High-level analysis of DAA's investment plans:

key issues

Report to the Commission for Aviation Regulation

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analysis for confidence in policy

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Note on the use of constant prices

Unless otherwise stated, estimates of future money amounts in this report are presented in constant 2006 price terms, excluding the effects of future inflation. Amounts presented by the Commission in the last determination were expressed in constant price terms as at the end of December 2004. The following table shows how key figures are adjusted to take into account consumer price inflation since December 2004:

Price base adjustments

	December 2004 price terms	Mid 2006 price terms
Consumer Price Index	*109.8*	*116.0*
Estimated average airport charges per passenger for 2006	-	€6.00
Maximum allowed average airport charges for the period 2006-09, per current determination	€6.34	€6.70
DAA estimate of average airport charges for period 2006-09 needed to accommodate September 2006 CIP	€7.50	€7.92
Capital investment for 2006-09 estimated by DAA in the May 2005 CIP	€542 million	€573 million
Capital investment for 2006-09 incorporated into the Commission's calculations of maximum airport charges for the current determination	€476 million	€503 million
Capital investment for 2006-09 estimated by DAA in the September 2006 CIP	-	€1,178 million

1 Introduction

Background

1.1 The Dublin Airport Authority (DAA) has provided the Commission for Aviation Regulation (the Commission) with a new Capital Investment Plan (CIP) for the period 2006 to 2015 involving major investment in the airport's terminal and airfield facilities and its access roads and car parks, including the construction of a new terminal, Terminal 2 (T2). This CIP represents more than double the level of expenditure anticipated by the DAA at the time of the Commission's determination of maximum airport charges currently in force, dated 29 September 2005. Following consultation with interested parties, the Commission has decided to undertake a review of that determination.

1.2 The Commission has asked me to prepare a report on the high level issues arising from the new CIP to inform the Commission's thinking about the 2006 CIP and its dialogue with interested parties during the review.

1.3 In preparing this report, I have been guided by the Commission's objectives set out under the Aviation Regulation Act, 2001, as amended. Those objectives are to facilitate the efficient and economic development and operation of Dublin Airport which meet the requirements of current and prospective users of Dublin Airport, to protect the reasonable interests of those users in relation to the airport and to enable the DAA to operate and develop the airport in a sustainable and financially viable manner.

Limitations

1.4 This report sets out the results of my high-level analysis of the CIP and the reasons for the increase in projected costs. I have sought to outline some of the explanatory factors and the main issues that could be relevant to the Commission's review. This report is therefore more about raising questions than answering them. In particular, I have not carried out any detailed scrutiny or independent verification of any information provided to the Commission.

1.5 I have carried out my analysis based on information provided to the Commission by the DAA and in some instances the results of analysis of that information by Dr William Hynes. I have verified my understanding of key information with DAA staff, but DAA was not offered an opportunity to review this report before its completion.

1.6 I have focused on the investment programme in the CIP, but I am aware that implementing the CIP would have important implications for the operating costs and commercial revenues of the airport. The balance of

these implications could materially affect my estimates of the impact of the CIP on airport charges.

Summary

1.7 DAA's investment programme has doubled in cost since 2005. This report does not carry out or report any assessment of this cost, but provides some high level commentary on the reasons for the increase in cost and the policy implications for the Commission.

1.8 The factor with the largest cost impact is an assessment by the DAA that its new terminal will need to handle high peaks in passenger flows[1], in particular in the early morning. T2 is planned to be physically larger and to handle significantly more passengers per hour than the existing terminal but, because of expected peakier flows, it would be able to handle half the annual volumes handled by the existing terminal in 2006.

1.9 My analysis questions the assumption that the new terminal would only be able to handle about 11.5[2] million passengers in a year, taking the airport's terminal capacity to around 30 million passengers per year. Under some apparently plausible circumstances, it could be significantly more.

1.10 Based on the Commission's financial model, and a number of key assumptions, I calculate that average airport charges would need to be about €9.50 per passenger in 2006 price terms shortly after T2 opens. One of those assumptions is the time profile, and passenger profile, over which costs would be recovered. This would be a matter of policy for the Commission.

1.11 The Commission must decide on the appropriate regulatory response to these new costs. Are they attributable to all current users, a subset of current users, to future users or even to the shareholder? This document sets out some high level analysis to help answer this and other important questions, but the final answers will depend on continuing engagement with users, particularly airlines, and the DAA during the Commission's current review of the determination. This paper is designed to help inform that dialogue.

1.12 This paper raises serious and searching questions, but asking serious questions should not be interpreted as prejudging the answers to them – it

[1] "Peaky" means proportionately more passengers travelling at peak times and proportionately fewer at other times.

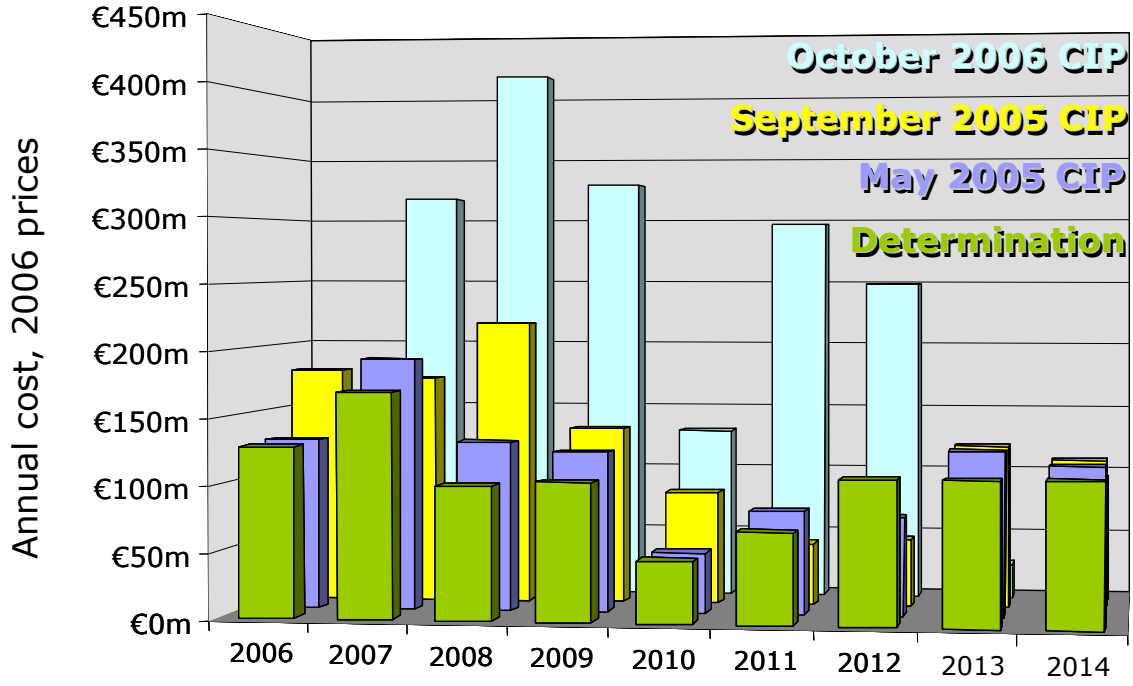
[2] I understand that the DAA does not present the figure of 11.5 million as a firm estimate of the annual handling capability.

is clear that the airport needs investment in new capacity and the scale of investment proposed by DAA appears to be supported in a number of respects by authoritative industry benchmarks. This report is about helping the Commission probe more deeply than these benchmarks.

2 Overview of the investment plan

2.1 DAA's investment plan for the period 2006 to 2009 amounts to a total of €1,178 million, which compares with a total of €542 million planned in the May 2005 investment plan over the same period, of which the Commission incorporated €476 million in its calculations for its determination of maximum airport charges[3]. The following chart illustrates the evolution of DAA's capital expenditure estimates.

Chart 1
Evolution of the CIP



[3] As set out in Annex II of Commission Paper CP5/2006. These latter two figures were presented in December 2005 price terms, whereas DAA's current plan is presented in mid 2006 price terms.

2.2 After taking account of inflation[4], the current plan represents an increase of some €606 million or 106% on its May 2005 plan (an increase of 134% over the lower Determination assumption).

2.3 The following table summarises the difference between DAA's plans in September 2006 and May 2005. The projects in the two plans are not always directly comparable and this table only provides a broad guide as to the differences.

Table 1

Increase in the CIP

September 2006 vs. May 2005
2006 construction prices

		CIP totals, 2006-2009		
	Increase	*2006 CIP*	*May '05 CIP inflated*	*May '05 CIP (Dec 04 prices)*
	€m	*€m*	*€m*	*€m*
T2 and related programmes				
T2 & Pier E (Pier E not in 2005)	372.0	606.7	234.8	222.2
Temporary Forward Lounge	6.0	6.0	0.0	0.0
Utilities	25.8	48.3	22.5	21.3
Multi-storey car park	24.2	27.5	3.3	3.1
Roads reconfiguring	12.1	25.9	13.8	13.1
Customs & Border Protection	30.0	30.0	0.0	0.0
Programme management	12.8	12.8	0.0	0.0
Subtotal	482.8	757.2	274.4	259.8
T1 and other projects				
Long-term car parking	9.7	9.7	0.0	0.0
Pier D	33.0	119.7	86.7	82.0
T1 extension	22.0	54.8	32.8	31.0
Other T1 capacity	24.9	30.5	5.6	5.3
Other	33.2	206.6	173.3	164.1
Subtotal	122.8	421.2	298.3	282.4
Total	605.6	1,178.3	572.7	542.1

