However, there are recent exceptions to this at Adelaide and Canberra where the airport owners have paid for the installation of new jet fuel supply infrastructure. Also, in 2017 Darwin International Airport (2017) acquired an ownership stake in the airport JUHI, with an agreed timeframe in place to purchase 100 per cent of the facility. The purchase is the first time an Australian capital city airport has acquired an interest in an existing JUHI.

At many of the capital city JUHI's and large regional airports, the leases between the JUHI Manager and the airport owner specifically contain clauses requiring the JUHI consortium participants (via the manager) to invest as required by the airport owner to support potential airport growth and infrastructure changes.

In its 2011 application seeking declaration of the Sydney JUHI under Part IIIA of the *Competition and Consumer Act 2010* (CCA), BARA (2011, pp. 51-52) contended that restricting access to the Sydney Airport JUHI to equity holders represented an entry fee that constituted a barrier to entry and was thus anti-competitive:

> *Access is restricted, however, in that the Sydney JUHI can reject applications for access and that an equity stake in the JUHI JV is required in order to get access to the Sydney JUHI – in other words, network ownership is required as a pre-condition to the supply of jet fuel to airlines at Sydney Airport. This equity stake is a large fixed cost (with potentially a high sunk component). This is restrictive by its very nature and does not constitute access on a basis dependent on the cost of provision, which would eventuate in a competitive market. Moreover, the requirement of equity to use the Sydney JUHI is evidence of market power - if there was a competitive market, a requirement of equity would not be sustainable. Rather, the contract would allow for the service to be utilised at charge of (or near to) the cost of provision (a throughput arrangement) and an equity contract would only arise if it were somehow mutually beneficial.*

In relation to the Sydney JUHI, under the terms of the joint venture (JV) agreement between the owners, any third party can gain access to the services provided using the JUHI facilities on the same terms and conditions as the existing JV participants so long as they meet certain entry requirements set out in the agreement (Frontier Economics, 2011, p. 7). The entry requirements contain two key requirements:

- First, a set of qualifying criteria that an applicant must meet.
- Second, a requirement to make a purchase contribution to the existing JV participants for an ownership share in the JUHI in line with certain specified valuation principles.

Aside from certain shareholding requirements, the other qualifying criteria primarily relate to the capacity of an applicant to be able to safely supply and deliver jet fuel at Sydney Airport, including:

- To be a jet fuel marketer at Sydney Airport an entity needs airside access and this is only granted by the airport operator.
- A requirement for the applicant to be able to deliver to the JUHI aviation fuels sufficient to supply its customers, and that these fuels meet the product specifications defined in the JV Agreement. The applicant must also have access to laboratory testing facilities to consistently and promptly confirm the fuels meet such quality requirements.
- A criterion requiring that the applicant be financially capable of fulfilling the obligations of a JV participant; have sufficient qualified labour to perform the obligations of a JV participant; and have insurance coverage which is adequate to meet the indemnity obligations of a JV participant. In particular, an applicant must be capable of providing an into-plane fuelling service to its own customers.
- A requirement that the applicant be technically capable of assuming the obligations and responsibilities of the JV Operator when required to do so in accordance with the provisions of the JV Agreement.

Any party is able to acquire equity in the Sydney JUHI, as Australian domestic and international airline Qantas has clearly demonstrated. According to Qantas (2011, p. 3):

> *… the JUHI JV Agreement sets out the terms on which third parties can access JUHI, by providing an equity contribution and paying usage fees. These access terms are reasonable and objective.*
>
> *… Qantas was not a foundation member of JUHI. It became an equity participant in "Component A" (tankage and hydrant facilities for the international apron) in 1988 and in "Component C" (domestic hydrant) in 2001. Component B (the pipeline connecting the international and domestic aprons under the runway) was constructed in 1990 and Qantas funded a 20% share of this at the time of construction. These were key steps in enabling*

Qantas to "self supply" its fuel requirements in Sydney at both the international and domestic aprons.

It is open to other third parties to apply to join the JUHI at any time.

Other Limited Access JUHIs around the country operate under similar conditions to the Sydney JUHI with outside parties able to join if they can satisfy the qualifying criteria and acquire equity.

A review of transaction cost economics demonstrates the assertion that the requirement of equity for participation in a JUHI (i.e., Limited Access) is a manifestation of market power that could not be sustained in a competitive market is arrant nonsense.

The 2009 Nobel Laureate for economics Oliver Williamson (1983, p. 535) observed there were two different contracting traditions for evaluating nonstandard or unfamiliar contracting practices: the common law tradition and the inhospitality tradition. According to Williamson (1983, p. 535):

The inhospitality tradition is supported by the widespread view that economic organization is technologically determined. Economies of scale and technological nonseparabilities explain the organization of economic activity within firms. All other activity is appropriately organized by market exchanges. Legitimate market transactions will be mediated entirely by price; restrictive contractual relations signal anticompetitive intent.

Under the common law tradition, contractual irregularities are presumed to serve affirmative economic purposes (Williamson, 1983, p. 535). A consideration of transaction cost economics clearly demonstrates the equity requirement imposed on access seekers to a Limited Access JUHI does serve an affirmative economic purpose contrary to the assertions made by BARA.

The 1991 Nobel Laureate for economics Ronald Coase (1964, p. 195) observed that all feasible forms of organisation are flawed:

Until we realise that we are choosing between social arrangements which are all more or less failures, we are not likely to make much headway.

This applies in the case of markets also known as the price mechanism (market failure), to firms (bureaucratic failure), and to government (regulatory failure) (Williamson, 1995, p. 50). This in turn raises the question as to how best to organise the delivery of any function. In terms of organising functions within a firm or seeking services from the market, Ronald Coase (1937, p. 395) observed:

… a firm will tend to expand until the costs of organising an extra transaction within the firm become equal to the cost of carrying out the same transaction by means of exchange on the open market or the costs of organising in another firm.

