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VLJ WORKSHOP

Focusing in on the facts

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AEROSPACE INFORMATION REDEFINED

Focusing in on the facts agenda

- **What is a Very Light Jet ?**
 - **Overview of current programmes**
 - **What are the markets for VLJs ?**
 - **Forecasts of demand**
 - **Current GA/business jet fleet**
 - **The air-taxi market**
 - **Middle Eastern market**
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Very Light Jets (VLJs) are here....

- **A new class of small jet – development driven by new small engine technology, new avionics, manufacturing techniques and use of composites**
 - **Defined as a jet aircraft with an MTOW of 10,000 pounds or less**
 - **Can be certificated to be flown by a single pilot**
 - **Many different offerings – single/twin engine; metal/composite; 2-8 seats; 25/45,000 feet ceiling; \$1-3.6m pricing**
 - **Even this category may break out into VLJ, and PLJ (Personal light Jet)**
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Eclipse 500

- The first VLJ to be launched
- New manufacturer, Vern Raburn CEO
- July 2006 certificated; delivery starting but issues with avionics supplier and training partner
- Uses innovative welded aluminium construction.
- Pratt and Whitney PW610F engines
- 6 seats; 1125nm range, 2300ft field, 41K ft ceiling, 370 knots cruise
- 1800+ firm orders; 60% air taxi
- \$1.5m+ new price



Cessna Citation Mustang

- 1st VLJ to receive full type certification by the FAA – deliveries began Nov 2006
- The airframe is traditionally manufactured - smaller development from CJ1
- Two pod mounted Pratt and Whitney PW615F engines
- Fully retractable landing gear equipped with anti-skid protection
- \$2.5m new price
- 250 orders backlog (40 dels 07); owner pilot market is key



Adam A700

- Straight tapered wing, central fuselage, and twin wing-mounted booms which support aft twin rudders linked by a high horizontal stabilizer – unconventional.
- Large cabin – 6-8 seats
- Powered by two Williams FJ33 turbofans
- Fully composite construction reduces weight and build time
- Adam is a relatively new manufacturer; makes A500 turboprop
- \$2.25m new; 2008 deliveries
- 400 orders



Embraer Phenom 100

- Regional jet manufacturer moving into purpose-built small jets – Phenom 100 and the Phenom 300 light jet
- Being designed for high utilization
- PW617F engines
- With 4 passengers, 1160nm IFR range; 41K ceiling, M0.7; 3,400 feet field
- 350+ firm orders
- Flies mid 2007; service entry mid 2008
- \$2.85m new



Spectrum Independence S-33

- Spectrum Aeronautical, HQ California, built in Utah
- All composites
- 7-9 seats in 18 ft cabin - long by VLJ standards
- 2 x Williams FJ33-4
- First flew January 2006
- Accident July 2006 delayed programme
- Certification now due 2009
- 2,000nm IFR range
- \$3.65m new



Diamond D-Jet – a PLJ ?

- A composite, five-seat, single-engine jet aircraft
- Flew 2006 - currently undergoing flight testing
- Deliveries start in 2008 at a cost of US\$1.38m
- Diamond has targeted the aircraft at the owner-pilot market
- Planned lower operating cost than other VLJs
- FADEC controlled Williams FJ-33 engine
- 1250nm range



PiperJet

- Launched Oct 2006 – 6 / 7 seater
- Single 2,400lbt William FJ44 engine in tail – unusual configuration, gives greater airflow than if in fuselage
- Delivery being planned for 2010
- Based on Piper Meridian fuselage
- Fuselage has all-metal construction
- 360 knots, FL350, 1,300nm
- Approx US\$2.2 million
- 20+ orders at launch



HondaJet

- Delivery being planned for 2010
- Unusual over-the-wing podded engine configuration, allows for more space within the fuselage and reduces drag at higher speeds ; GE/Honda HF120s
- Fuselage has composite construction ; 7-8 seats
- Wings are made from aluminium alloy
- Planned 30-35% higher fuel efficiency than other similar aircraft
- \$3.65 million – at high end of VLJ
- 70 jets to be built per year at Greensboro, USA; 100+ orders



Other aircraft under development include..