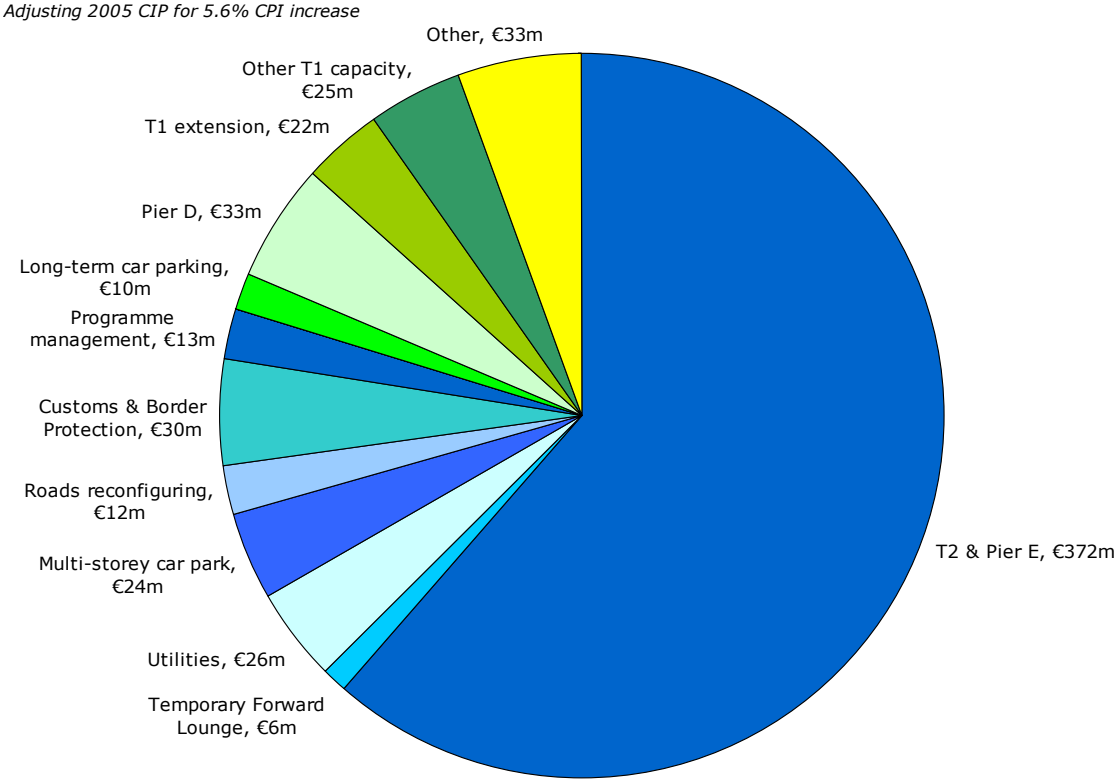
2.4 The next chart presents the increase in graphical terms.

[4] Adjusted for 5.6% consumer price inflation from December 2004 to mid-2006; the CIP is expressed in constant construction price terms; outturn construction costs would be affected by construction price inflation which is liable to be different to consumer price inflation.

Chart 2

Increase in CIP

Adjusting 2005 CIP for 5.6% CPI increase



2.5 It can be seen that the majority of the increase is associated with the new terminal, Terminal 2 (T2). The increase in cost on other projects is also material, but this report focuses mainly on T2 as its new proposed scale and cost represents the main change in circumstance between the two investment plans and, to some extent, is a driver for costs in other projects too.

3 Terminal 2 and related projects

3.1 The T2 project is made up of a number of components. The plan for 2006 to 2009 includes the construction of a larger terminal than was anticipated in May 2005 and bringing forward the construction of a new pier, Pier E, which is also larger than anticipated in the May 2005 plan. In May 2005, DAA did not plan to start construction of Pier E until 2010 but it is now planned for completion at the same time as T2 in 2009.

3.2 The following table summarises the cost components in the plan, reconciling to the overall Cost Plan provided by DAA. Note that this excludes related programmes identified in Table 1 above.

Table 2

T2 & Pier E

September 2006 vs. May 2005
2006 construction prices

		CIP totals, 2006-2009		
	Increase	*2006 CIP*	*May '05 CIP inflated*	*May '05 CIP (Dec 04 prices)*
	€m	*€m*	*€m*	*€m*
T2 construction and fees	184.2	384.1	199.9	189.2
T2 enabling & external	2.4	37.3	34.9	33.0
Pier E	111.2	111.2	0.0	0.0
T2 Project contingency	74.1	74.1	0.0	0.0
Total T2 & Pier E	372.0	606.7	234.8	222.2

T2 & Pier E: reconciliation to Cost Plan

Total per Cost Plan	609.4
Less: costs after 2009	(2.7)
CIP project 7.030: Terminal 2 Projects	606.7

3.3 The table highlights three key components: T2 construction, Pier E construction and contingency[5]. In the remaining part of this section, I analyse the factors that appear to be driving the scale and cost of the project. I deal first with Pier E.

[5] I note that the project contingency figure is in addition to explicit contingency allowances of 5% made in DAA's detailed costings, bringing the overall contingency up to about 19% of the underlying project costs.

Construction of Pier E

3.4 I set out below a table characterising the increase in the projected costs for Pier E.

Table 3

Pier E

September 2006 vs. May 2005 2006 construction prices

		CIP totals, 2006-2014		
	Increase	*2006 CIP*	*May '05 CIP inflated*	*May '05 CIP (Dec 04 prices)*
CIP totals: 2006-2009	-	€111.2 m	-	-
CIP totals: 2010-2014	-	-	€83.8 m	€79.3 m
Total costs	33%	€111.2 m	€83.8 m	€79.3 m
Pier area	58%	25,182 sq. m	15,951 sq. m	15,951 sq. m
Cost per square metre	-16%	€4,418	€5,252	€4,971
Number of narrow body stands	46%	19	13	13
Cost per stand	-9%	€5.86 m	€6.44 m	€6.10 m
Area per stand	8%	1,325 sq. m	1,227 sq. m	
Benchmark busy hour passenger capacity*		2,750	1,900	

* *145 departing passengers per narrow body stand per hour per page 9 of IMR/WHA 28/9/05 report, close to DAA's implicit assumption of 150 departing passengers per stand.*

3.5 The construction of Pier E has been brought forward from the period 2010-2014 to the current period, 2006-2009, and to serve 19 narrow body contact stands instead of the originally planned 13. It is also planned to be built in a different location, involving the conversion of the existing Pier C from pier to terminal use[6] (the May CIP planned Pier E to extend from the end of Pier C, while the current plan has Pier C being incorporated into the new terminal and Pier E extending from the middle of it). This means the loss of Pier C's equivalent of 6 narrow body contact stands, making a net addition of 13.

3.6 DAA's projections envisage that Pier E will only handle a proportion of T2's early morning peak passengers, the remainder being handled through Pier D and by bussing to remote aircraft stands.

3.7 The average cost per square metre for the Pier, which includes significant estimates for external work on the apron, appears more consistent with the independent unit cost assessment made for the Commission in September 2005 than the costs estimated for the May 2005 CIP.

6 Some of the existing Pier C will continue to be used for gate lounges for remote stands.

Construction of T2

3.8 The following table shows that the proposed construction costs of T2, excluding the overall project contingency, are some 92% larger than anticipated in May 2005. This increase can be broken down to the following factors:

- the terminal is expected to handle 15% more passengers per year, and
- is designed to provide 44% more space for each of those passengers on average, and
- is projected to cost 16% more per square metre of that space than the May 2005 estimate.

Table 4
T2 construction and fees
September 2006 vs. May 2005
2006 construction prices

	Increase	*CIP totals, 2006-2009*		
		2006 CIP	*May '05 CIP inflated*	*May '05 CIP (Dec 04 prices)*
CIP totals	92%	€384.1 m	€199.9 m	€189.2 m
Terminal area	65%	78,000 sq. m	47,164 sq. m	47,164 sq. m
Cost per square metre	16%	€4,924	€4,238	€4,012
Annual passenger flows	15%	11.5 m	10.0 m	10.0 m
Cost per annual passenger	67%	€33.40	€19.99	€18.92
Area per million annual passengers	44%	6,783 sq. m	4,716 sq. m	
Busy hour departing passengers		4,200	-	
Busy hour arriving passengers		2,500	-	
Busy hour departing aircraft		28	-	
Busy hour arriving aircraft		16	-	

3.9 By far the most important factor lying behind these changes is the DAA's expectation for the number of passengers that will need to be handled during busy hours[7]. DAA has designed a terminal that can handle 4,200 departing passengers[8] per hour at a reasonable level of service, IATA level of service C, while DAA has declared the summer 2006 capacity of its existing terminal to be 3,250 departing passengers per hour[9]. Together, without including any of the T1 capacity improvements also in the plan,

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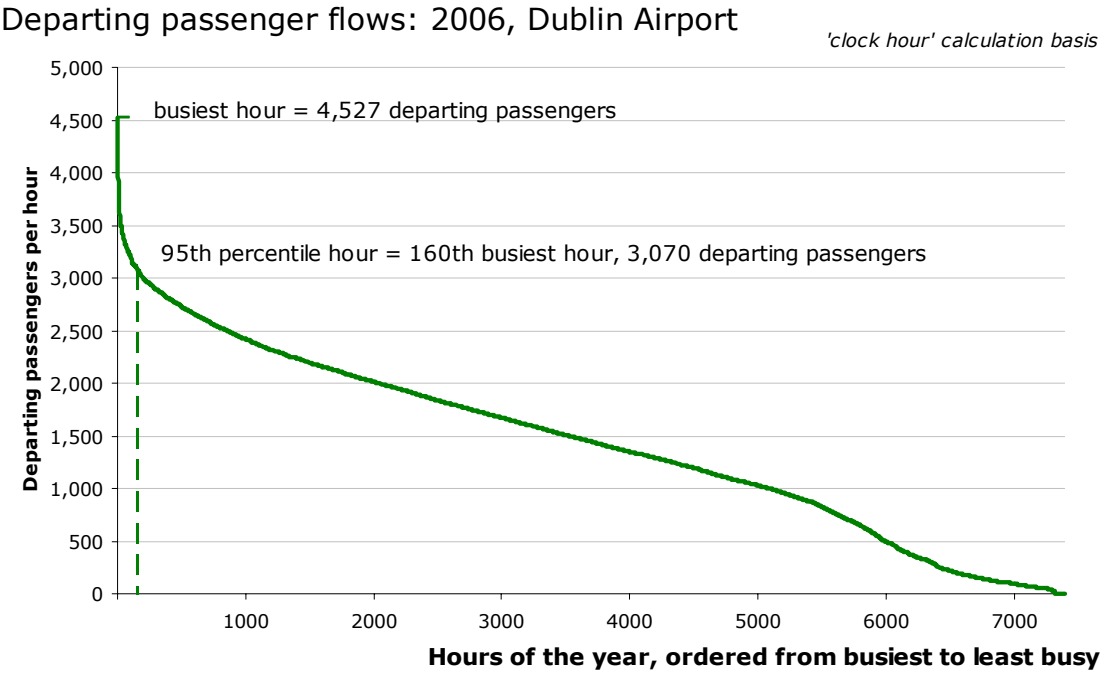
7 Note on use of terms 'busy hour' and 'peak hour': it would be usual to design terminal capacity for the passenger flows in a typical busy hour, which would not be the busiest hour of the year. It is accepted by airport designers that it is not economic to design airport facilities to handle the absolute peak flow of passengers in a year, as the facilities would be under utilised for all but one hour of the year. To measure a typical busy hour flow rate, the Commission adopts a methodology accepted in the UK and which has also been used by the DAA in the past. This identifies a busy hour flow rate at or below which 95% of passengers will use the airport. An airport facility designed for this level of flow should provide levels of service to the desired standard for 95% of passengers. Some hours will inevitably be more congested and service levels would dip below the standard for those periods, but only a small minority of passengers should be affected. This methodology can be illustrated in the following chart for 2006, where the area to the left of the vertical dashed line represents 5% of all departing passengers handled by the airport.