In turn, this led Coase (1988, p. 19) to the conclusion:

A firm … [has] a role to play in the economic system if ... transactions [can] be organised within the firm at less cost than if the same transactions were carried out through the market. The limit to the size of the firm ... [is reached]

> *when the costs of organizing additional transactions within the firm [exceed] the costs of carrying out the same transactions through the market.*

Coase's insights provide the foundation of what has become known as transaction-cost economics (TCE) where the economising on transaction costs determines the organisational form (Williamson, 1988, p. 66). Within TCE, the boundaries of the firm will be decided on the basis of whether it is cheaper to internalise the provision of activities within the firm or rely on the market and the price mechanism, or some hybrid type arrangement. This in turn will be determined by transaction costs. Transaction costs are the comparative costs of planning, adapting, and monitoring task completion under alternative governing structures (Williamson, 1981, pp. 552-553). Transaction costs can be divided up into three main categories:

- Information costs that arise *ex ante* to an exchange and include the costs of obtaining price and product information and the costs of identifying suitable trading partners;
- Negotiating costs are the costs of physically carrying out the transaction and may include commission costs, the costs of physically negotiating an exchange and the costs of formally drawing up contracts; and
- Monitoring or enforcement costs that occur *ex post* to a transaction and are the costs ensuring that the terms of the transaction are adhered to by other parties to the transaction (Hobbs, 1997, p. 1083).

Williamson (1979a, p. 239) has identified three critical dimensions for categorising transactions:

1. Uncertainty;
2. Frequency with which transactions recur; and
3. The degree to which durable transaction-specific investments are incurred.

An investment in a specialised asset creates quasi-rents which provide the potential scope for opportunistic behaviour. A quasi-rent value of an asset has also been defined as the excess of its value over its salvage or its value in its next best use to another renter (Klein, Crawford, & Alchian, 1978, p. 298). The potentially appropriable specialised portion of the quasi-rent is that portion, if any, in excess of its value to the second highest-valuing user (Klein, Crawford, & Alchian, 1978, p. 298). In the long-run, a firm must earn sufficient quasi-rents to yield a competitive return or it will not be willing to replace capital investments as they wear out or become obsolete (Noll, 2005, p. 593).

Williamson (1979, p. 234) has described opportunism as:

> *... a variety of self-interest seeking but extends simple self-interest seeking to include self-interest seeking with guile.*

Asset specificity creates the scope for opportunistic behaviour that leads to the hold-up problem as outlined by former Industry Commission economist Jim Rose (1999, pp. 81-82):

> *Asset specialisation creates openings for opportunistic behaviour in which one party to the relationship manoeuvres to extract wealth from the other; and that wealth is wealth that could not be extracted in the absence of the interdependence. Specialised assets are vulnerable to hold-ups. When one party to the relationship refuses to pay the other party more than the highest value of the specialised asset elsewhere, we have a hold-up.*

The ACCC has previously recognised the hold-up problem in a previous matter before the Australian Competition Tribunal:

... a contracting problem that can arise where (a) incomplete or otherwise limited contracts exist between two or more parties who can engage in a mutually beneficial activity, and (b) prior to the parties engaging in the mutually beneficial activity, one of the parties must make an investment that is substantially sunk and, as such, the recoverable value of the investment for the investor is significantly below the initial investment cost. 'Hold up' occurs in this situation when the party making the relevant investment cannot, through the contracting process and prior to making his or her investment, be guaranteed to receive an adequate share of the returns from the mutually beneficial activity after the investment is made and the activity occurs. As a consequence of the expectation that he or she will be 'held up' after making the investment, the relevant party will either invest a smaller amount or not invest at all. In the extreme this will make the mutually beneficial activity unviable. [6]

Airport hydrant fuelling systems, such as the Sydney Airport JUHI, is an investment in specialised physical capital of a transaction and site specific nature. The value of the use of this facility, by its very nature, is much smaller for any activity other than for the provision of aircraft refuelling services. Thus owners/operators of such a system are thus 'locked in' to the supply of jet fuel and the provision of aircraft refuelling services.

One often neglected aspect of economic efficiency is transactional efficiency where market participants design business practices, contracts, and organisational forms to minimise transaction costs and, in particular, to mitigate information costs and reduce their exposure to opportunistic behaviour or hold-ups (Kolasky & Dick, 2003, p. 249).

The traditional means by which asset owners can protect themselves against opportunism is through contracts specifying all possible contingencies. However, as asset specificity increases, it becomes impossible to draw up complete contracts that cover off on all possible contingencies. Thus asset specificity creates contractual hazards. In response to increasing asset specificity, resort much be given to more elaborate governance structures in order to constrain opportunism (Bensaou & Anderson, 1999, p. 462). This may give rise to relational governance through the development of strategic alliances, joint ventures, franchises, and other close relationships between parties. According to Professor Paul Joskow (2002, p. 102) of the Massachusetts Institute of Technology:

Recognising the potential for opportunistic behaviour ex ante, the transacting parties have an incentive to choose a governance arrangement ... that mitigates the ex post hold-up potential. This in turn facilitates the creation of an economical trading relationship that supports efficient investments in specific assets, lower costs, and lower prices.

The requirement for access seekers to become equity holders in an airport JUHI needs to be considered in the context of the parties seeking to achieve transactional efficiency in order to minimise transaction costs and thus reduce their exposure to opportunistic behaviour and the possibility of hold-ups. Indeed, Williamson (1981, p. 556) has observed that:

... the common ownership of site-specific stations is thought to be so "natural" that alternative governance structures are rarely considered.

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[6] Re VFF Chicken Meat Growers' Boycott Authorisation [2006] ACompT 2, para. 103

One potential source of hold-up is paying for site remediation in the event the tank farm associated with an airport JUHI may need to be relocated to make way for the expansion of airport terminals. It is quite common under the terms of JUHI leases for there to be a make good provision at the end of the lease term.[7] Sites contaminated with petroleum compounds include tank sites and can remain at a site for a long period of time (Khaitan, et al., 2006, p. 20).

The cost of the remediation of the tank farms at airport sites could run into the millions of dollars. However, the imposition of an Open Access regime for JUHIs would ensure that non-equity jet fuel suppliers would escape any future polluter pays obligations and allow them to free ride on equity holders.