Cirrus Jet



Epic Jet



EV-20 Vantage Jet

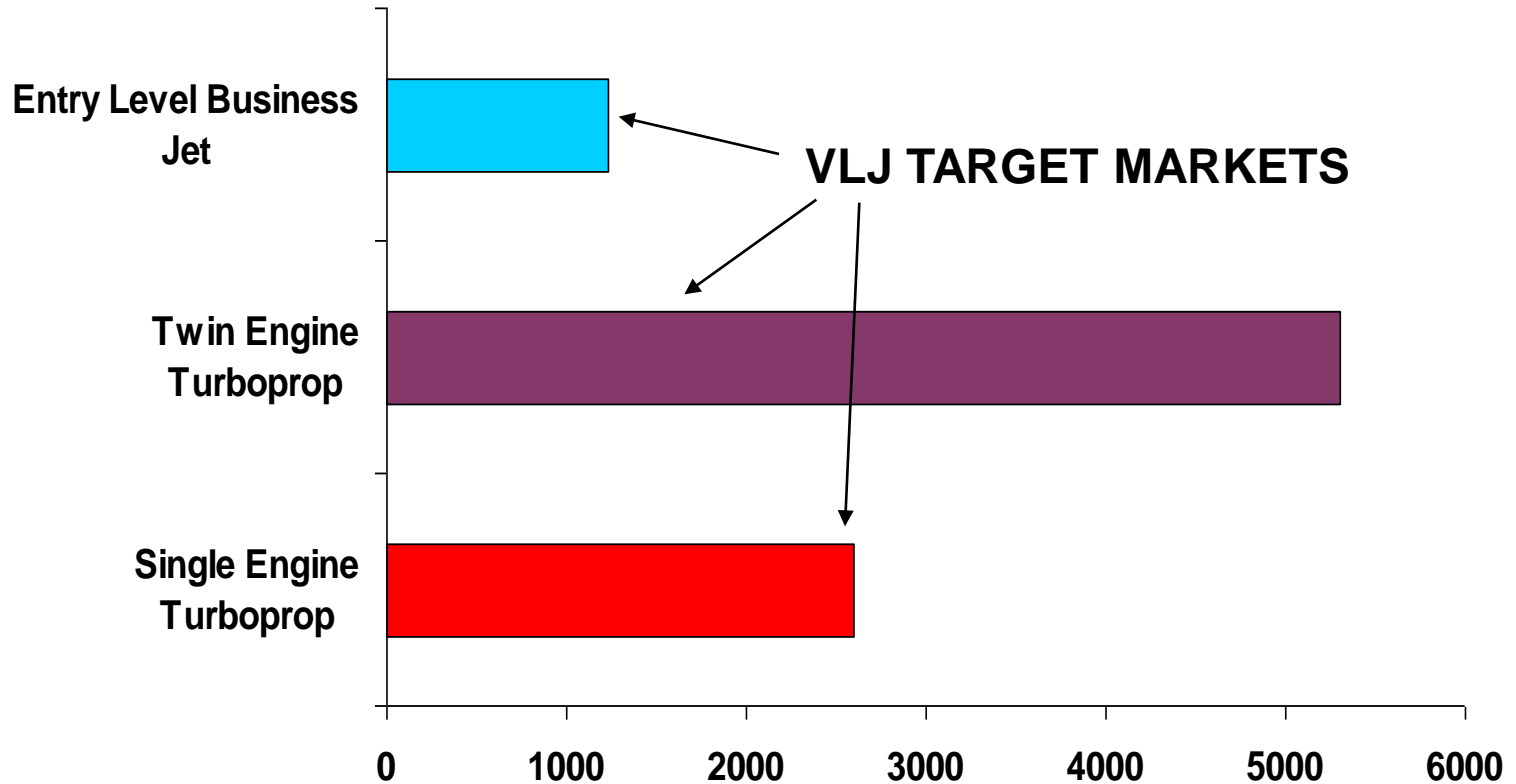


ATG Javelin

Very Light Jet - Markets

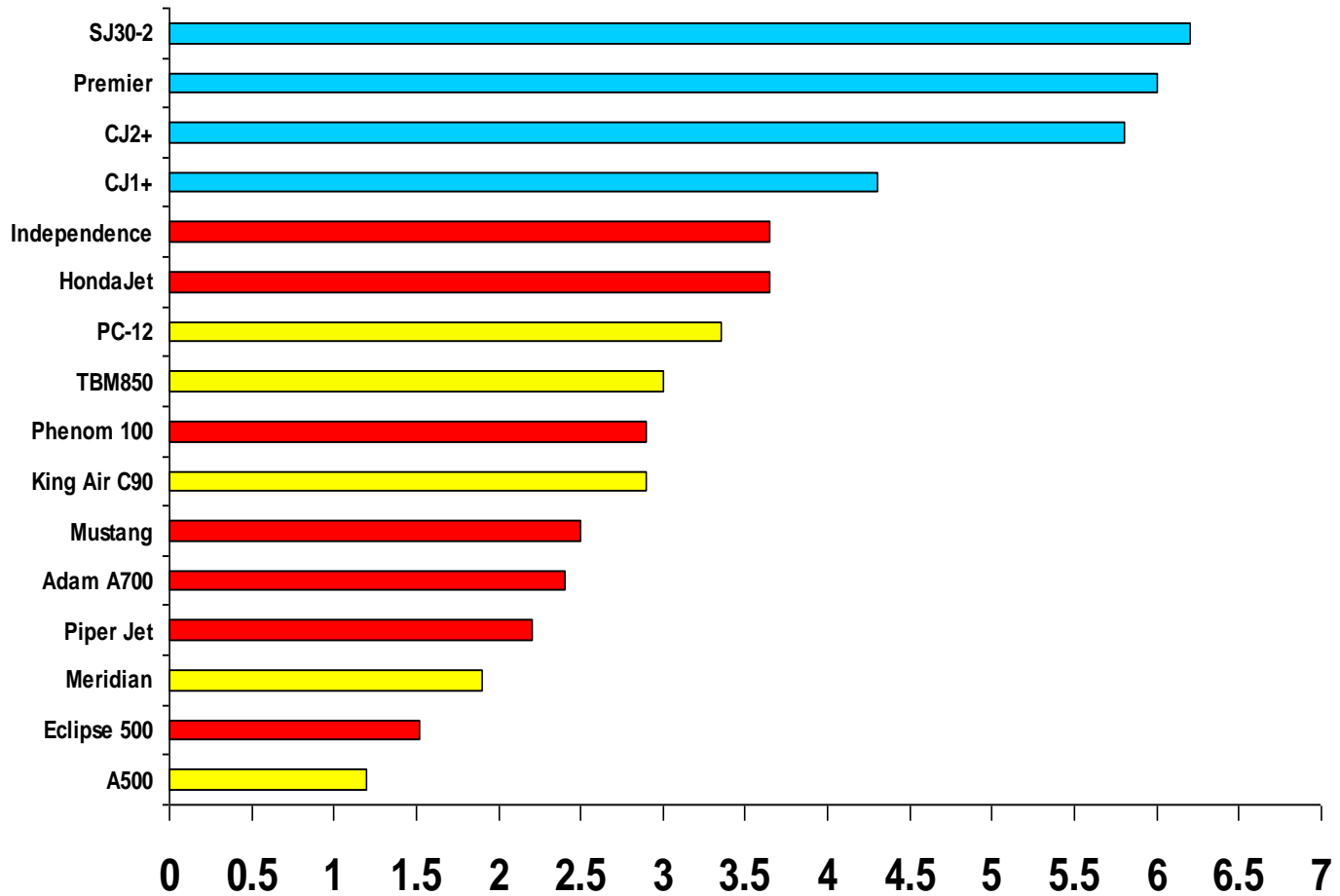
- **Small Corporates and Owner-pilots, probably moving up from turboprop or twin piston**
 - **Air taxi – developing a network of on-demand air taxi routes, pay per seat, on demand**
 - **On-demand sole charter – adding to existing fleet of turboprops and bizjets serving the corporate/VIP market**
 - **Fractional schemes where shares are sold in aircraft usage – new players emerging rather than established bizjet users**
 - **Training**
 - **Special mission, priority cargo etc**
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US GA TURBOPROP & SMALL JET FLEET



Source – GAMA 2005

VLJs ARE PRICED IN THE TURBO:JET GAP (US\$m)