8 The spatial requirements of a terminal are driven mainly by flow rates for departing passengers, who dwell in the terminal for longer periods of time than arriving passengers.

9 Calculated from detailed flight schedules, the 95th percentile busy hour flow rate on a 'clock hour' basis for 2006 was 3,070 passengers, or 3,144 passengers on a rolling hour basis calculated each quarter hour (I have adopted this second slightly more accurate method in my main calculations for this report).

the airport will increase the airport's departing passenger handling capacity by some 129%. An increase of 129% in passenger numbers would take the airport close to 50 million passengers per year. However, once T2 is built, DAA characterises the airport's terminal facilities as capable of handling some 30 million passengers annually, an increase of only 42% over actual 2006 levels[10].

3.10 Contrasting these two sets of statistics highlights a key driver for the increased cost: a significant change in the expected pattern of daily demand, specifically for prospective users of T2. The following table compares the spatial and demand characteristics for T2 with the current position for T1. I have also calculated estimated characteristics for T1 as if it were significantly less congested than today, for illustration only, assuming 15 million annual passengers while retaining a busy hour capacity of 3,250 departing passengers per hour.

Table 5
T2 compared with existing terminal

	Dublin T2 *Phase 1*	Dublin T1 *2006*	Dublin T1 *Uncongested?*
Busy hour passenger capacity:			
Departing	4,200	3,144	3,144
Arriving	2,500	2,854	2,854
Available terminal area*	78,000 sq. m	56,900 sq. m	56,900 sq. m
Annual passengers	11.5 m	21.2 m	15.0 m
Area per million annual passengers	6,783 sq. m	2,684 sq. m	3,793 sq. m
Area per busy hour departing passenger	18.6 sq. m	18.1 sq. m	18.1 sq. m
Peak hour departing passengers per mppa	365.2	148.3	209.6
Terminal utilisation (busy hours equivalent per day)	3h 45m	9h 14m	6h 32m

* *T1 area per page 14 of IMR/WHA 28/9/05 report, which excludes a floor used for general offices; T2 area includes new build area of 78,049 sq. m and the refurbished area of Pier C of 4,075 sq. m incorporated into the design*

Note: terminal utilisation is calculated as average departing annual passengers per day divided by peak hour capacity for departing passengers times 24. In other words, it seeks to express the average daily passenger throughput in terms of the number of 'busy hours' needed to accommodate an average day's departing passengers.

3.11 However, while these statistics suggest that T2 appears to be designed large, it remains true that the area per million annual passengers for T2 is close to a benchmark figure of 6,600 square metres per mppa which the UK Department for Transport used for determining core terminal area in its

10 These statistics relate to terminal facilities only; the capacity of the airport as a whole would depend on building other facilities, notably a second runway.

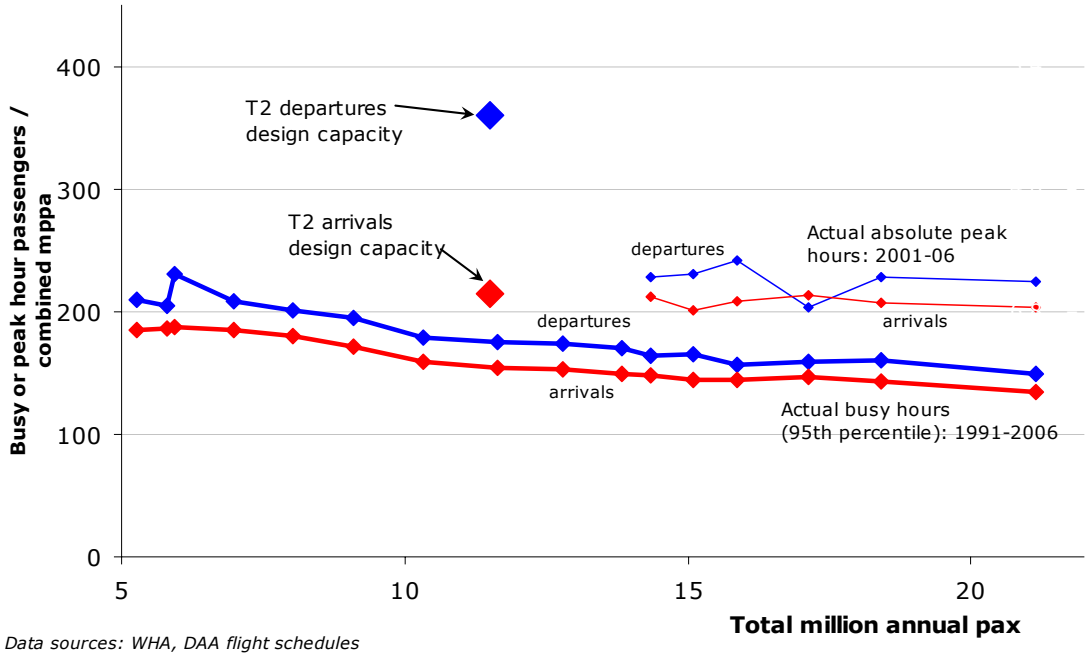
study of airport capacity in the South East of England (SERAS) in 2003. Dublin Airport, at present, is clearly out of line with this benchmark.

T2 peak hour demand

3.12 Table 5 shows that the utilisation of T2 throughout the day is anticipated to be less than half the current use of T1. High levels of utilisation in the existing terminal are attributed by the DAA in part to very high levels of congestion at all times of the day, forcing passengers and airlines to fly at less convenient times. However, it is not immediately evident from the history of hourly passenger flows at Dublin Airport since 1991 that utilisation patterns have been greatly skewed by the congestion experienced in recent years, as the following chart shows.

Chart 3

Busy and peak hour flow rates



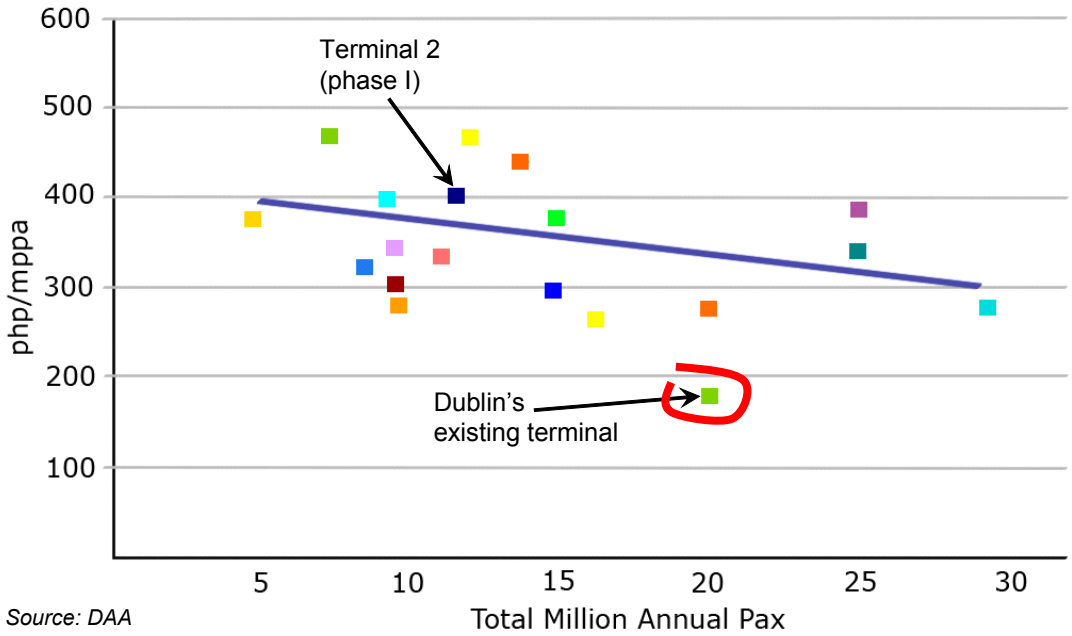
Data sources: WHA, DAA flight schedules

3.13 This chart may be compared with analysis provided by DAA in the following chart, which shows the peak hour for combined departing plus arriving passengers[11] and corresponding statistics for a number of other airports (with names omitted).

11 The peak aggregate flow for arrivals plus departures is not necessarily a good guide to required terminal capacity since the two flows are largely segregated in the terminal and capacity is thus required to handle the peak flows on a segregated basis. Combined peaks are invariably less than the sum of the separate peaks due to timing differences between the peaks for departing and arriving passengers. The combined peak for T2 is projected to

Chart 4

Comparison with other European airports



Source: DAA

3.14 This benchmarking comparison identifies that Dublin's existing terminal, circled in red in the chart, appears to exhibit an especially low level of peakiness (at least on an aggregate arrivals and departures basis), which it perhaps has done for a number of years.

3.15 This may be true for a number of reasons, including:

- Until recent years, a smaller proportion of aircraft using Dublin Airport belonged to home-based airlines, which have an operational requirement to get their fleets in the air early in the day, and it was used more by charter and other airlines with fleets based elsewhere;
- As the home-based airlines have expanded their presence, their growth strategies, and their ability to get large numbers of aircraft in the air early in the morning, have been constrained because the airport has been operating at close to capacity for a number of years.

3.16 However, to the extent that short-haul airlines are able to maximise the productivity of their aircraft assets by flying throughout the day, on

be about 4,600 passengers per hour, only about 10% above the projected peak for departing passengers alone. The equivalent statistic for Dublin Airport historically is about 60-70%. This would directly affect the position of T2 in the benchmarking chart, Chart 4.

average the airports they use would also have a relatively even pattern of utilisation through the day[12].

3.17 DAA's calculations for the demand pattern for T2 are based on forecast flight schedules for a representative busy day each year, assumptions about the number of Dublin-based aircraft operated by the prospective users of T2, the proportion of those departing in an early morning peak hour (6.15-7.14 am) and the load factors that would be achieved. DAA's calculations are informed by DAA's growth assumptions and the growth strategies indicated by the Dublin-based airlines, in particular Aer Lingus, the intended anchor tenant of T2. The key drivers in these calculations appear to be:

- continuing growth in demand for air travel;
- the evolution over a number of years in the user profile for Dublin Airport towards home-based airlines;
- the dependence of those airlines on Dublin-based aircraft; and
- the value to those airlines of being able to despatch Dublin-based aircraft during a peak hour of the morning.

