STATE OF AVIATION RESEARCH IN SOUTH AFRICA

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INTRODUCTION

This paper aims to highlight the research that the aviation industry, in South Africa has undergone in the last few years. The paper will assess the research need, the approach and methodology used for the research, the major findings and the practical application or technological innovation that will be applied in the industry in South Africa. In areas where ongoing research exists, this will be highlighted as wel

GLOBAL CONTEXT

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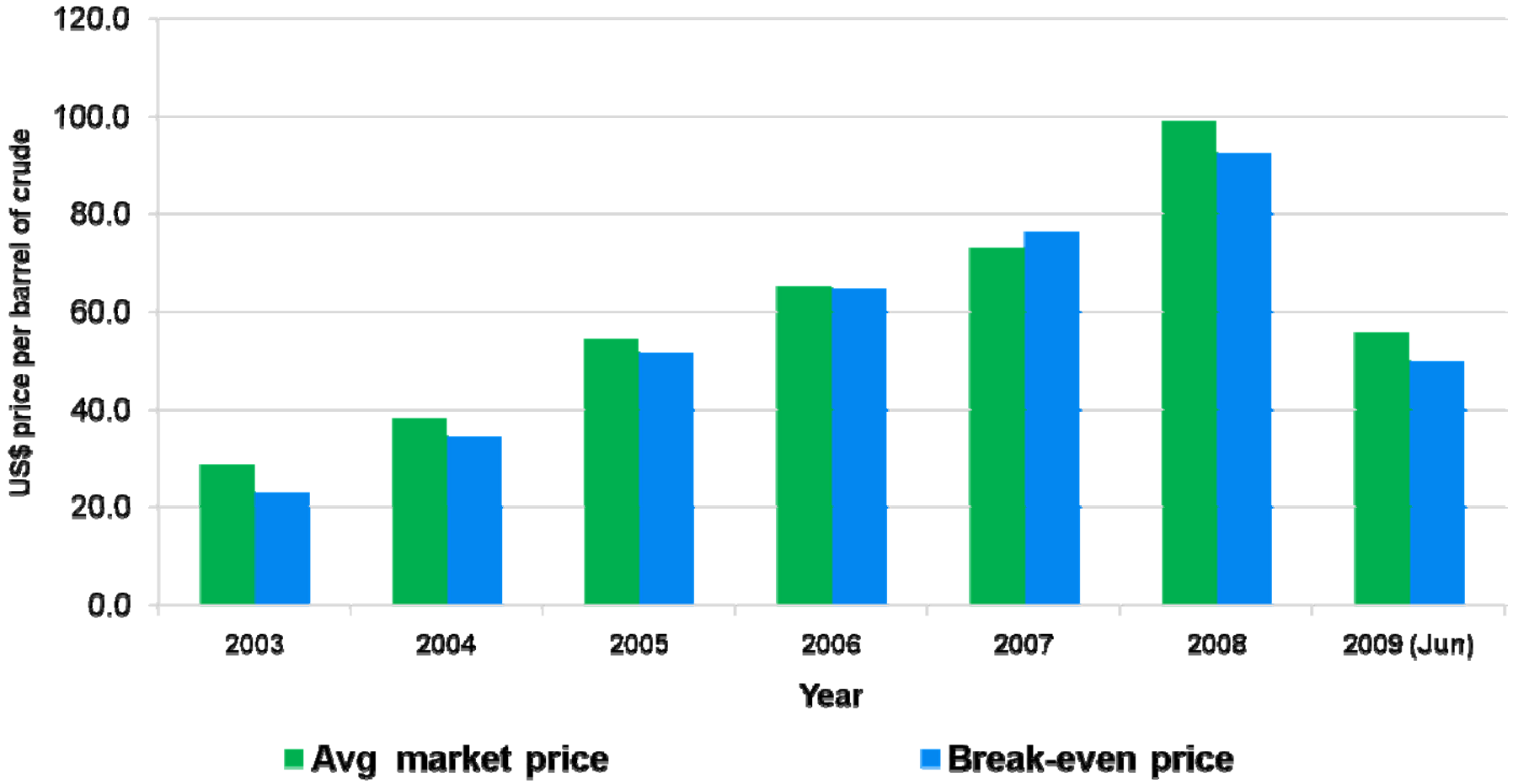
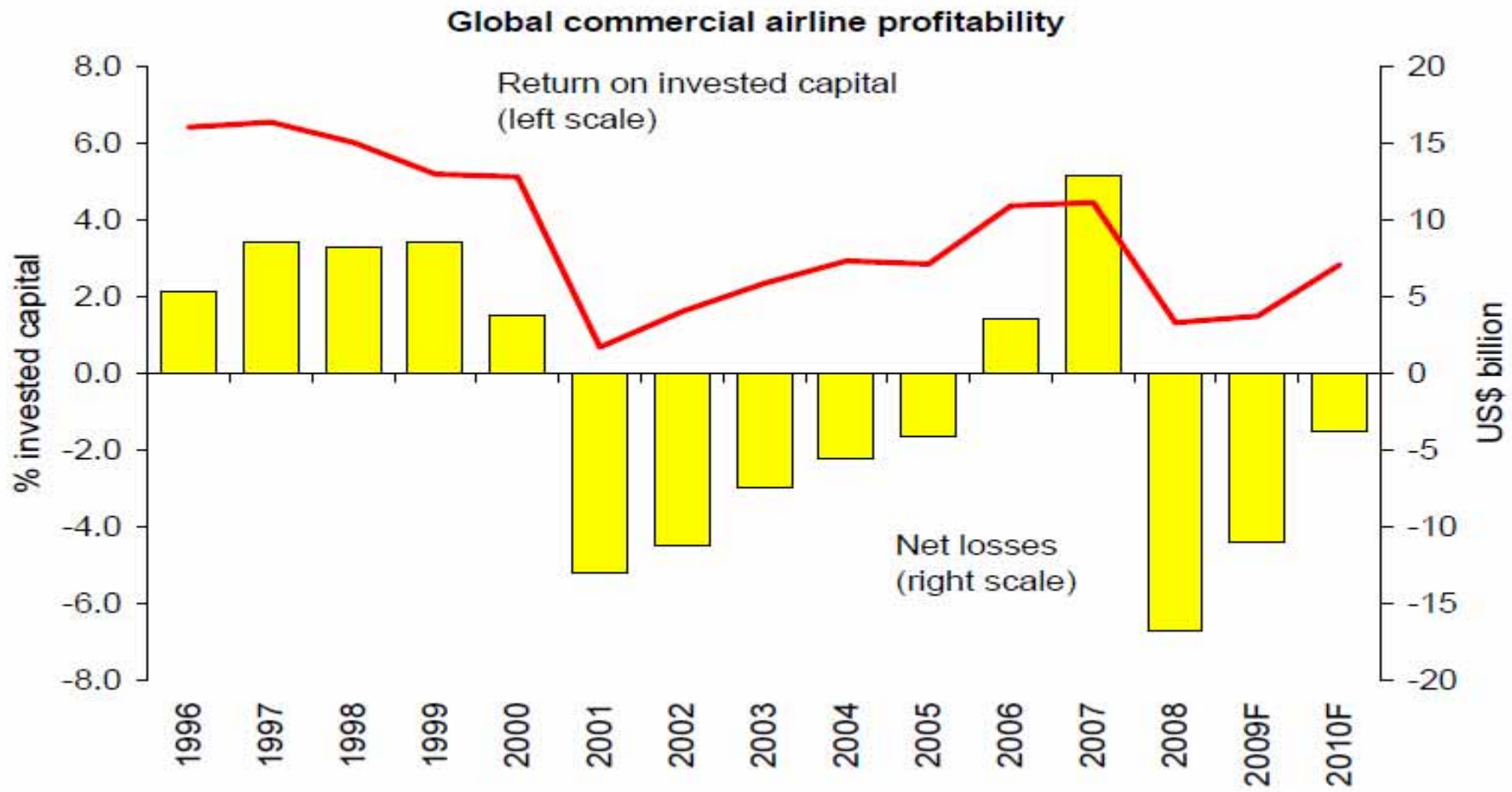
Average Fuel prices



Recession effects on the airline industry

- High operating costs: combined with
- Low passenger numbers: as people could not afford to fly
- Airlines shed extra fleet capacity,
- Airlines have cancelled growth strategies and aircraft orders
- Airlines have cut down frequency and
- Laid off employees so as to survive:
- For the moment the industry remains in survival mode and the need to conserve cash, manage capacity effectively and cut costs is crucial for most airlines. (IATA, 2009c)

Effects of Recesssion (Source: IATA, ICAO)



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Aviation Infrastructure research:

Context of Infrastructure research

In South Africa, a lot of infrastructure needs have been highlighted with the FIFA 2010 world cup.