In the case of JUHI facilities owned by consortiums of jet fuel suppliers, there is also the danger of the emergence of another hold-up problem whereby the jet fuel infrastructure supply assets contributed by JUHI consortium members could potentially be taken over by airport owners. The jet fuel supply infrastructure assets will generally have a life well beyond the current JUHI participants' lease term, thereby providing the airport owner with the opportunity to acquire jet fuel supply infrastructure previously contributed and owned by former JUHI consortium members at nominal cost. Such conduct on the part of airport owners could have much wider ramifications if airport owners seek to revalue those same assets upwards immediately upon their acquisition to reflect their value as a source of future income and increase airport charges as a consequence.

Professor Benjamin Klein (1980, p. 357) of the University of California at Los Angeles has articulated such a hold-up problem in the following terms:

> *After a firm invests in an asset with a low-salvage value and a quasi-rent stream highly dependent upon some other asset, the owner of the other asset has the potential to hold up by appropriating the quasi-rent stream. For example, one would not build a house on land rented for a short term. After the rental agreement expires, the landowner could raise the rental price to reflect the costs of moving the house to another lot.*

One potential solution to this problem is vertical integration by the airport operator. This is the solution that is being implemented at Darwin Airport where the airport operator is moving towards acquiring full ownership of the JUHI facilities. However, there are numerous potential pitfalls associated with vertical integration by the airport operator. First and foremost, airport operators do not possess expertise in the management and operation of jet fuel supply infrastructure and the appropriate handling of jet fuel. The proper handling of jet fuel ensures that it remains essentially free of harmful contaminants during transportation and distribution as the safety of air transport depends on it. Any move by airport owners to operate jet fuel infrastructure without obtaining sufficient knowledge and expertise in the handling of jet fuel could have dire and catastrophic consequences. Therefore airport operators (such as Darwin Airport) would need to appoint a specialised third party to appropriately operate, maintain and manage their 100% owned jet fuel infrastructure and this amounts to additional cost to be recovered by airport operators.

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[7] 'Make good' refers to the provision in a commercial lease that stipulates how a property should be left at the end of the term.

Second, vertical integration by the airport operator would come at the expense of breaking up the efficiencies already achieved by existing jet fuel suppliers obtained through vertical coordination incorporating the existing on-airport jet fuel supply infrastructure. Vertical organisation is traditionally seen in the context of vertical integration, however, it is only one mode of vertical structure (Frank & Henderson, 1992, p. 941). Vertical coordination is a more comprehensive concept, capturing not only vertical integration but the entire process by which the various functions of a vertical value adding system are brought into harmony.

Finally, there may not be any effective mechanisms in place to prevent any subsequent abuse of market power on the part of airport operators. Airports have been exploring options to purchase JUHI assets at a significant cost. Airports are also looking to take over the joint venture assets (storage and hydrant systems) and appoint an operator. The motivation on the part of airport operators appears to be increased revenue – the storage and hydrant facilities are not governed by the Customers Work

Agreements the airports sign with airlines governing the work they are able to do on-airport that will affect landing prices. There is also the possibility they may choose to over invest on jet fuel supply infrastructure assets and then charge a return on that investment. If overinvestment occurs the return on investment, or infrastructure fee or throughput fee, is likely to be substantially higher than the fee that would have been charged under existing joint venture JUHI arrangements where the parties look to timely investment and operational efficiency. The prospect of airport owners imposing new and additional costs upon jet fuel users is very real, given comments by the ACCC (2018, p. 6) regarding past conduct by airport operators:

> *In the past the ACCC has raised concerns that the current monitoring regime did not provide an effective constraint on the airports' market power.*

Indeed, the purchase of equity in the Darwin Airport JUHI by the airport operator (DIA) was accompanied by the imposition of a new infrastructure fee that effectively amounts to the imposition of an additional levy on top of the pre-existing fuel throughput levy. This additional levy has increased the cost of jet fuel supply. It stands to reason that DIA, who also operate Alice Springs, Tenant Creek and Maroochydore Airports, is incentivised to replicate this model elsewhere. DIA has a material economic incentive to over-invest in infrastructure and build excess, inefficient capacity, as in the pursuit of doing so increases the returns to its shareholders. The cost of this inefficiency is directly levied upon the patronising airlines, which is ultimately borne by the traveling public.

Another solution to the potential hold-up problem in this instance is a long-term lease arrangement for the existing owners of the on-airport jet fuel supply infrastructure. Despite the contractual obligation on the part of JUHI consortium members to make long term capital commitments as part of their lease agreements, there appears to be a trend on the part of airport owners towards shorter term lease arrangements or no new leases for JUHIs. An airport lease term for a JUHI of anything less than 20 years is problematic in terms of creating the potential for a hold-up as the assets in question have an effective economic life of at least 40 years.

A long term lease arrangement would be preferable in terms of economic efficiency as it would avoid any additional cost impost associated with double marginalisation or a double mark-up on the supply of jet fuel. For example with jet fuel, if the supplier provides fuel with a mark-up and the airport owner storage operator then receives the fuel and marks it up again, this double mark-up will results in higher prices, lower total sales and lower total profit than if the supplier and airport owner storage operator were vertically integrated. Limited Access JUHIs currently operate on a purely cost-recovery basis as jet fuel suppliers take any profit margin from the sale of jet fuel, but that may not be the case if airport owners takeover ownership of the on-airport jet fuel supply infrastructure.

If there is any move towards structural separation between jet fuel suppliers and on-airport jet fuel supply infrastructure and JUHI operations, it may unwind many of the benefits achieved through vertical coordination of the jet fuel supply chain. According to the OECD Competition Committee (2006, p. 7), structural separation can impose potentially significant costs including:

- A loss of economies of scope from integrated operation;
- Increased transaction costs for consumers;
- Direct costs of separation can be high;
- System reliability may fall when investments are not made jointly; and
- Accountability for interface problems may be difficult to assign.

In relation to system reliability and accountability for interface problems the stakes are astronomically high in relation to jet fuel. Despite the move by airport operators to acquire equity or indeed full ownership of jet fuel supply infrastructure on their premises, JUHIs and other associated jet fuel supply infrastructure so far continue to be managed and operated by jet fuel suppliers with the appropriate knowledge and expertise, but there is no automatic guarantee that this will always be the case in the event that airport operators seek ownership and exercise full control.