3.18 DAA's projections indicate that prospective users of T2 currently use about 65% of the existing terminal's declared hourly capacity for departing passengers (2,050 out of 3,250 in summer 2006) and will roughly double that busy hour terminal capacity requirement by about 2015 (to 3750-4,200 on DAA's centreline growth assumptions). This is a rather faster rate of growth for peak hour demand than the underlying growth in annual passengers (from more than 21 million in 2006 to 30 million passengers over the same period). At that time, T2 will still handle rather less than 50% of the airport's annual passengers when it reaches capacity (11.5 million out of about 30 million).

3.19 Thus the projected operating schedules for T2's users appear to be peakier than the average for Dublin Airport as a whole and are projected to get peakier still. As a result, T2 is projected to have a demand profile for departing passengers which is twice as peaky[13] as the airport's demand profile at present, and it is this prospect that drives the proposed size and cost of the terminal.

12 Logically, this would be less true for long-haul services.

13 Calculated as busy hour departing passengers per million annual passengers.

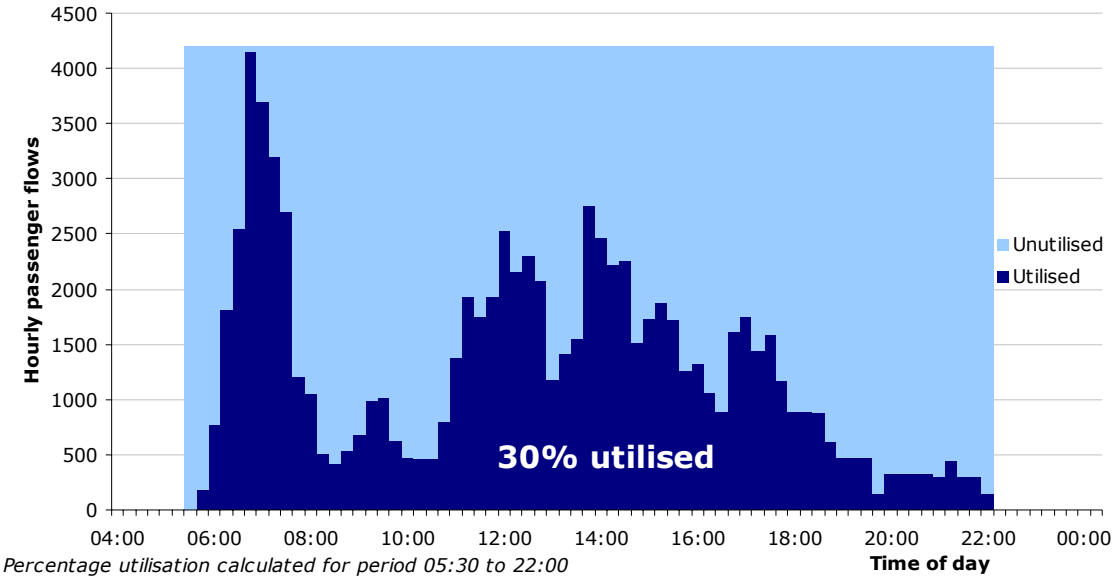
3.20 The following chart represents T2's projected peakiness graphically, based on DAA's projections for the last Friday in July 2016[14]. DAA has chosen the Friday before the August Bank Holiday as a 'planning day' as it broadly represents a typical busy day of the year[15]. DAA has projected flight schedules for this day to identify levels of passenger flows to inform the design capacity of the terminal.

3.21 According to these projected schedules, over the period 05:30 to 22:00 on this day, the terminal's departures capacity is projected to be about 30% utilised on average, with a very high utilisation at the peak hour of the early morning.

Chart 5

Terminal 2, 2016 capacity utilisation

Departing passengers for Friday before August Bank Holiday per DAA Gateway 2 report



Percentage utilisation calculated for period 05:30 to 22:00

3.22 I have carried out equivalent analysis of the actual flight schedules for the same Friday in each of the years 2002 to 2006. I have calculated an equivalent utilisation statistic for each of these years adopting the peak hourly flow in that day for each year as a measure of capacity[16]. The utilisation statistic ranges between 55% and 62%. The following chart

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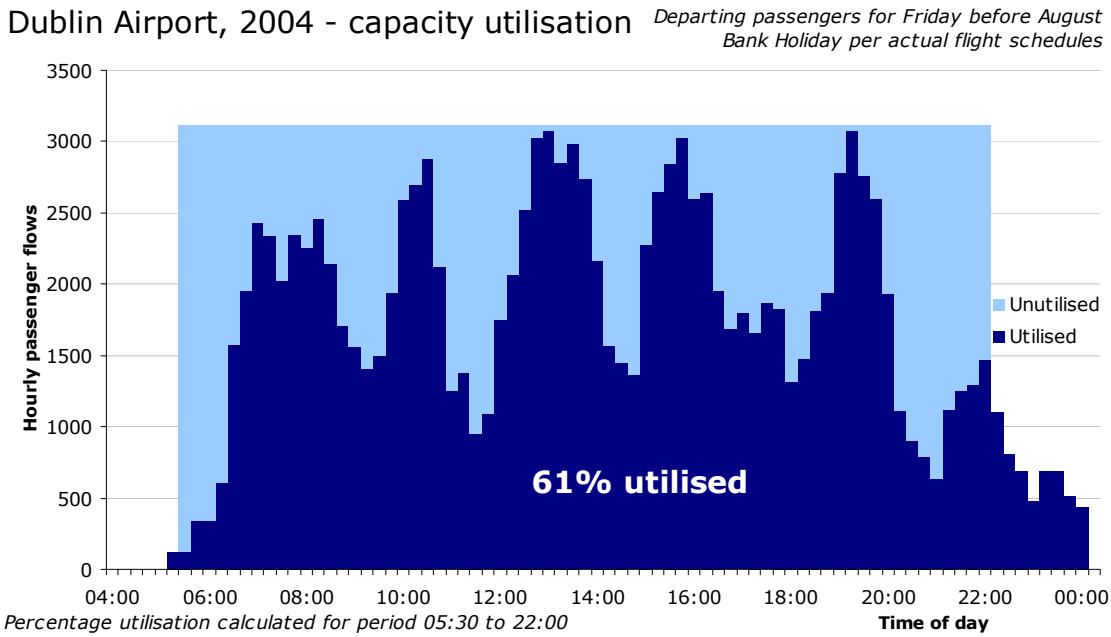
14 As indicated in the DAA Gateway 2 document. DAA advised the Commission just prior to finalisation of this report that the date should have read 2013. Whether it is 2013 or 2016 does not materially affect my analysis, but elsewhere in this report I refer to the date as originally stated in the Gateway 2 document.

15 For the years 2002-06 and for three different subsets of airlines (all airlines, Aer Lingus alone and non-Ryanair airlines) it has represented between the 7th and 37th busiest day of the year for departing passengers.

16 This ensures the statistic measures the pattern of demand.

illustrates the result for 2004. It shows double the level of utilisation, compared with T2, with a number of distinct peaks throughout the day and only relatively short periods of low utilisation.

Chart 6



3.23 The contrast between these two utilisation statistics, and between the densities shown in the charts, characterises DAA's projections for T2. Compared with Dublin's existing terminal, T1, it is a significantly larger facility[17] but it is projected to handle only about half the passengers annually compared with T1 in 2006 before it is deemed to have reached its capacity and to need an extension[18].

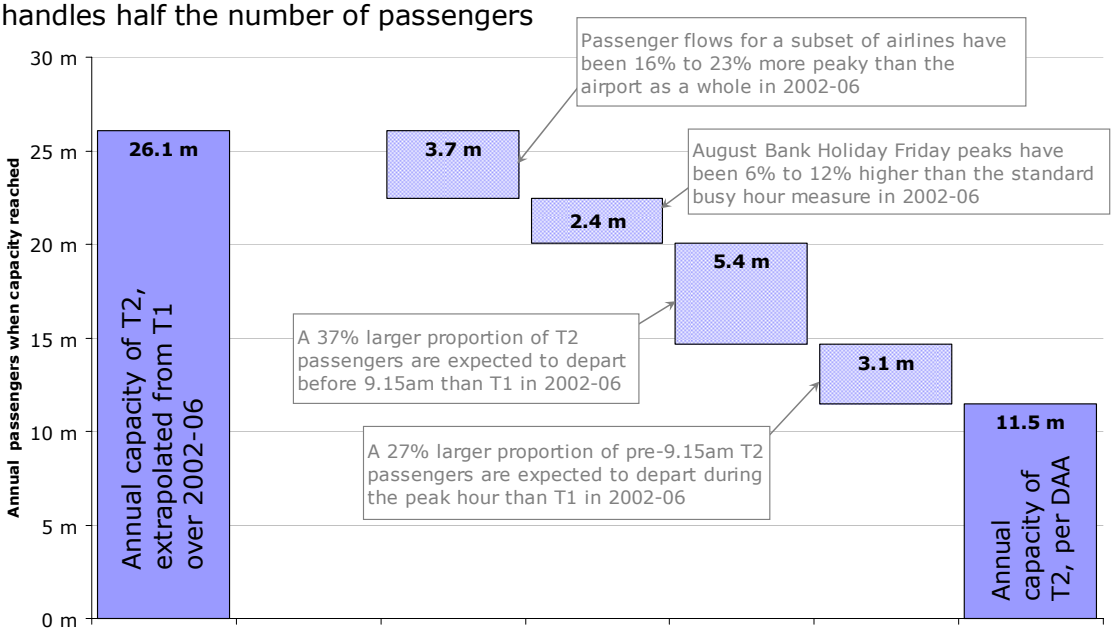
3.24 If the pattern of passenger flows in T2 were to reflect the patterns shown by T1 over the last five years, a simple calculation shows it should be able to handle 26 million passengers in a year. The following chart shows how that estimate is stepped down to an annual level of 11.5 million in DAA's projection.

17 Both in terms of floor areas and in terms of busy hour departing passenger capacity.

18 DAA's Gateway 2 document refers to "a second phase of construction for an additional peak departing capacity out to 5,500 passengers per hour at or around 2015. However, the timing and precise scale of this second phase will depend on exactly how demand develops over time."

Chart 7

Annual capacity of T2: how a larger terminal than T1 handles half the number of passengers



3.25 The chart[19] highlights four significant features of the projections used by DAA in determining T2's busy hour and annual passenger flows. I briefly describe each.