Various levels of government explored ways to upgrade and fund Infrastructure in the form of airports so as to meet the growing demand that was estimated for the FIFA 2010 world cup.

Large scale expansion programmes in the current economic climate

ACSA Capital Expenditure (CAPEX) programme

- **Carried out by** IATA in consultation with ACSA and worked closely with local airline representatives, including the Airlines Association of Southern Africa(AASA) & Board of Airline Representatives in South Africa(BARSA)
- IATA advised after consultation that:
  - That ACSA should “sweat” their existing assets, ensuring that the capacity of all existing passenger & cargo terminals be used at optimum levels;
  - Should reduce the scope of current projects and/or defer individual projects;
  - Ensure future capacity enhancement projects were demand led

WAY FORWARD

- Some of the results, IATA received confirmation from ACSA that;
  - They had reduced their CAPEX plans from 27.0 to 19.3 billion Rand.
  - ACSA announced that it had deferred the following projects;
    - A new realigned runway & associated taxiways at Cape Town International
    - A new midfield passenger terminal complex with capacity for 13 million passengers per annum &
    - A new midfield cargo terminal at O R Tambo International airport.
  - The contribution of this research is that because of the reduced CAPEX program, allowed for ACSA to limit their request (to the Regulator) to increase passenger handling charges - down from 46.4% to 18.5% (IATA, 2009b)

ONGOING INFRASTRUCTURE RESEARCH

Government strategy for state ownership and government ownership of infrastructure within the aviation industry is unclear and it is on this back foot that the research is being done by DBSA, and the DOT