An alternative arrangement for the provision of airport jet fuel supply infrastructure by a joint venture providing Limited Access is for the implementation of an Open Access regime for all jet fuel suppliers. However, even with the imposition of an Open Access regime there is still the need to protect the quasi-rents of infrastructure owners from opportunistic behaviour through some mechanism. In the case of LAXFUEL Corporation at LAX, this problem has been solved through non-members paying a higher access price for the jet fuel supply infrastructure than members of the LAXFUEL Corporation. Similarly, at Darwin Airport it was the introduction of a new Infrastructure Fee

8.6 Energy Security and Adequacy of Jet Fuel Supply Infrastructure

With projections of increasing demand for jet fuel at major airports, certainty around lease tenure is required by joint venture JUHI participants, as this informs capital spending and operational requirement planning to ensure efficient, cost effective and timeline investment on-airport and to ensure supply security. Without security of tenure, timely investment in upgrades to jet fuel supply infrastructure may be lacking. In turn, this presents a challenge for energy security in the supply of jet fuel.

The interest in energy security is based on the notion that an uninterrupted supply of energy is critical for the functioning of an economy (Kruyt, P, deVries, & Groenenberg, 2009, p. 2167). Energy insecurity has been defined as "the loss of economic welfare that may occur as a result of a change in the price or availability of energy" (Bohi & Toman, 1996, p. 1). The International Energy Agency (2007, p. 161) has characterised energy security in practice as a problem of risk management where the objective is to reduce to an acceptable level the risks and consequences of disruptions and adverse long-term market trends.

Although joint venture participants have engaged with airports well in advance of the expiration of JUHI leases, in some cases 5 or more years prior to the expiration, participants have experienced significant delays and uncertainty when attempting to secure ongoing leases. Satisfactory security of tenure of airport leases for jet fuel supply infrastructure has a significant flow on effect for upstream investment from the airport. Oil companies are unable to put forward business cases that would lead to new projects when ongoing tenure at an airport is unknown and uncertain. Risk and uncertainty are worked into infrastructure business cases and without certainty of supply in relation to an airport lease, the appetite to place capital into a market is much lower.

Prior to the signing of a new 20 year lease with Melbourne Airport, investment in jet fuel supply infrastructure was lacking.

BP understands that Airline Industry lobby groups such as BARA encouraged the owners of Melbourne Airport to embark upon an open tender process for fuel infrastructure providers, its simple premise being that more on airfield competition will reduce fuel prices. BP assumes that BARA held the view, independent of the economics of the pre-airfield supply envelope, that a third party investor would invest its capital and provide access at lower rate of return than incumbent JUHI members, whom are inherently incentivised to place product into the markets in the most efficient and cost effective manner possible. BARA's lobbying and interjection, in BP's view, delayed the ability of private capital to be invested efficiently to meet the needs of the Melbourne Airport supply chain, to the point where stock shortages occurred. It is also BP's contention that BARA's intervention has acted to unbundle the costs of investing material and long dated investments causing them to be "line itemed" to airlines, effectively increasing the price to consumers.

This resulted in some jet fuel supply disruptions during January and October 2015 and again in November 2016 (Calligeros & Carmondy, 2016). Rationing of jet fuel was introduced at Melbourne Airport in January 2015 in response to the late arrival of a jet fuel shipment (Creedy, 2015). Rationing was also introduced in November 2016 as a result of a jet fuel shipment failing quality control tests (Australian Competition and Consumer Commission, 2017, p. 14). The rationing in November 2016 prompted concerns by the Victorian Government regarding ongoing supply security at Melbourne Airport (D'Ambrosio, 2016).

Following the lease tenure being secured at Melbourne Airport, oil companies have proceeded with significant investment both on and off the airport. Recent investments include building a 2.7 km pipeline connecting the Mobil and BP joint venture Yarraville terminal to the Somerton jet pipeline that supplies the Somerton Jet Fuel Depot as well as a $6 million investment in increased jet fuel storage at the Melbourne Airport JUHI with the construction of two new jet fuel tanks.

9 Competition in the Supply of Jet Fuel

Jet fuel suppliers compete vigorously in response to supply tenders from airlines and have strong economic incentives to do so. Winning tenders through supplying more jet fuel is the only way for jet fuel suppliers to minimise their operating and production costs.

Oil refining is subject to large economies of scale as capital costs rise less than proportionately with capacity. In order to realise economies of scale in oil refining, a local refiner has a strong incentive to operate a refinery as close to its maximum production capacity as it can possibly get.

In relation to jet fuel imports there are also economies of scale available in both shipping and terminaling. The larger the vessel used to import jet fuel, the lower will be the average transport cost. Terminals also exhibit scale of economies, because, as storage volume and throughput increases, the lower the operating costs.

Jet fuel suppliers not only compete on the basis of their ability to source jet fuel, but also on the basis of their integrated supply chains. The integrated supply chains and associated infrastructure is usually most comprehensive for those jet fuel suppliers who also operate local refineries or were previously refinery operators. This is the case in Sydney where the two former refinery operators both own and operate jet fuel pipelines to Sydney Airport. This is also the case in relation to Melbourne and Perth where the local refiners supply the bulk of jet fuel to Melbourne and Perth airports.

Access to the most comprehensive integrated supply chains and associated infrastructure is the underlying reason behind BARA's (2014, p. 5) complaint regarding the state of competition in jet fuel supply:

> *BARA's members have long been concerned at the lack of competition in jet fuel supply at Australia's major international airports. This has been reflected in the uncompetitive bids received when members tender for jet fuel, particularly at Sydney, Melbourne and Perth airports…*
>
> *While outcomes for individual international airlines may vary from time to time, the consensus view is that in most instances there is a lack of effective competition between jet fuel suppliers at three of the four major Australian international airports.*

BARA (2014, p. 5) claims there are only two effective jet fuel suppliers at Sydney and Melbourne airports and only one for Perth Airport, and its rates the competitive conditions as either poor or very poor at all three airports. The only airport at which BARA rates competitive conditions as satisfactory is Brisbane Airport for which it claims there are three effective jet fuel suppliers.