A subset of airlines

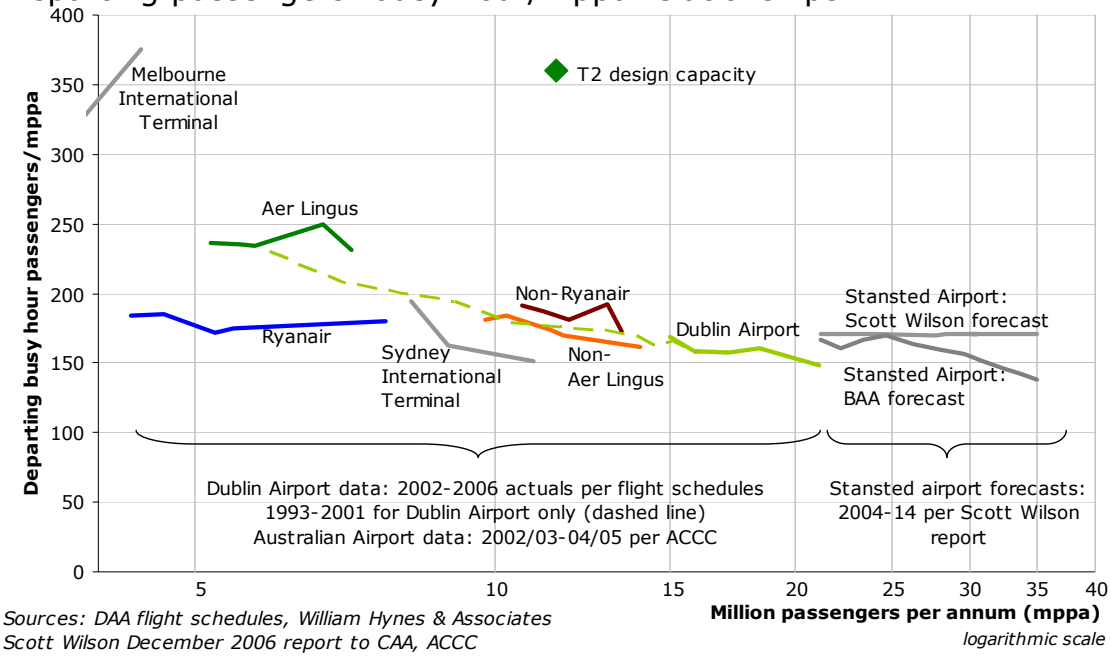
3.26 To inform my analysis of the capacity requirements for T2, I analysed the detailed flight schedules for 2002 to 2006 provided to the Commission by DAA. I have calculated for each year and for different subsets of airlines the departing passenger busy hour flow rates for the year, using the standard 95th percentile method, to generate a map of how these statistics relate to annual passenger flows. For comparison, I have drawn from comparable analysis set out in a recent report published by the UK's

19 The calculations for the chart track the relationships between the annual busy hour to peak ratio for the airport, the annual busy hour to peak ratio for a subset of airlines, the peak hours for a defined period on August Bank Holiday Fridays for 2002-06 for that subset of airlines, the total passengers departing in that defined period for that subset of airlines, the total passengers departing in the day for that subset of airlines and the total passengers departing in the year for that subset of airlines. To consider a range of possible user airlines, I have carried out calculations for two subsets of airlines, Aer Lingus and non-Ryanair, airlines, using the latter for the main analysis but referring to the results of the former to highlight any significant differences. I have used defined periods (early morning being 05:45 – 09:15 and midday being 11:45 – 15.15) which I considered fairly captured the main peak periods, but carried out sensitivities to ensure that the results were not unduly affected by small changes in the definitions.

Civil Aviation Authority on the departing passenger busy hour flow rates projected for Stansted Airport and supplemented this with further data from the Australian Competition and Consumer Commission in relation to Australian price controlled airports[20].

Chart 8

Departing passengers: busy hour/mppa relationships



Sources: DAA flight schedules, William Hynes & Associates
Scott Wilson December 2006 report to CAA, ACCC

3.27 The chart suggests a relationship between annual passenger numbers and the departing busy hour passenger/mppa 'peakiness' statistic (also shown in chart 3 above). In the light of this apparent relationship, I have built my analysis of required capacity for T2 on the historical patterns of passenger flows for a subset of airlines representing potential users of T2, being non-Ryanair airlines. I have also carried out the same analysis built on those for Aer Lingus, the anchor tenant for T2.

3.28 The historical peakiness statistics for the non-Ryanair subset of airlines have been greater than those for Dublin Airport as a whole by about 16% on average over the period 2002-06. Adopting these passenger flow

20 Publicly available data on airport capacity statistics, such as the Airport Capacity/Demand Profiles published most recently in 2003 by International Air Transport Association, Airports Council International and Air Transport Action Group, provide aggregate statistics but do not generally provide statistics specifically on departing passenger flows. The Commission's data on departing passenger statistics are taken from a very limited number of available ad hoc reports published by economic regulators.

patterns instead of Dublin Airport's would result in a reduced estimate of annual passenger handling capacity by about 3.7 million passengers. However, the level of growth projected for T2's users may be expected to lead to less peakiness, in line with the relationship apparent in the chart above. If so, the fact that T2 will be used by a subset of airlines would not necessarily imply a lower level of annual handling capacity.

The Friday before August Bank Holiday methodology

3.29 In its analysis of T2's capacity requirements, DAA has adopted a pragmatic approach that uses projected flight schedules for a typical busy 'planning day' in 2016, the Friday before the August Bank Holiday Monday (which will be 29 July 2016). DAA's analysis adopts the projected peak hour of this day as a measure of a typical busy hour for the year. I have carried out analysis of the equivalent Fridays for the years 2002-06 for different subsets of airlines and observe that the peak hour flows for those days tend to be higher than the standard 95th percentile measure. In the case of non-Ryanair airlines, it is a difference of some 12% on average.[21]

3.30 This difference may reflect a departure from an accepted standard methodology, although it may have been reasonable for DAA to adopt a 'planning day' approach.

Early morning and peak hour departures

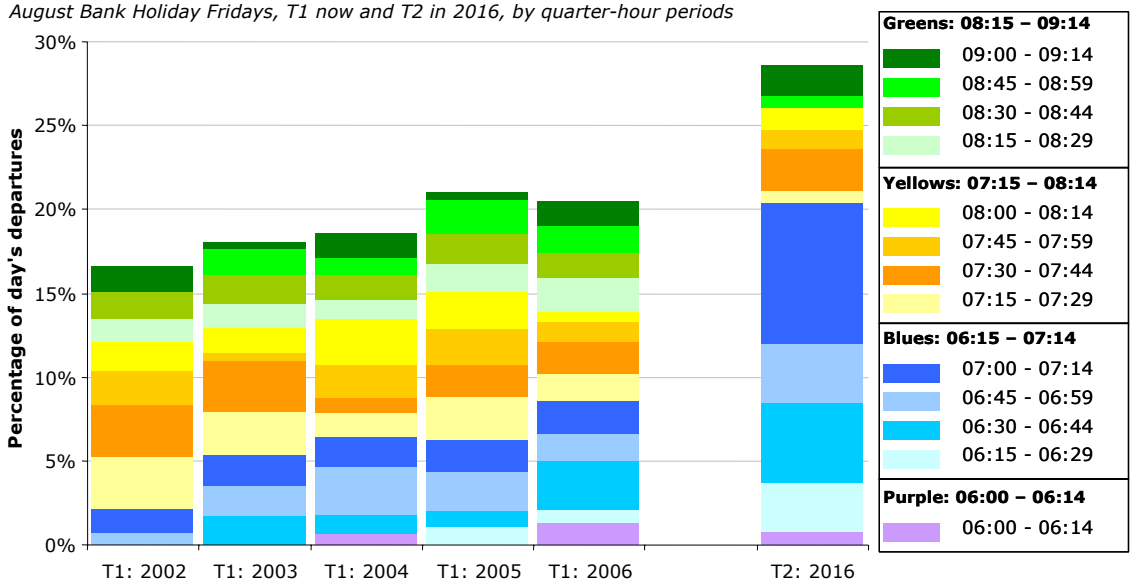
3.31 Comparison between the projected flight schedules for 29 July 2016 and the actual flight schedules for the period 2002-06 highlights that proportionately rather more passengers will be departing before 09:15 in the morning and a higher proportion of those will be departing before 07:15, particularly in the peak hour of 06:15 to 07:14. The chart below shows the overall comparison by quarter hour periods.

[21] Thus, the August Bank Holiday Friday peaks for non-Ryanair airlines have on average been some 12% higher than the standard busy hour statistic for each year for those airlines, which has been some 16% higher than the same statistic for the airport as a whole. Doing the analysis a different way, the August Bank Holiday Friday peaks for non-Ryanair airlines have on average been some 23% higher than the August Bank Holiday Friday peaks for the airport as a whole, which have been some 6% higher than the standard busy hour statistics for each year for the airport. These two statements are entirely consistent (1.12 x 1.16 = 1.23 x 1.06).

Chart 9

Early morning departing passengers, T1 and T2

August Bank Holiday Fridays, T1 now and T2 in 2016, by quarter-hour periods

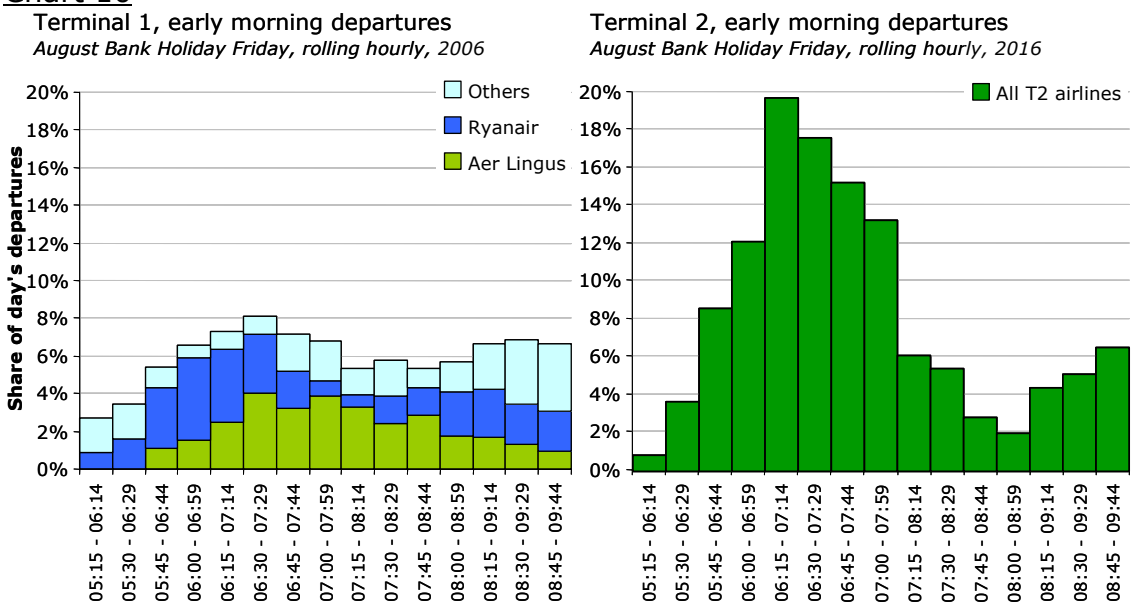


3.32 There has been some stability in the proportion of passengers departing before 09:15 on August Bank Holiday Fridays over the period I have analysed, with statistics varying by barely 1% across different subgroups of airlines (Dublin Airport, Aer Lingus alone and non-Ryanair airlines). That the flight schedules for T2 indicate a 37% step change in this proportion appears highly significant. It would be consistent with a strategy by airlines using T2 to base proportionately more aircraft at Dublin, but it raises a question over whether passengers leaving Dublin can be persuaded to fly more often in the early morning.