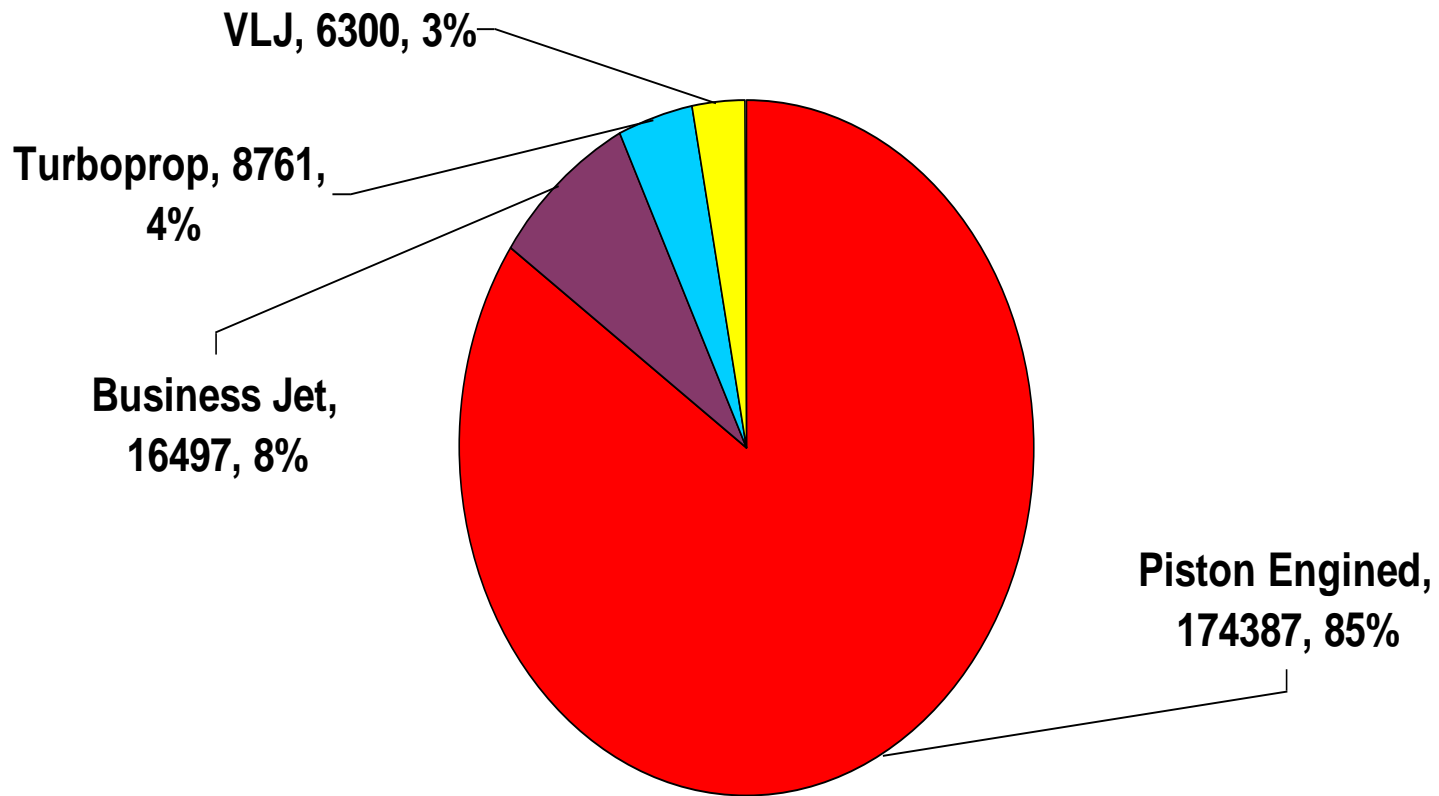


Source – Ascend AIR Online Prices

How Big is the Market ? VLJ Demand Forecasts vary....

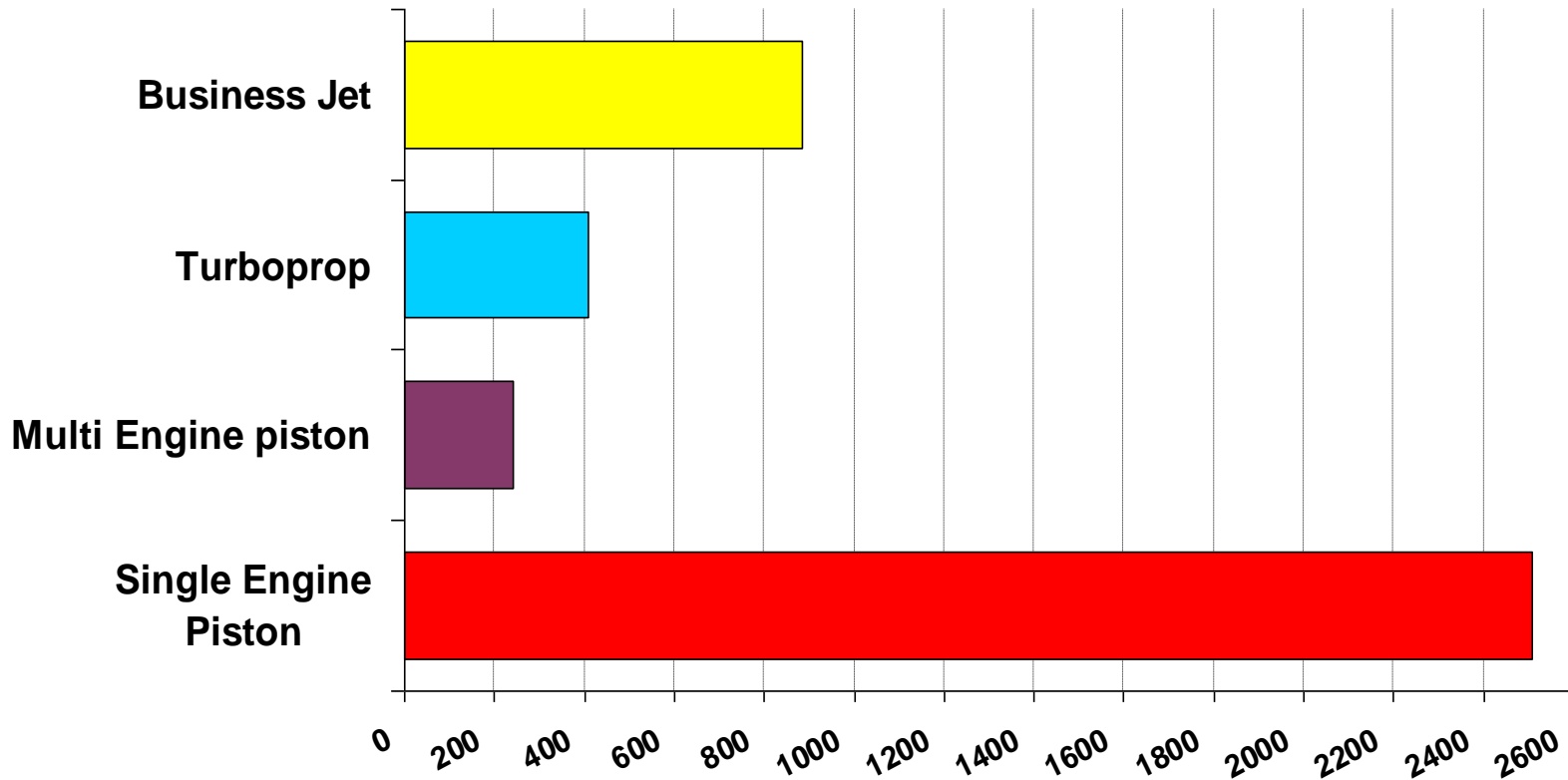
- **FAA 2007 – US market to see 400-500 deliveries/year, with a fleet of 6,300 by 2020**
 - **Honeywell 2006 – 2,500 aircraft over 10 years, covering ‘larger’ VLJs like Mustang/Phenom and Entry –level; 4,000+ of smaller VLJs like Eclipse, D-Jet etc**
 - **Rolls-Royce 2006 – 7,649 VLJs over 20 years – likely to be new demand, turboprop replacement air taxi and wont affect continued growth of the traditional business jet sector**
 - **Embraer 2007 – 2,700 for traditional customers +2,500/3,000 more for air taxi over 10 years**
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FAA FORECAST US GENERAL/BUSINESS AVIATION & AIR TAXI FLEET - 2020