3. Aviation Operations research:

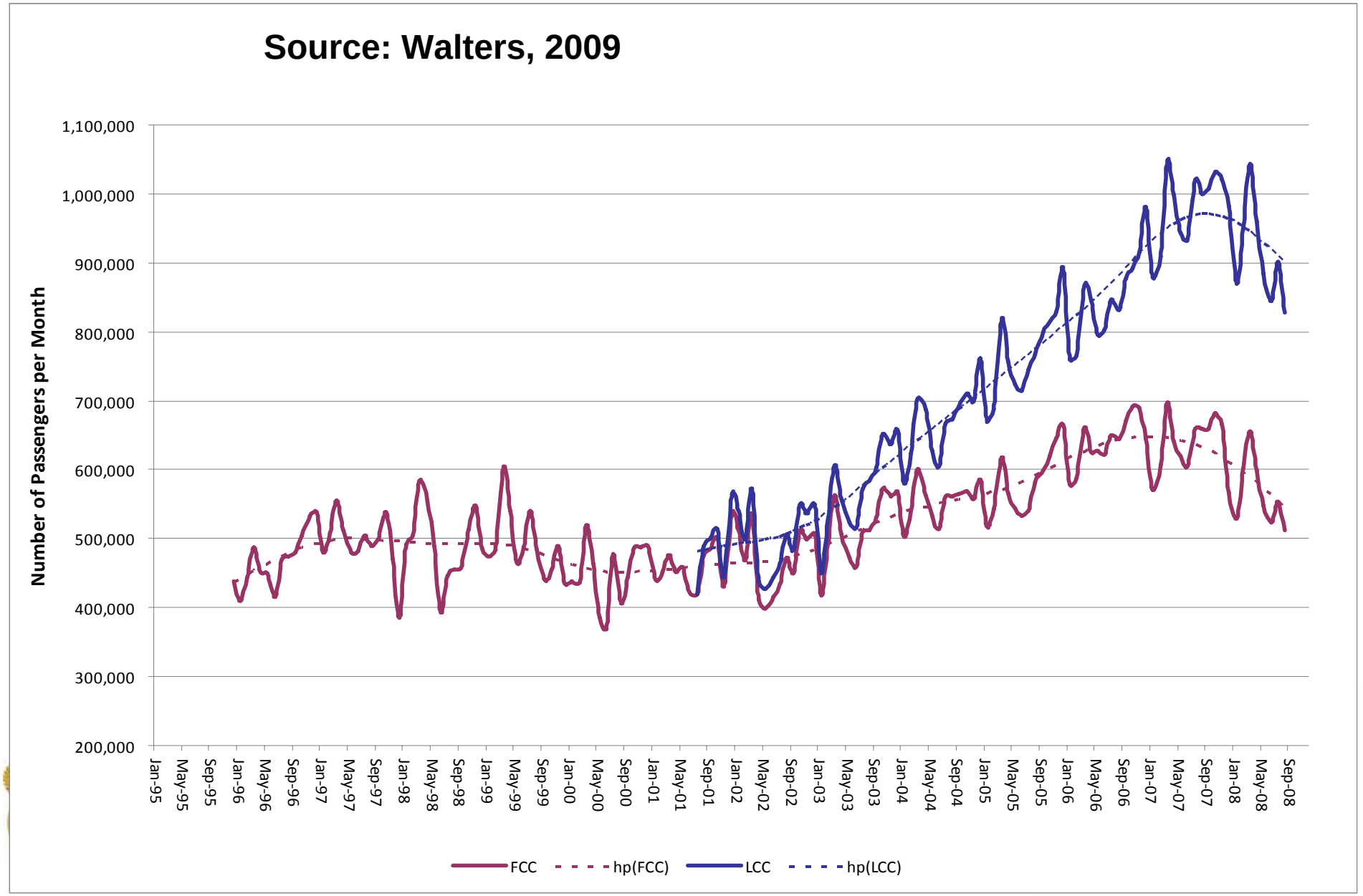
Sustainable airline operations research

- CSIR research to assess the current state-owned airlines in Africa, in this current operating environment to highlight some of the inherent weaknesses and identify elements that improve sustainability;
  - Aircraft ownership, acquisition and maintenance models
  - Reforming ownership stakes for state –owned airlines.
  - Exploring mergers and alliances
  - Adopting low cost carriers operating models and outsourcing of non-core services
  - Creation of spin off airlines and
  - Growing non-aeronautical business revenue.

South Africa's Econometric Forecast Model

- Research work was commissioned to UJ develop an econometric forecast model, for the three main airports of ACSA, tailored to the South African situation, to forecast passenger, traffic and freight volumes for the period 2008 to 2022.
  - **Combined the three golden triangle airports(ORTIA, CPT &DIA) handle 95% of passengers and 73% of traffic movements**
  - **Full costs carriers' average market share for these three airports has decreased from 86% in April 2003 to 56% in May 2008 where as the average market share for low cost carriers has increased from 12.3% to 44% over the same time period**

Profiles of scheduled pass movt (ORTIA,CPT,DIA)



AVIATION OPERATIONS RESEARCH

- Ssamula (2008) embarked on research investigates cost-effective hub-and-spoke (H&S) network design strategies for the African route network.
  - To minimise the cost of air transport and improve accessibility and connectivity.
  - The results contribute to understanding the effectiveness of H&S networks in sparse markets and show that economies of scale can be realised.
  - The study found that for sparse networks, the cheapest hub-location options should have: high passenger demand for greater economies of scale and short sector distances in order to operate more efficient short-range aircraft.

OPERATIONS OVERSIGHT RESEARCH

- The DOT in undertaking the following research studies in order to monitor the aviation industry impact on the Country;
  - The impact of low cost airlines to the economy and its sustainability (DOT/RFQ/01/2008/TP&ER)
  - Evaluate; detail the benefits and cost of adopting the horizontal agreement, its implication for Yamoussoukro Decision, South Africa, Southern Africa Development community(SADC) and Africa (**DOT/34/ 2008/TR&AII)**
  - A study on the contribution of civil aviation to the south African economy (DOT/09/2008/TP&ER)