3.33 The dominance of the blue shades in the right hand column of the chart above reflects a sharpening of the peak in the daily profile. Not only will more passengers be flying in the early morning, but 20% of the day's passengers will be departing before 07:15, representing a marked change in the travelling patterns, and presumably the sleeping patterns, of passengers using Dublin Airport. Over the period I have analysed, Ryanair has tended to have more passengers departing before 07:15 than other airlines, on average just below 10% of its departing passengers, although this statistic rose to nearly 14% in 2006. Other subsets of airlines I analysed showed proportions consistently well below 10%. A 20% statistic for 2016 is a conspicuous increase.

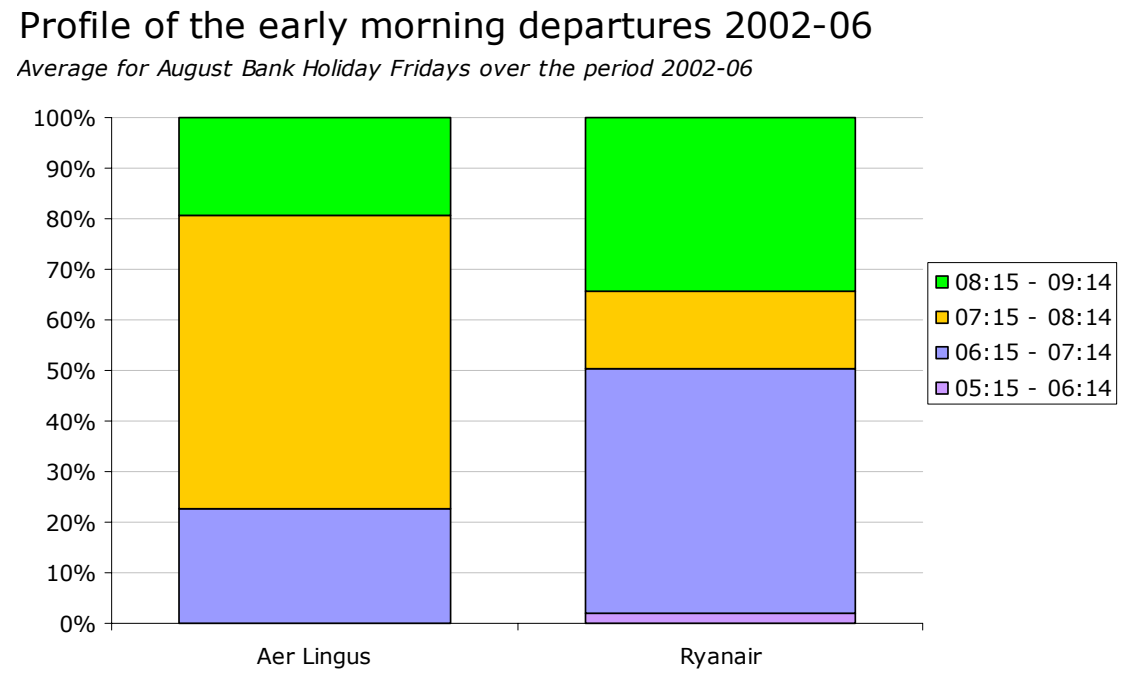
3.34 The sharpness of the projected peak for T2 is further illustrated in the following pair of graphs comparing the hourly flows for the bank holiday in 2006 with those projected for 2016 in T2 as proportions of the day's departures. It shows that nearly 20% of the day's departing passengers in 2016 will depart in one hour (including more than 21% of the projected departing passengers for Aer Lingus).

Chart 10



3.35 The proportion of the morning's departures in the peak hour flow projected for T2 is some 27% higher than the average proportion for non-Ryanair airlines over the period 2002-06. Aer Lingus's statistic for 2002-06 is some 18% higher, although it has generally been a later peak hour than that projected for T2. To some extent, Aer Lingus's morning peak hours have complemented the peak hours for the other large Dublin-based airline, Ryanair, as shown in the following chart.

Chart 11



3.36 This suggests that the peakiness of the projected schedules for Aer Lingus at T2 reflects an assumed preference by the airline for earlier peaks, significantly shifting its current profile of passenger departures. In other words, it would appear to be in part a matter of choice by the airline.

3.37 While there is spare capacity, as there would be in T2, it may be efficient for an airline to operate in a peaky manner. However, it is not clear whether the economic benefits for the airline in operating in that way would be high enough to warrant the cost of building further capacity at or around 2016 to accommodate a single very peaky hour of the day. If not, substantially higher annual passenger numbers might be simply accommodated in T2 by a modest rebalancing of the flight schedules.

Departures peaks in the middle of the day

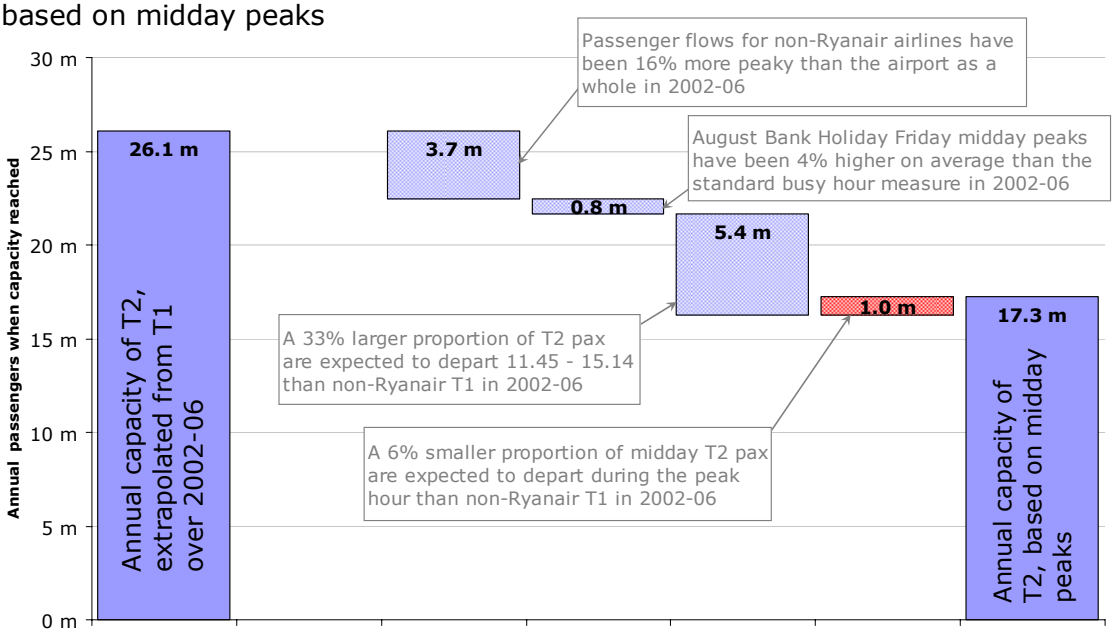
3.38 If much of the projected early morning peak could be accommodated by a modest rebalancing of the flight schedules, or otherwise, the relevant busy hours for T2 could revert to being in the middle of the day (broadly somewhere between 11:45 and 15:14).

3.39 Based on DAA's projection for 2016, consistent with an annual passenger flow of 11.5 million, the midday departure peaks of 2,760 passengers per hour would be some 66% of the terminal's capacity, suggesting room to accommodate further growth to a level of about 17.3 million passengers per annum.

3.40 This figure can be tracked from the T1-based extrapolation as follows:

Chart 12

Annual capacity of T2: capacity calculations based on midday peaks

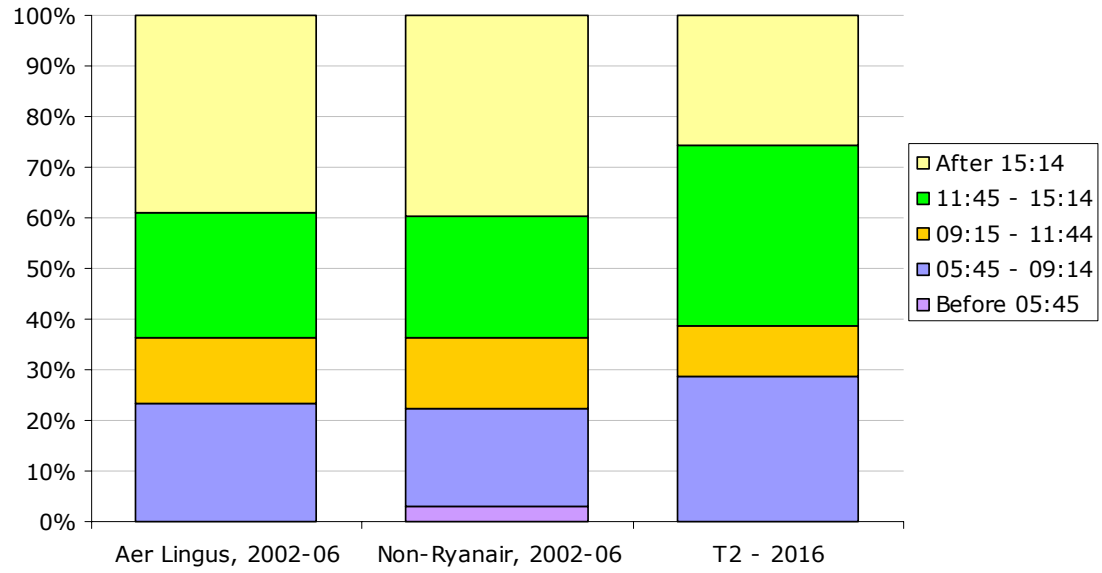


3.41 A key feature of the 2016 planning day schedules identified by the graph is a significant change in the proportion of passengers departing from the airport in the busy midday period, compared with 2002-06. This is a similar finding to the early morning analysis. The following chart illustrates these findings together, highlighting a significant swelling in the blue and green segments of the chart in comparison with both subsets of airlines for 2002-06.