According to BARA (2013, p. 2):

> *For a number of years many of BARA's member airlines have complained that, when they tender for the supply of jet fuel at Sydney Airport, there is little or no competition between the existing oil company suppliers.*

When it considered the merits of BARA's claims in 2011 and 2012, the National Competition Council (NCC) (2012, p. 25) came to an entirely different conclusion:

> *On the material presented, airlines (notably international airlines) generally receive only one or two bids to an invitation to tender for the supply of jet fuel. The Council considers that the limited bids are reflective of supply and capacity constraints, more so than a lack of access or abuse of market power by any service provider.*

The NCC (2012, p. 34) went on to conclude that it did not consider that BARA had made out its position that jet fuel supply is characterised by excessive prices or other manifestations of market power in relation to jet fuel supply at Sydney Airport.

Economic theory would caution that the level of market concentration alone may not necessarily be the prime determinant for the actual state of competition in a market. In this regard, Professor David Round (2006, p. 54) of the University of South Australia, has warned:

> *… concentration statistics or even market shares attributable to individual firms by themselves tell us nothing about the dynamics of competition within a relevant market. They present a snapshot only, and tell us neither how firms obtained those market shares, nor whether those shares are currently increasing or decreasing, and they certainly offer no guide as to what might happen as future market conditions change.*

Thus, a competition analysis focusing solely on market concentration could be fundamentally flawed because it ignores other critical factors. These other factors include the height of barriers to entry and the extent of sunk costs incurred by new entrants.

An oligopoly market structure need not necessarily result in an anti-competitive outcome, for as the Council of the European Union (2004) has observed:

> *Many oligopolistic markets exhibit a healthy degree of competition.*

Similarly, the independent review of the competition provisions of the Trade Practices Act chaired by Sir Daryl Dawson (Dawson Report) concluded:

> *A concentrated market may be highly competitive. (Dawson, Segal, & Rendall, 2003, p. 67)*

Prominent industrial organisation economist Joseph Bain (1956) considered the force of potential competition as a regulator of price and output of comparable importance to that of actual competition and focused on the height of barriers to entry as the critical determinant of the price level. According to Bain, the extent of barriers to entry in an industry indicated the advantage that existing sellers enjoyed over potential entrant sellers that in turn reflected the capacity of existing sellers to raise their price over the competitive level without attracting new entry. [8]

[8] Bain defined the competitive level of prices as the minimum attainable average cost of production, distribution, and selling for the good in question, such cost being measured to include a normal interest return on investment in the enterprise.

Bain postulated that where entry into a market was easy or unimpeded was associated with the inability of firms to raise the price above the competitive level without attracting new entry. On the other hand, if the price persistently exceeded the competitive level without inducing entry, then Bain asserted that entry was somewhat impeded. The greater the discrepancy between the price and the competitive level price without inducing entry, the more difficult entry into the market was.

According to Bain (1956, p. 14), the height of barriers into a market was determined by three factors:

1. the absolute cost advantages enjoyed by established firms over potential new entrants;
2. the extent of product differentiation advantages enjoyed by established firms; and
3. significant economies of large scale firms.

Bain postulated that barriers to entry would have the greatest impact in oligopolistic markets. In these markets, collective action would permit the deliberate elevation of prices to the extent allowed by barriers to entry. In addition, firms individually and collectively would calculate the effects of their policies in inducing or forestalling entry (Bain, 1956, p. 33).

The theory of contestable markets (Baumol, Panzar, & Willig, 1982), is a reformulation of Bain's work on barriers to entry whereby oligopolistic behaviour can be explained by means of the constraint imposed by potential competition. Under this theory, an entry barrier has been defined as "anything that requires an expenditure by a new entrant into an industry, but that imposes no equivalent cost upon an incumbent" (Baumol & Willig, 1981, p. 408). From this definition, a distinction is drawn between fixed costs and sunk costs. Fixed costs do not necessarily constitute a barrier to entry because they affect incumbents and entrants alike. However, any entry cost that is unrecoverable is a sunk cost. The need to sink costs into a new firm imposes a difference between the incremental cost and the incremental risk that are faced by an entrant and an incumbent (Baumol & Willig, 1981, p. 418). In the case of an incumbent, such funds have already been expended and they are already exposed to whatever risks the market entails (Baumol & Willig, 1981, p. 418). In contrast, the new firm must incur any entry costs on entering the market that incumbents don't bear.

Entry will occur in the event the profits expected by a successful entrant outweigh the unrecoverable entry costs that will be lost in the case of failure (Baumol & Willig, 1981, p. 418). Hence, the need to sink costs can therefore constitute a barrier to entry.

In a market situation where there is an absence of barriers to entry, if incumbents offer profit-making opportunities to potential entrants then they leave themselves exposed to the possibility of hit and run entry, whereby new firms enter the market and gather up all the available profit and depart once the going gets tough. This is what has been dubbed a *contestable market*, and describes a market that is vulnerable to costlessly reversible entry.

Within a contestable oligopoly, it has been observed that an incumbent can only immunise itself from the threat of hit and run entry by setting price equal to marginal cost (Baumol, 1982,

p. 2). Hence, a perfectly contestable market delivers exactly the same outcome as that of a perfectly competitive market with no consequent loss of allocative efficiency.

Very few markets in the real world qualify as perfectly contestable with costlessly reversible entry, however, barriers to entry for the imported supply of jet fuel do not appear insurmountable to overcome. As such, alternative supplies of jet fuel do provide an effective competitive constraint on incumbent jet fuel suppliers at Australian airports.

While there would be substantial fixed, sunk and capital costs associated with the construction of a new oil refinery, sourcing jet fuel from an existing oil refiner overseas would not appear to be a prohibitive barrier. According to BARA (2014, p. 3), there are new prospective suppliers of imported jet fuel to Australia waiting in the wings who have been stifled in their efforts so far by their inability to access the integrated supply chains of existing suppliers:

> *Globally recognised suppliers of jet fuel have been stifled in their efforts to bring competition and lower priced fuel to Australia. Principally, the barriers to competition have been the difficulties in transporting jet fuel from Australia's ports to aircraft at the airports – known as the 'jet fuel infrastructure supply chain'. These supply chains are largely owned by existing fuel companies.*

It should be noted that corporations are not generally under any obligation to share their resources with prospective competitors and this matter is considered further below.