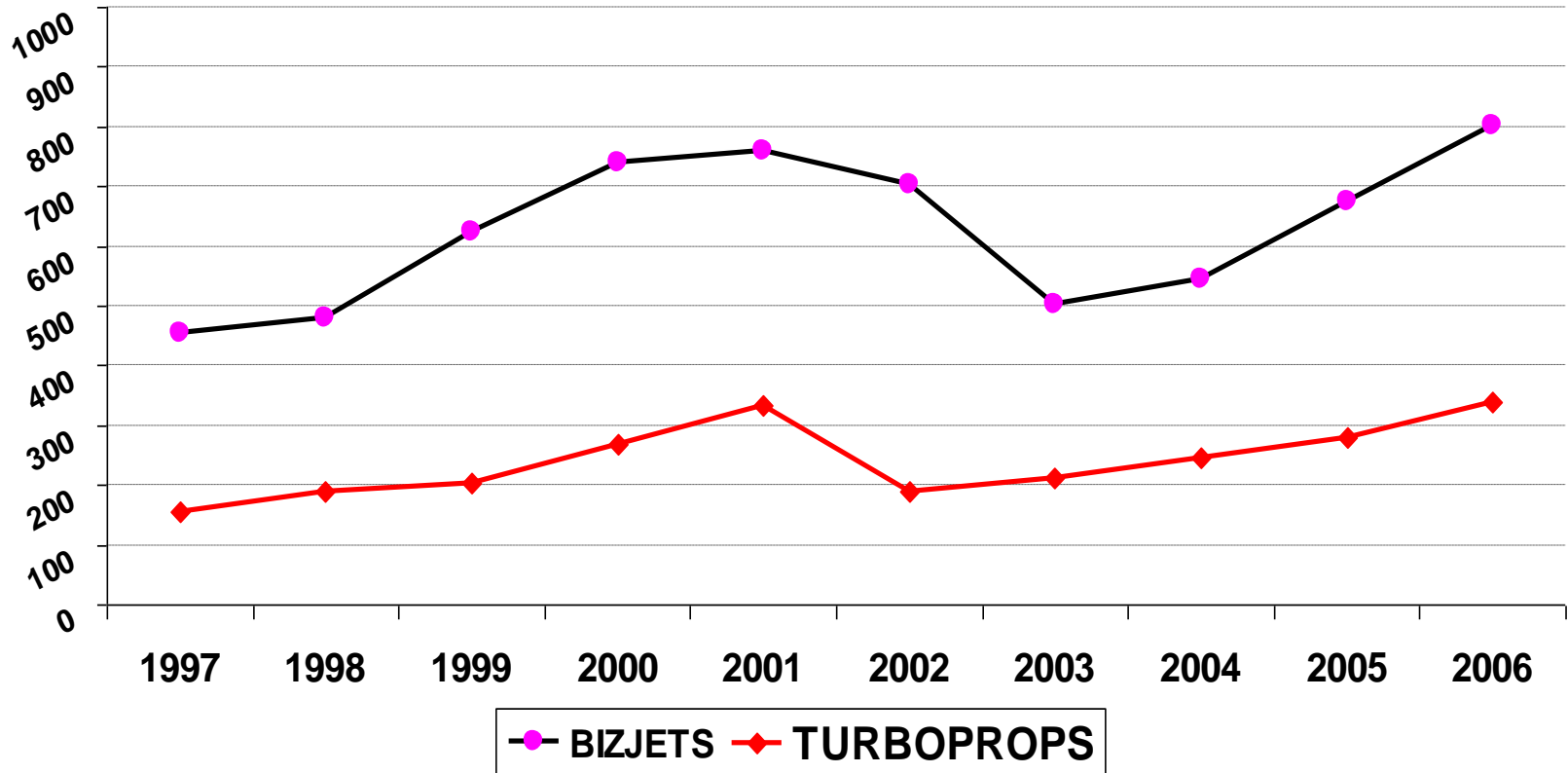
Source – FAA Forecast 2007

HIGH PRODUCTION NUMBERS ARE FEASIBLE....2006 GENERAL / BUSINESS AVIATION DELIVERIES



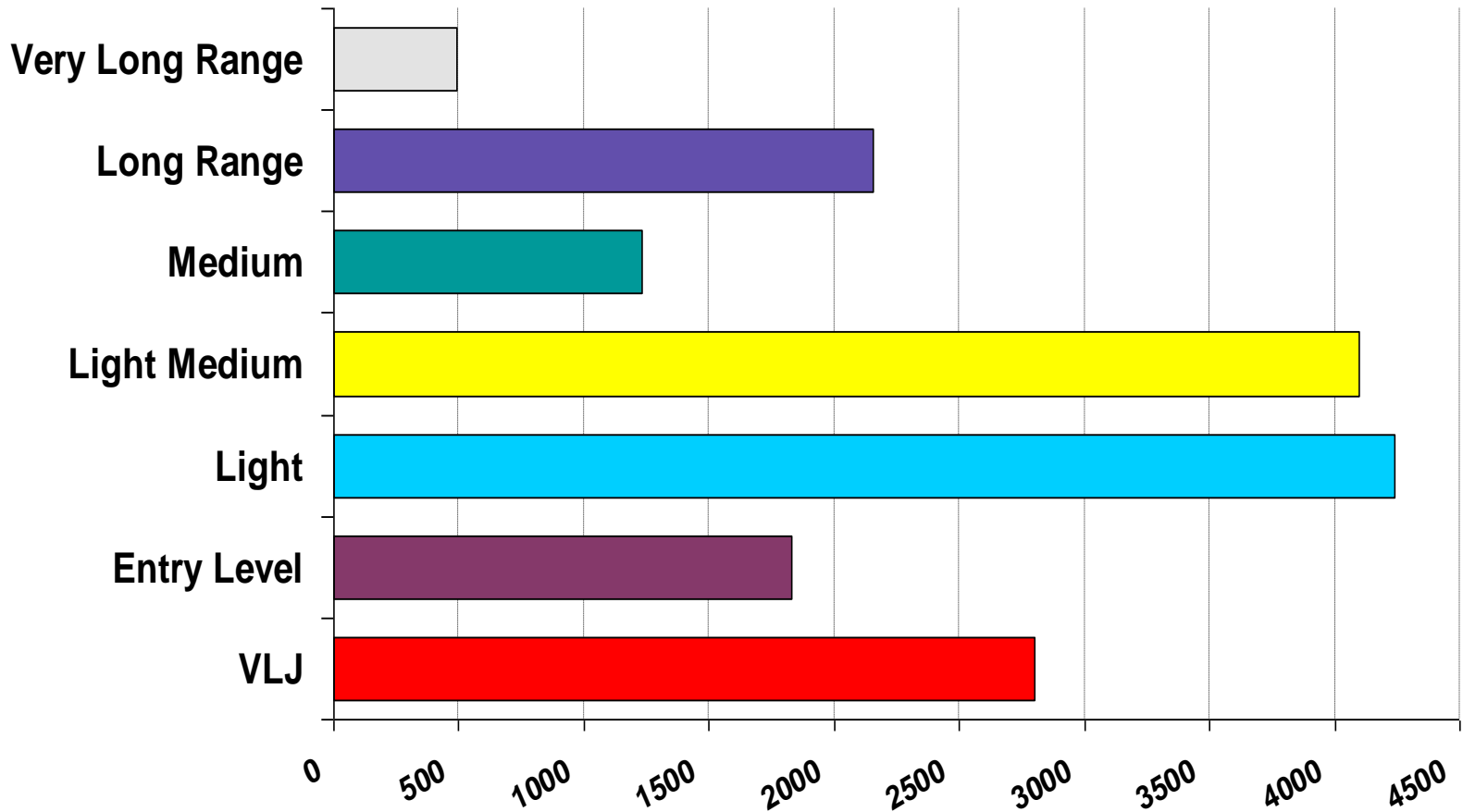
Source – GAMA

VLJs ENTER MARKET IN THE UPCYCLE - BUSINESS JET AND TURBOPROP DELIVERIES



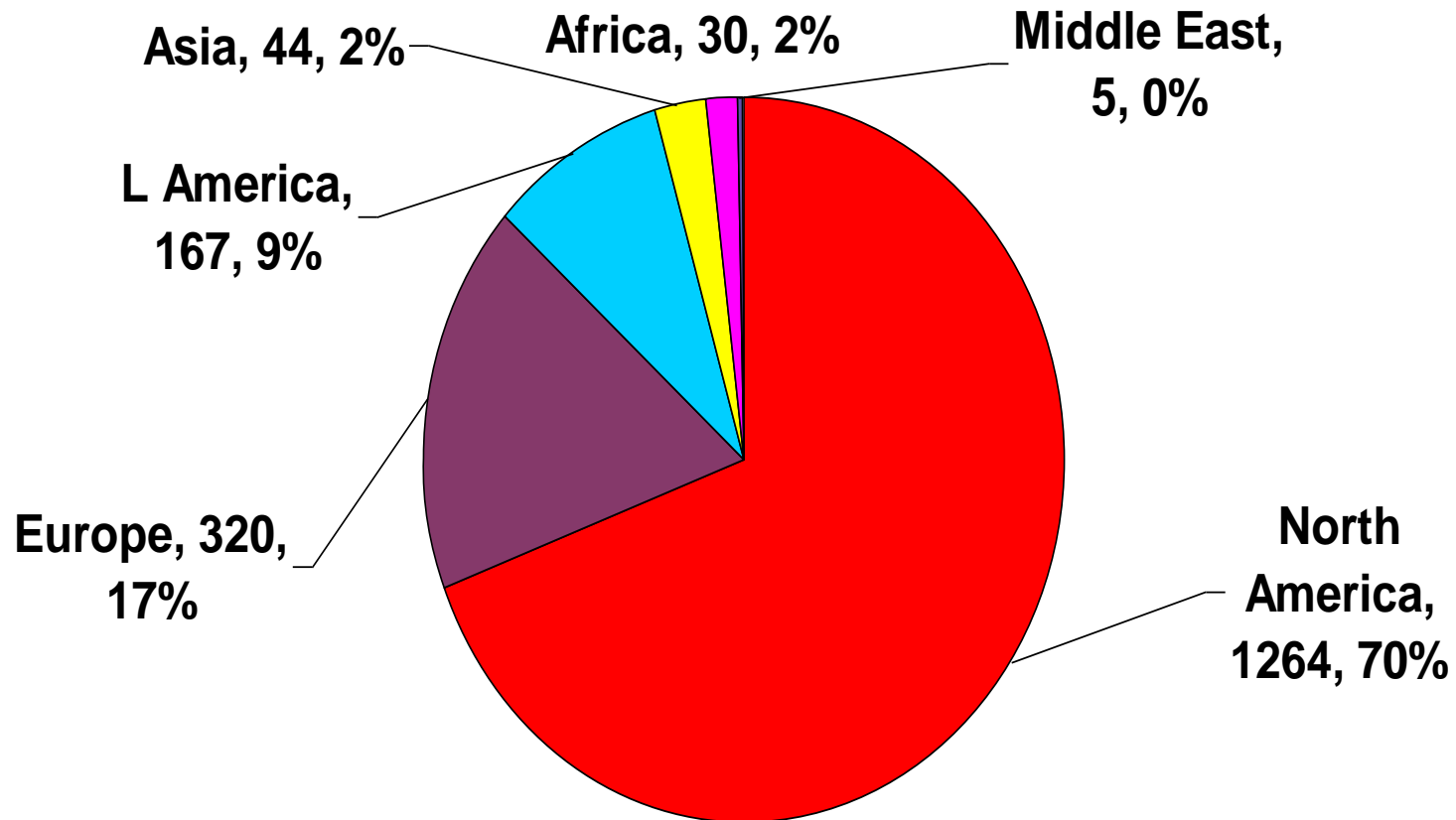
Source – Ascend CASE

IN-SERVICE GLOBAL BUSINESS JET FLEET + VLJ FIRM BACKLOG



Source – Ascend CASE

A GLOBAL MARKET - ENTRY-LEVEL JET FLEET



Source – Ascend CASE

Very Light Jet Commercial Customers include

- **DayJet – 239 Eclipses for on demand, per seat air taxi; initially Florida**
 - **Magnum Jet (Houston) – 100 A700s/Phenoms for owner management and air limo**
 - **Avantair – fractional scheme with ten Phenom 100s**
 - **JetBird in Zurich – 50 Phenom 10s from 2009 to launch European air taxi network**
 - **Linear Air – NE US – Eclipses to join Grand Caravans on air taxi flights**
 - **LEA, UK – Mustangs for on-demand charter**
 - **.....and others**