Chart 13

Profile of the day's departures

Average for August Bank Holiday Fridays over the period 2002-06 & T2 in 2016

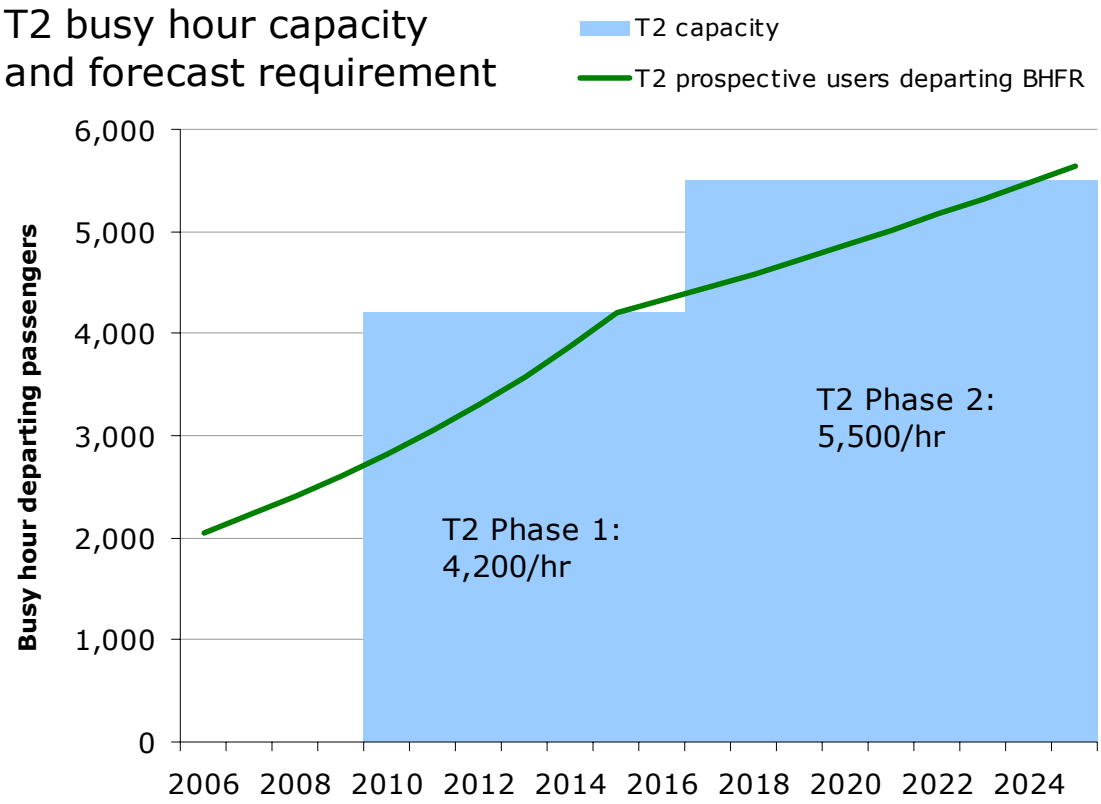


3.42 However, detailed analysis shows that, in 2006, there was a significant increase in the proportion of Aer Lingus passengers departing in these two segments of the day. That increase may be the start of a larger and enduring underlying shift in the daily profile of that airline's passengers. To reach the profile projected for 2016 would imply a rate of further growth in passenger numbers in these segments of the day some 4% per annum higher than the rate of growth in the other periods of the day, sustained over ten years from 2006 to 2016.

Implications for the airport as a whole

3.43 The build-up of busy hour demand at T2, compared with busy hour capacity for departing passengers, is shown in the following chart, which characterises the analysis provided by DAA.

Chart 14



Simplified characterisation of DAA 'Gateway 2' analysis

Note: BHFR = 'busy hour flow rate', measured as passengers per hour

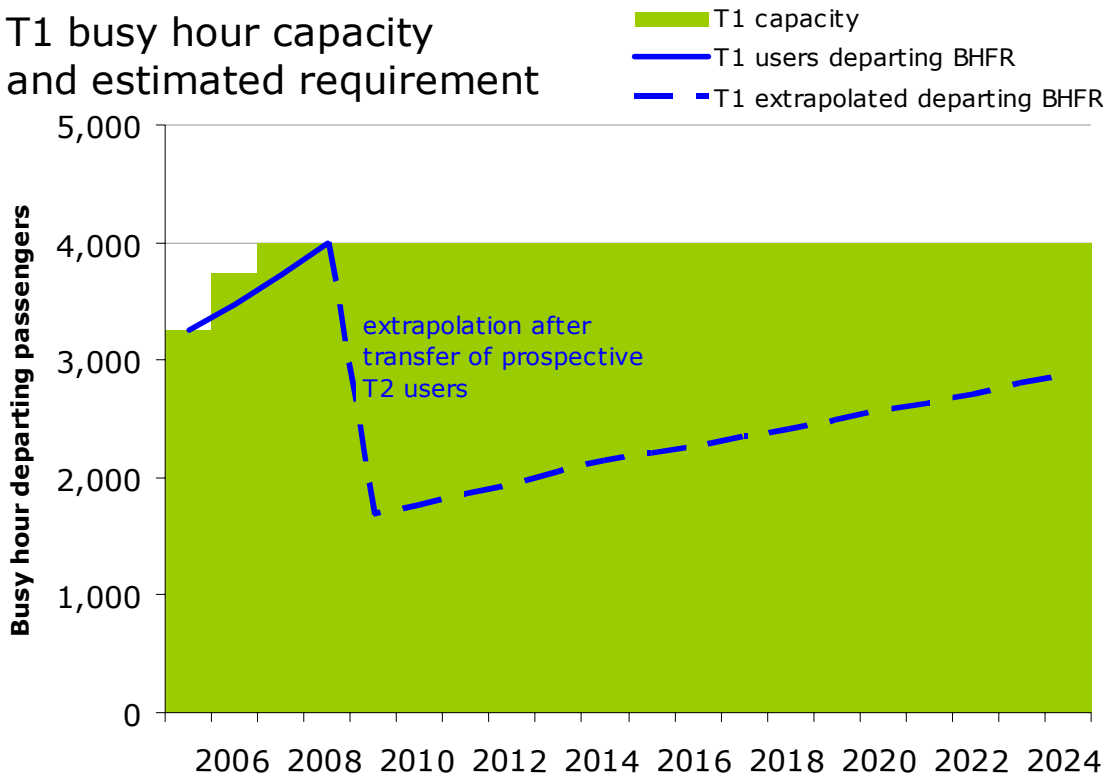
3.44 This shows the rapid growth of busy hour departing passengers projected for prospective users of the terminal and illustrates how the proposed terminal building would be full, if only for the peak hours of the year, at some point within its first decade. DAA has therefore plans for an extension to the terminal.

3.45 The transfer into T2 of a peaky set of users would mean that T1 would become significantly less congested. Until T2 opens, for DAA to sustain its current forecasts for annual passenger numbers, it will need to increase the capacity of the existing terminal. For the purpose of this illustration, I assume a T1 hourly departures capacity of 4,000. The transfer of the proposed group of users to T2, with a busy hour projection close to 2,600 passengers at that time, will mean a reduction in the peak hour demand in T1[22].

[22] This will not necessarily be a one-for one reduction. In line with the subset analysis, I assume that the transfer of users to T2 might leave the residual flows about 15% more peaky than the combined flows at present.

3.46 The following graph illustrates the effect.

Chart 15

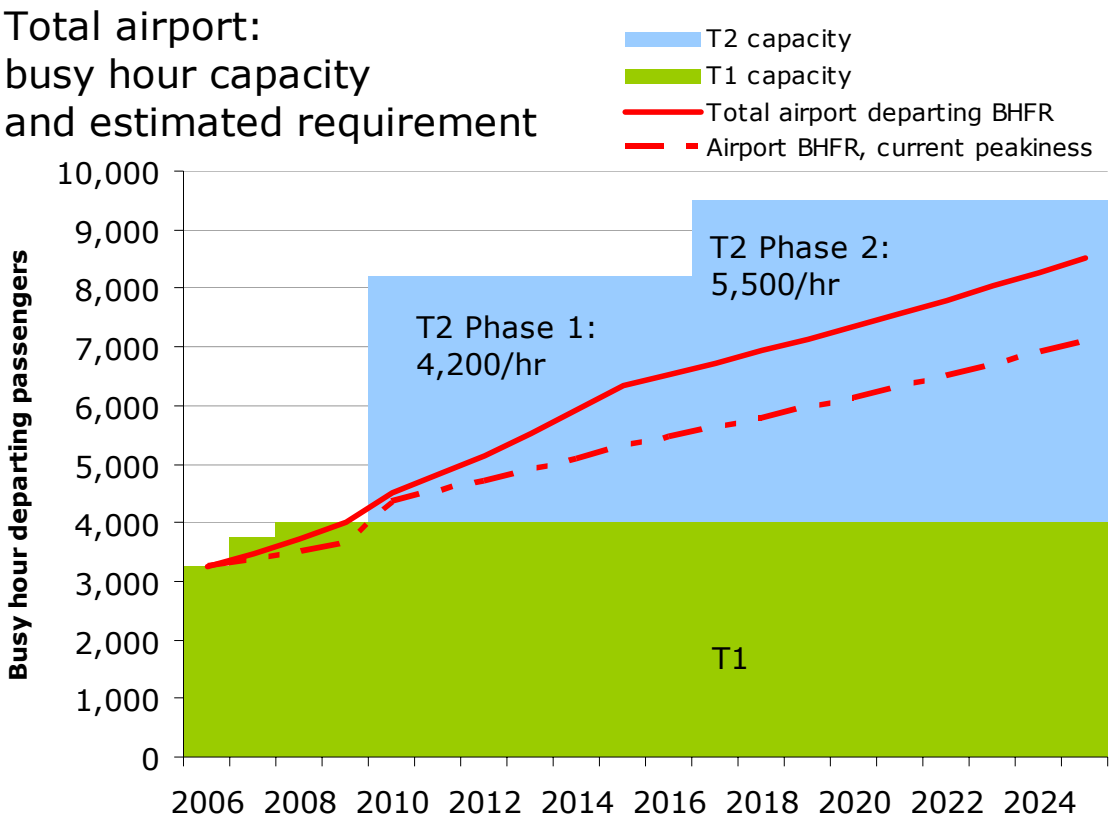


Assuming T1 handling residual busy hour passengers (after transfer of T2 users) 15% more peaky than airport as a whole, growing at 5% p.a. to 2015, 3% p.a. thereafter

3.47 On the information currently provided to the Commission, there therefore appears to be a possibility that Dublin will become an airport with a highly specified new terminal with spare capacity for much of the day and a newly expanded and streamlined old terminal with spare capacity throughout the day. However, the extrapolation of spare capacity in T1 assumes, in broad terms, that the airlines using T1 continue their existing pattern of usage. The release of a substantial amount of terminal capacity at the peak hours, certainly when the second runway is also built, may permit those airlines to adopt different strategies which may be operationally advantageous but use up that capacity more quickly at peak times.