There are potential barriers for prospective new jet fuel import suppliers from establishing their own terminal facilities. A new entrant in product terminaling is faced with the prospect of high capital costs. BARA's (2014, p. 8) proposed solution in this instance is for airport owners to expand into the fuel terminaling business:

> *BARA proposes that, to address this barrier to entry, airport operators should procure off-airport storage options and provide them on fair and open terms to all potential jet fuel importers. This could involve a combination of renting or acquiring existing storages (e.g in Sydney) and investing, or enabling investment in new facilities in Melbourne, Brisbane and Perth. These off-airport storage facilities should have the capability to transfer jet fuel to the airport by both pipeline and road tankers.*
>
> *Once procured, the airport operator can on-sell access to these facilities to jet fuel importers at an agreed competitive price. BARA envisages that the storage facilities would be on-sold on a competitive per litre basis, removing the financial barrier of fixed rental payments. A volume-based price would be especially beneficial as importers gradually increase their volume of sales at each major international airport.*

However, fuel terminaling is a specialised business and airport owners may be reluctant to expand beyond their current area of expertise. Furthermore, the suggestion by BARA would appear to be somewhat naïve in light of the following observation by the ACCC (2018, p. 6) in relation to the conduct by airport operators:

> *In the past the ACCC has raised concerns that the current monitoring regime did not provide an effective constraint on the airports' market power.*

On the other hand, access is available on commercial terms as there is always the opportunity to lease spare terminaling storage capacity from either existing jet fuel suppliers or from other parties. Other parties involved in leasing terminaling storage capacity include:

- Vopak at Port Botany (Sydney) and at the Port of Darwin;
- Terminals Pty Ltd at Port Botany, Port of Melbourne, and Port Adelaide;
- Stolthaven at Coode Island at the Port of Melbourne;
- Coogee Chemicals at the Port of Fremantle (near Perth); and
- Puma Energy at the Port of Fremantle (near Perth) and at the Port of Brisbane.

Although BARA (2014, p. 8) is aware of Vopak at Port Botany, it complains the problem in Sydney is the inability of importers to gain sufficient access to the remaining jet fuel infrastructure supply chain. This probably refers to both jet fuel transport to the airport and jet fuel storage at the airport.

In relation to jet fuel transport to the airport, BARA (2014, p. 8) has proposed negotiating with existing pipeline operators in the first instance, or constructing new jet fuel pipelines:

> *One solution is for existing pipeline owners to establish access arrangements to their pipelines consistent with BARA's principles for workable access. In the first instance, the existing owners should be given the opportunity to modernise access to their pipelines to support competitive jet fuel markets.*
>
> *If agreement with the pipeline owners cannot be reached, however, it will be necessary to accelerate the construction and delivery of new pipelines. These accelerated pipelines should be owned and operated by companies that do not provide jet fuel to airlines.*

It is interesting to note there is a lack of detail on BARA's part as to who exactly would fund the construction of these new jet fuel pipelines.

While there are definitely barriers for prospective new jet fuel import suppliers from establishing their own their own jet fuel pipelines to airports, barriers to entry by road transport from road fuel tankers are comparatively low in comparison. Qantas has also proven that it is indeed possible to negotiate access to a pipeline supplying an airport on commercial terms with an existing jet fuel supplier.

The requirement for prospective new jet fuel import suppliers to purchase equity in a Limited Access JUHI has already been addressed above and should be seen in the context of mitigating the hold-up problem rather than presenting a barrier to entry. In addition, there is now Open Access available at the Melbourne and Darwin JUHIs.

The NCC (2012, p. 39) has previously accepted that barriers to entry into the market for the provision of into-plane services are low. According to Qantas (2011, p. 13):

> *Qantas believes that barriers to entry to this market are already low. The cost to start-up an into-plane company is minimal in comparison to other infrastructure, taking into account the cost of a hydrant truck (approximately $500,000), insurance, licensing and labour costs.*

It is possible for alternative jet fuel suppliers to access Australian airports and it has indeed been done. On this basis, barriers to entry are not insurmountable and thus prospective jet fuel suppliers provide an effective competitive constraint on existing jet fuel suppliers.

10 Other Avenues to Obtain Access to Jet Fuel Supply Infrastructure

In its public pronouncements on its perceived problems with jet fuel pricing and supply chains, BARA often refers to 'Open Access'. For example:

> *BARA proposes a reform path to allow importers of jet fuel to compete on merit at Australia's major international airports. The new path involves unlocking the jet fuel supply chain through Open Access and fair pricing. (Board of Airline Representatives of Australia, 2014, p. 2)*

While BARA's platitudes may sound superficially attractive, there is not a lot of fine detail provided on what exactly they mean by 'Open Access.

What BARA overlooks is that there are already avenues available for their members to access jet fuel supply chain infrastructure that have already been outlined above. Furthermore, in addition to Open Access regimes already operating at some airport JUHIs, there are two other potential legal avenues available for prospective jet fuel suppliers that could compel access by existing operators of jet fuel supply infrastructure both on and off airport. Both of these avenues are discussed below.

BARA also overlooks the benefits of continuity of supply. The Australian jet fuel industry has a long history of continuous investment ahead of demand to provide uninterrupted fuel supply. When there have been stock outs, they have arisen ether from Force Majure events, or primarily when lobby groups such as BARA has attempted to distort free market forces and the efficient placement of capital. BP notes, the cost on underinvestment in infrastructure, a fragmented model where no party has an integrated responsibility for continuous supply, has not been costed. The damage to the airline industry of such a disaggregated model is immeasurable.

10.1 National Access Regime

Part IIIA of the CCA establishes a legal regime to facilitate third party access to certain services provided by means of significant infrastructure facilities. It is also known as the National Access Regime. One of the objects of Part IIIA is to promote the economically efficient operation of, use of and investment in infrastructure by which services are provided, thereby promoting effective competition in upstream and downstream markets.