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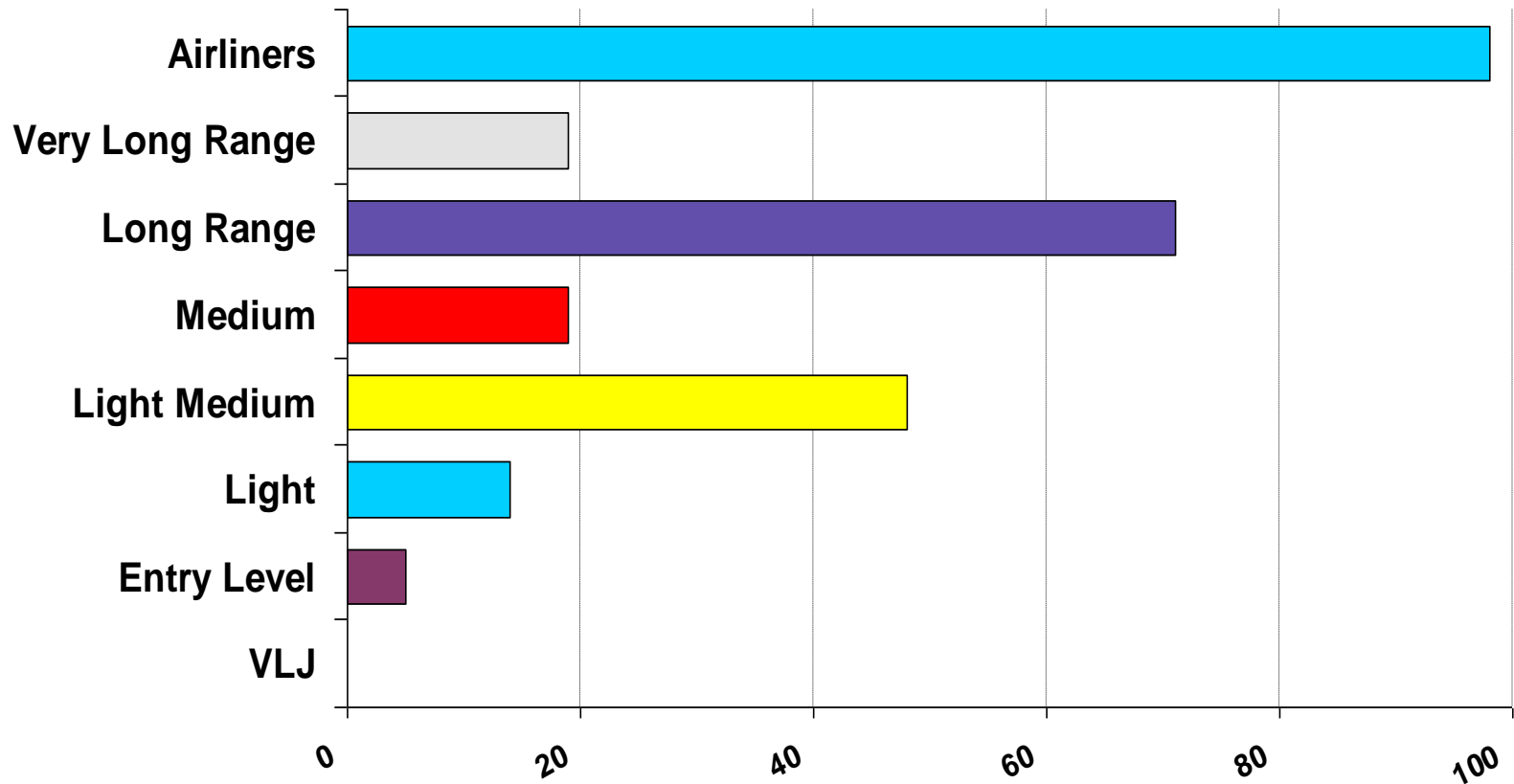
The benefits of air taxi / charter

- **Higher cost than airlines but value to the customer is greater because of....**
 - **Scheduling flexibility – fly when the customer wants to**
 - **Greater choice of airports – not limited to scheduled services or routing via hubs; business aviation can serve thousands of local airports**
 - **No hassle factor at airports - often dedicated biz terminal**
 - **Security – ability to work/discuss in secure location**
 - **Time saving – almost a door-to-door service**
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VLJ – The Air Taxi Question

- **Majority of orders to date are for new on-demand air-taxi users**
 - **Success of a number of programmes dependant on air-taxi success ?**
 - **Air taxis will need high utilization (FAA estimate average 1500 hours/year v 350 for private use) to be viable**
 - **Will be most effective on day-return basis over short distances (600 miles max ?)**
 - **Will need regular volume of traffic to make high utilisation possible**
 - **Aimed at replacing car journeys in US**
 - **Still industry scepticism on how successful it will be.....**
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MIDDLE EAST IN-SERVICE BUSINESS/VIP JET FLEET



Source – Ascend CASE

Middle Eastern Market Growing

- **Fleet has expanded moderately in past 10 years from 115 to 155 business jets (excluding airliners)**
 - **Significant growth occurring in locally based charter operators**
 - **Development of more business and leisure opportunities in the Gulf is driving demand for charters; high net worth individuals buying property**
 - **Focus has been on larger sized aircraft to serve Europe**
 - **Moves to increase smaller jet (and VLJ ?) capacity for intra Middle East/Gulf flights**
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THANK YOU – ANY QUESTIONS ?

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