3.48 Adding the scenarios for the two terminals together in the next graph shows how the aggregate capacity of the two terminals may be significantly greater than the level of demand during busy hours. For comparison, I also show an extrapolation of the busy hour figure for 2006 assuming a constant peakiness profile.

Chart 16



Assuming DAA centreline annual traffic projections to 2015, 3% growth thereafter and 15% increase in peakiness on separation into two terminals.

Conclusion on T2's annual passenger handling capability

3.49 Subject to more detailed analysis, it appears that T2 may have been reasonably scaled to provide the capacity to handle 4,200 departing passengers in a typical busy hour. However, there is reason to question the assumption that the new terminal would only be able to handle about 11.5 million passengers in a year.

3.50 There are three key factors that the Commission might seek to understand in more detail:

- Do prospective users of T2 confirm that DAA's flight schedule projections reflect a reasonable assessment of their future operating patterns?
- If so, are those operating patterns, insofar as they lead to proportionately more passengers departing in the busy early morning and midday periods with a sharp focus in the very early morning hour of 6:15 to 7:14, unavoidable or economically preferable over alternative patterns that would reduce the peak hour burden on airport infrastructure?

- To what extent are these factors unique to the prospective users of T2 and to what extent will they also affect capacity utilisation patterns in T1?

3.51 These questions are relevant to important policy issues for the Commission. The scale of T2 implies higher levels of cost than were anticipated at the last determination. The appropriate regulatory response to that increased level of cost depends on whether the additional capacity accommodates issues facing current users of the airport in general, accommodates issues facing only prospective users of T2 or accommodates levels of demand not anticipated until some years into the future, in other words primarily benefitting future users. In short, are the additional costs attributable to all current users, a subset of current users or to future users?

4 Underlying impact on airport charges

4.1 I have carried out forward projections of the regulatory price cap calculations, using the regulatory financial model used by the Commission at the last determination and adopting the same calculation methodology.

4.2 I have carried out a reference calculation of required revenues and costs per airport passenger, reflecting the full CIP submitted by DAA. The following table sets out the key assumptions:

Table 7

Model variable	*Key assumptions*
Capital investment 2006-09	Full €1,178 million in 2006 price terms as detailed in the CIP submitted by DAA, with no adjustment for any real changes in construction prices
Capital investment 2010-19	Full CIP for 2010-15 as provided by DAA to the Commission and investment at a continuing level of €160 million per annum thereafter.
Regulatory depreciation	Determination model assumptions, adjusting for depreciation on additional investment over 35 years from the year of spend
Passenger numbers	F2006 forecast submitted by DAA
Operating expenditure	Determination model assumptions, which automatically adjust costs for assumed cost elasticities with respect to annual passenger numbers
Commercial revenues	Determination assumptions for revenues per passenger
Required return on average asset base	As for determination

Average price impact

4.3 The results of my calculations of average price that may be in prospect if the full CIP were used are presented in the following two graphs, the first in 2006 price terms and the second assuming consumer price inflation of 2.5% per annum. They start off with the current price path[23].

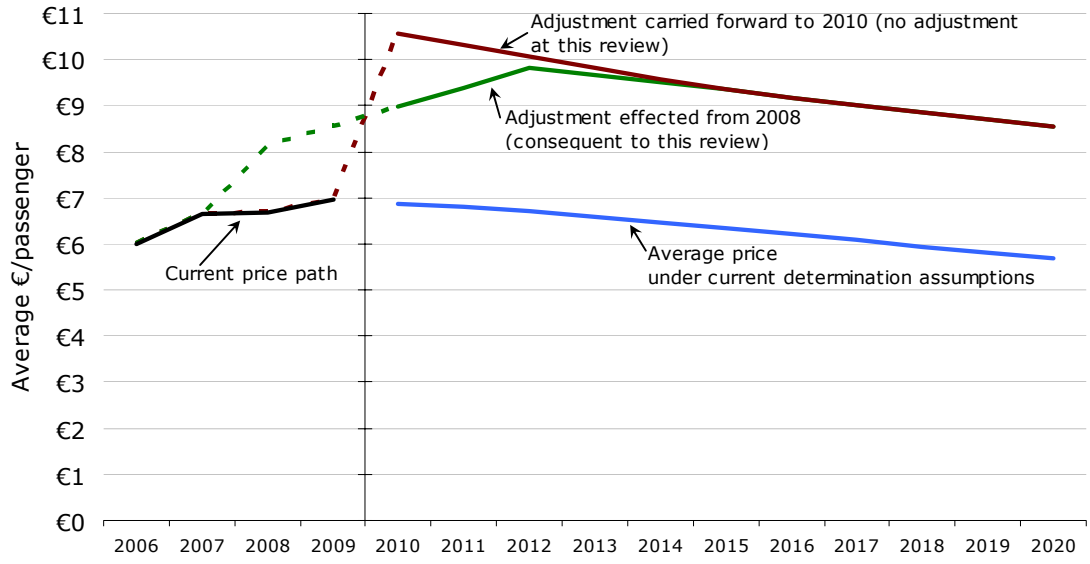
4.4 These graphs highlight the level of price increase that could arise as a direct consequence of the levels of investment assumed in the 2006 CIP and also highlight two possible price profiles:

- assuming the Commission adjusts the current determination; and
- assuming the Commission does not adjust the current determination but carries forward costs associated with additional investment to 2010[24].

Chart 17

Prospective price profiles: excluding inflation *(2006 price terms)*

Full allowance for CIP



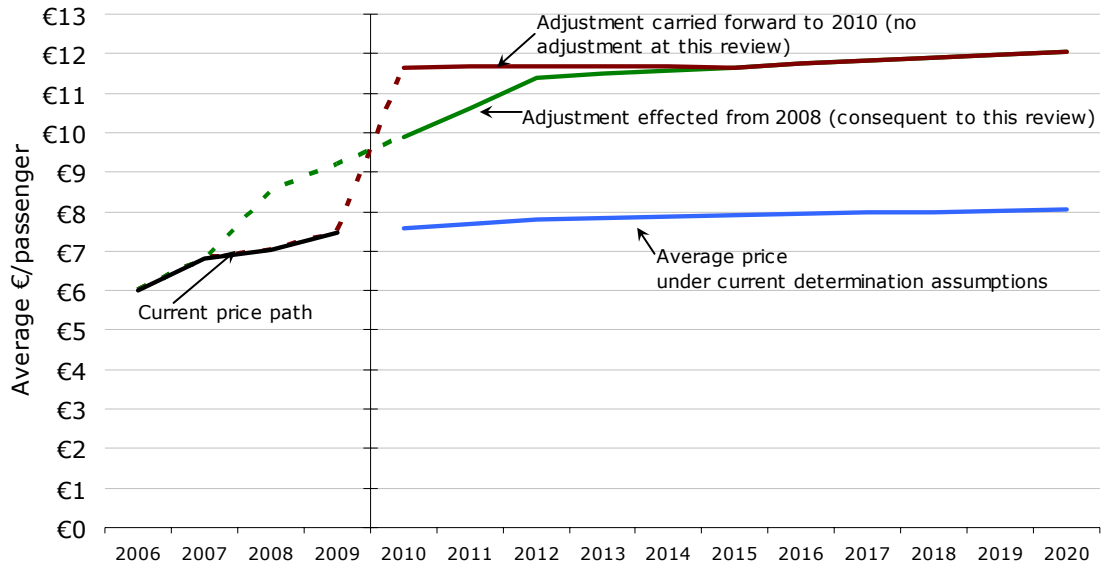
23 The determination price allowed in 2006 under the current determination is €6.20. For 2007, the underlying allowed price will increase by 4% plus the change in CPI over the year to October 2006, which was 3.9%. This would bring the underlying cap for 2007 to about €6.69, to which could be added any past under-recovery of the allowed price. If DAA sought to recover under-recoveries for 2006 (average charges are expected to be less than €6.00 per passenger), the 2007 price could be close to €7.00.

24 This scenario would have significant implications for the financial position of DAA during construction of major investments and accentuate a significant discontinuity in the price path for users, both of which may represent detriments to the Commission's objectives.

Chart 18

Prospective price profiles: with inflation *(assuming 2.5% p.a.)*

Full allowance for CIP



4.5 The graphs reflect stylised price profiling methods consistent with revenue requirements calculated by the Commission's regulatory financial model. The price profile, especially after 2014, is only indicative, depending on levels of capital investment and passenger growth. In some circumstances, the longer-term slope of prices may go up rather than down.

4.6 Assuming a review of the determination with full allowance for the CIP, my provisional calculations suggest an average airport charge per passenger of about €9.50 in 2006 price terms for the period 2010-14.

4.7 These calculations of the price prospects for 2010-14 take no account of the following:

- Any changes in operating costs associated with operating a larger terminal than originally assumed in the Commission's model.
- Any change in the level of commercial revenues arising from the provision of retail space in T2 or the extension of T1.
- Any policy decisions affecting the profile of airport charges over time that may alter the allocation of costs to future users.
- Any variances between DAA's forecasts in the CIP and assumptions that the Commission might make following detailed scrutiny by itself and its independent advisors.

- Outturn expenditure, commercial revenues and passenger numbers[25] during the current control period, revised assessments of the cost of capital and revised forecasts available when the Commission makes its determination of maximum airport charges for the period 2010-14, which could all be significantly different to current projections.

Summary price calculations

4.8 The following table summarises my provisional calculations of the average airport charge per passenger for 2010-14.

Table 8

Average projected for 2010-14

2006 price terms

		2005 CIP	*Full 2006 CIP*
Average RAB	*€m*	1,066.0	1,820.5
Financing costs	*€m*	76.1	129.9
Net operating costs less commercial revenues	*€m*	41.5	31.6
Depreciation	*€m*	56.3	80.2
Total	*€m*	173.9	250.6
Passengers	*m*	25.7	26.4
Average per passenger	*€/pax*	6.78	9.51

[25] The calculation uses DAA's F2006 forecast of passenger numbers. Outturns for 2006 were significantly higher.