Part IIIA is not limited to any particular industries. Services that may be covered under Part IIIA include those provided by facilities such as railway tracks, airports, port terminals or sewage pipes. Part IIIA sets out four 'pathways' through which access can be sought to infrastructure services:

- through declaration,
- pursuant to a state or territory access regime,

- under a voluntary access undertaking given by a service provider and accepted by the ACCC, and
- Through a competitive tender process for government owned facilities.

Competition can be stifled in situations where a vertically integrated firm excludes its non-integrated rivals from a vital input, thereby resulting in market foreclosure. The fundamental effect of any successful foreclosure is a restriction of output in both the upstream and the downstream markets, with a corresponding increase in price coming at the expense of customers in the downstream product market (Mullin & Mullin, 1997, p. 77). Market foreclosure due to the inability of a non-integrated rival to access a vital input may result in a loss of allocative efficiency.

The 1993 independent committee of inquiry into National Competition Policy (Hilmer Report) recommended the establishment of a legal regime to provide third party access to essential facilities under prescribed circumstances (Hilmer, Rayner, & Taperell, 1993, p. 266). The Hilmer Report defined essential facilities according to two criteria:

- Facilities that exhibit natural monopoly characteristics in the sense that they cannot be duplicated economically.[9] Examples given of natural monopolies were electricity transmission grids, telecommunications networks, rail tracks, major pipelines, ports and airports.
- Facilities must occupy a strategic positions in an industry in the sense that access to the facility is required if a business is to be able to compete effectively in upstream or downstream markets. (Hilmer, Rayner, & Taperell, 1993, p. 240)

The Hilmer Report saw the problem of denying third party access to essential facilities in the following terms:

> *Where the owner of the 'essential facility' is vertically-integrated with potentially competitive activities in upstream or downstream markets … the potential to charge monopoly prices may be combined with an incentive to inhibit competitors' access to the facility. For example, a business that owned an electricity transmission grid and was also participating in the electricity generation market could restrict access to the grid to prevent or limit competition in the generation market. Even the prospect of such behaviour may be sufficient to deter entry to, or limit rigorous competition in, markets that are dependent on access to an essential facility. (Hilmer, Rayner, & Taperell, 1993, p. 241)*

An essential facilities doctrine has evolved from US competition law jurisprudence based on refusal to deal cases prosecuted under sections 1 and 2 of the US *Sherman Act (1890).* Section 1 prohibits any contract, combination or conspiracy that restrains trade or commerce. Section 2 prohibits single-firm conduct that undermines the competitive process and thereby enables a firm to acquire, credibly threaten to acquire, or maintain monopoly power (US Department of Justice, 2008, p. vii).

The Hilmer Report recommended the establishment of a third party access regime for essential facilities that it envisaged would be used only sparingly:

[9] Natural monopoly is the situation where the entire demand within the relevant market can be satisfied at lowest cost by one firm (Posner, 1969, p. 548). It usually reflects the existence of unexhausted economies of scale, but can persist beyond the point at which economies of scale have been exhausted and average costs begin to rise.

> *The Committee proposes the establishment of a new access regime potentially applicable to any sector of the economy. In practice, however, such a regime should be applied sparingly, focusing on key sectors of strategic significance to the nation. (Hilmer, Rayner, & Taperell, 1993, p. 260)*

In response to the Hilmer Report recommendations on the establishment of an of third party access regime for essential facilities, the Commonwealth Government enacted Part IIIA of the then Trade Practices Act, now the CCA.

To have the provision of an infrastructure service declared under Part IIIA, the following declaration criteria must be satisfied:

a) that access (or increased access) to the service, on reasonable terms and conditions, as a result of a declaration of the service would promote a material increase in competition in at least one market (whether or not in Australia), other than the market for the service;
b) that the facility that is used (or will be used) to provide the service could meet the total foreseeable demand in the market:
    i. over the period for which the service would be declared; and
    ii. at the least cost compared to any 2 or more facilities (which could include the first-mentioned facility);
c) that the facility is of national significance, having regard to:
    i. the size of the facility; or
    ii. the importance of the facility to constitutional trade or commerce; or
    iii. the importance of the facility to the national economy; and
d) that access (or increased access) to the service, on reasonable terms and conditions, as a result of a declaration of the service would promote the public interest.

The access declaration criteria was amended last year. The amendments clarified the operation of criterion (a) to ensure that declaration would promote a material increase in competition in a market other than the market for the service rather than merely assessing whether access (or increased access) would promote competition. The amendments also clarified the operation of criterion (b) to ensure that access declaration focused upon the services provided by natural monopoly infrastructure facilities following confusion arising from judicial interpretation with the inclusion of a natural monopoly test.

As already discussed above, BARA has previously applied for an access declaration to the Sydney Airport JUHI under Part IIIA in 2011. However, the application was rejected largely on the basis that it failed to satisfy the previous criterion (a) in that access would not promote a material increase in competition in a dependent market (Bradbury, 2012). On that basis, it was further found that access would also fail the previous public interest test then contained in criterion (f).

10.2 Section 46 of the Competition and Consumer Act

Last year section 46 of the CCA was amended to prohibit a corporation with a substantial degree of market power engaging in conduct that has the purpose, effect or likely effect of substantially lessening competition in:

- that market; or

- any market in which the corporation itself, or a related body corporate, supplies or acquires goods or services or is likely to supply or acquire goods or services; or
- any market in which the corporation indirectly supplies or acquires goods or services or is likely to supply or acquire goods or services.

The primary inspiration behind section 46 of the CCA comes from the monopolisation provisions of the US competition law, section 2 of the *Sherman Act (1890)* (Quo, 2010). Section 46 has been characterised as the Antipodean analogue of section 2 of the Sherman Act (Reid, 2005, pp. 209-210).

The previous section 46 sought to prohibit a corporation that has a substantial degree of power in a market shall not take advantage of that power in that or any other market for the purpose of:

- eliminating or substantially damaging a competitor of the corporation or of a body corporate that is related to the corporation in that or any other market;
- preventing the entry of a person into that or any other market; or
- deterring or preventing a person from engaging in competitive conduct in that or any other market

Certain types of conduct that were covered by the previous section 46 and likely still covered by the amended provision include:

- refusal to deal; and
- restricting access to an essential input.

Businesses are generally entitled to choose whether or not they will supply or deal with another firm, including a competitor (Australian Competition and Consumer Commission, 2017a, p. 9). However, in limited circumstances, a refusal to deal by a firm with a substantial degree of market power may amount to a misuse of market power. In some circumstances, a firm with a substantial degree of market power may prevent or restrict a competitor's access to key input. This type of conduct may also breach the misuse of market power provision.

The previous section 46 was applicable to instances where parties refused to supply a good or service, as confirmed by the High Court's decision in the *Queensland Wire* case.[10] On this basis, the revised section 46 is also likely to be applicable in the case of a refusal to supply.

For infrastructure that doesn't meet the declaration criteria under Part IIIA of the CCA, section 46 could be used as a fall-back provision to obtain access as previously suggested by the Law Council of Australia (2001, p. 9). According to Associate Professor Brenda Marshal of Bond University in reflecting on the previous section 46:

> *… 'residual' access disputes, falling outside the ambit of the regime enacted by Part IIIA, remain justifiable under s 46. (Marshall, 2003, p. 51)*

There is no reason why this should not still be applicable in relation to the revised section 46. Parties can pursue their own private actions for breaches of section 46 in the Federal Court.

10.3 Industry-Specific Access Regimes

According to BARA (2014, p. 10):

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[10] *Queensland Wire Industries Pty Ltd v Broken Hill Proprietary Co. Ltd* (1989) 167 CLR 177.

> *The existing jet fuel pipelines are owned and controlled by either individual companies or joint ventures of companies that usually supply jet fuel to airlines at the airport.*
>
> *There are no approved codes or arrangements that permit Open Access on fair and reasonable terms as allowed for under the Competition and Consumer Act Act … This lack of Open Access prevents new entry into Australia's jet fuel industry.*

However, as already discussed, the operation of both Part IIIA and section 46 of the CCA means there are already pathways available for prospective jet fuel suppliers under Australian competition law to obtain access to jet fuel supply infrastructure if it is warranted. As such, there is absolutely no need to impose any industry-specific access regimes on jet fuel supply infrastructure.

However, it is possible that through its numerous public references to Open Access, what BARA is really suggesting is the creation of an industry-specific access regime for jet fuel supply infrastructure based on its vague public statements. At a time when jet fuel demand is rising and investment is required to increase the capacity of jet fuel supply infrastructure, the imposition of an industry-specific access regime would have a deleterious and chilling effect on further investment.

The Hilmer Report that recommended the establishment of Part IIIA of the CCA, was opposed to the establishment of any more industry-specific access regimes:

> *Importantly, the Committee is not convinced that access regimes of this kind need be legislated and administered on an industry-specific basis. While each industry has its own peculiar characteristics, there are also important similarities between access and related issues across the key infrastructure industries. The development of a common legal framework offers the benefits of promoting consistent approaches to access issues across the economy. It also permits expertise and insights gained in access issues in one sector to be more readily applied to analogous issues in other sectors. (Hilmer, Rayner, & Taperell, 1993, pp. 248-249)*

More recently, the Productivity Commission (2013, pp. 278-279) has also warned against the adoption of further industry-specific access regimes unless strict conditions can be satisfied:

> *Before any additional industry-specific access regimes are introduced, governments should seek to demonstrate that there is a policy problem that is best addressed by access regulation, and that there is sufficient similarity between infrastructure services in the industry to make an industry-specific approach the most appropriate approach. Governments should also seek to demonstrate that there are features of the industry that justify different regulatory treatment for third party access to infrastructure services from that offered by the generic National Access Regime. In the Commission's view, there is insufficient evidence to suggest that additional industry-specific regimes would generate substantial net benefits at this time.*

Specifically in relation to fuel terminals, the Harper Report concluded:

> *The Panel has not seen evidence that would justify industry-specific intervention to facilitate such access for fuel terminals. (Harper, Anderson, McCluskey, & O'Bryan, 2015, p. 291)*

Professor Harold Demsetz (1967, p. 354) of the University of California at Los Angeles has observed:

> *Private ownership implies that the community recognises the right of the owner to exclude others from exercising the owner's private rights.*

The ability to exclude prevents property from becoming common property (Barzel, 1997, p. 114). However, the imposition of an industry-specific access regime risks turning jet fuel supply infrastructure into common property. In recommending the introduction of Part IIIA of the CCA, the Hilmer Report warned:

> *The Committee is conscious of the need to carefully limit the circumstances in which one business is required by law to make its facilities available to another. Failure to provide appropriate protection to the owners of such facilities has the potential to undermine incentives for investment. (Hilmer, Rayner, & Taperell, 1993, p. 248)*

The NCC (2001, p. 85) has also recognised that access regulation could have adverse implications for infrastructure investment:

> *If applied inappropriately, Part IIIA could undermine price signals, innovative activity or the incentives for investment.*

The Productivity Commission (2001, p. 67) has previously commented that concerns regarding the *potential* for access regulation to deter investment have been well founded. According to the Productivity Commission (2001, p. 70):

> *… the mere existence of access regulation may well have some deleterious impacts on investment in essential infrastructure.*

The Productivity Commission (2001, p. xix) opined that access regulation may deter investment for two reasons:

- Potential exposure to access regulation is likely to increase the general level of risk attaching to investment in essential facilities; and
- Investments in essential infrastructure will also be deterred if regulated terms and conditions are not expected to provide a sufficient return.

An industry-specific access regime for jet fuel supply infrastructure could also have a chilling effect on investment through discouraging firms from developing their own alternative inputs. The loss of competitor incentive to invest in their own inputs could be extremely serious in the event that rivals could enter the market by some alternative means not requiring access to another parties' facilities (Areeda & Hovenkamp, 2002, p. 173). In this case, the access regulation could serve to reduce the incentive for the development of realistically available competitive alternatives.

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