3. Aviation ***REGULATORY, COMPLIANCE, OVERSIGHT AND MONITORING*** research:

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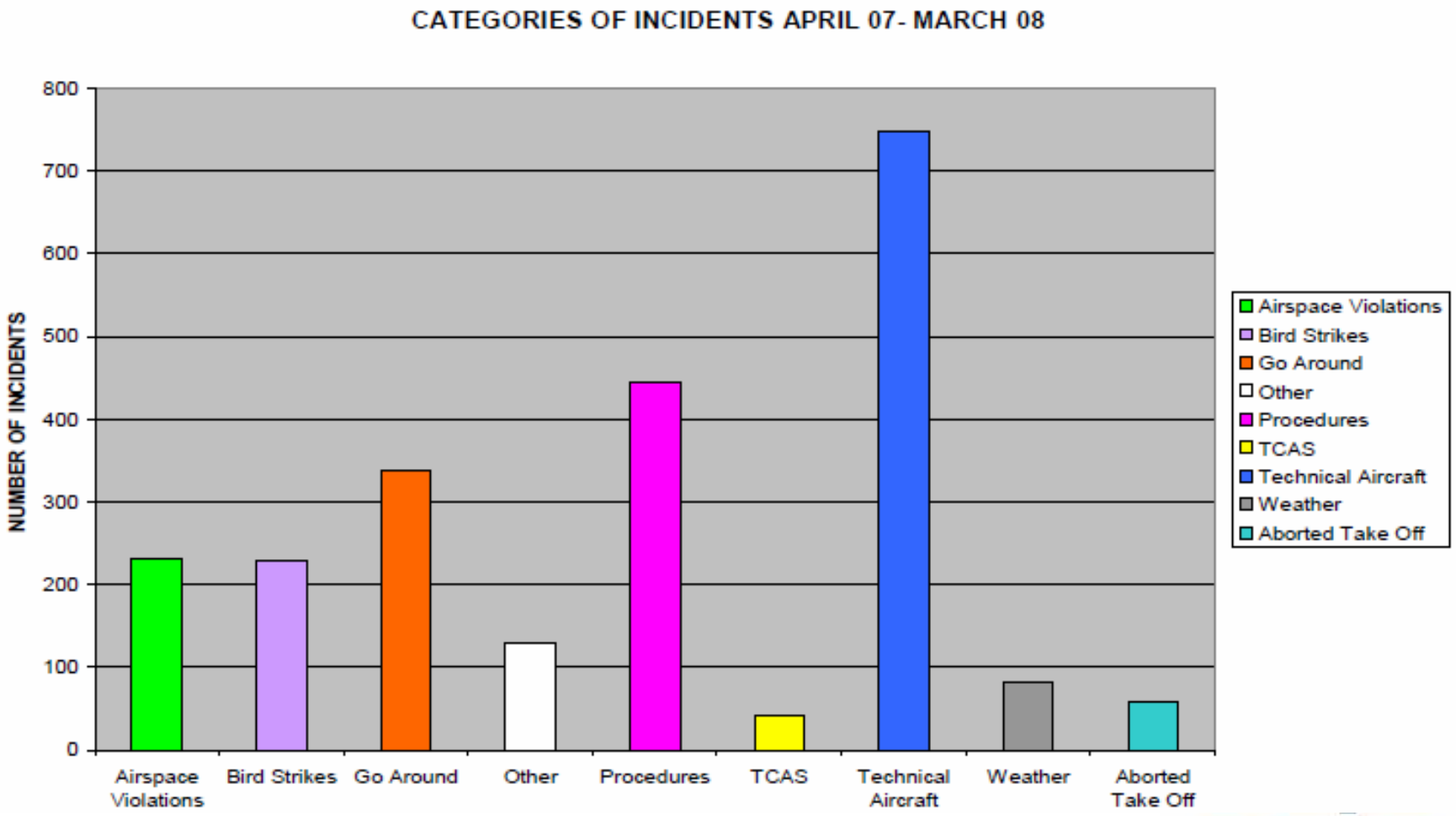
General aviation incidents research (CAA)

- A review of the March 2008 incident category indicates various causes of incidents and accidents in the general aviation(GA) sector in September and October of 2008, in which in two months alone, a total of 56 people lost their lives in general aviation accidents
- CAA gathered relevant role players through the General Aviation Safety Initiative (GASI) which found that:
  - Single pilot environment made GA a higher incident risk
  - Training organizations were not mandatorily pre-approved by CAA
  - Non-security personnel were not conversant with safety regulations and procedures

South African Aviation incidents (source: SACAA)



Recommendations

- Implementing single pilot resource management programme,.
- SACAA has introduced regulation which comes into effect April 2010, that schools should apply and be approved as Aviation Training Organisations by the CAA, this will help to root out bogus institutions (CAA, 2009b)
- Another regulation has been introduced that requires the presentation of compulsory aviation security awareness programmes to non-security personnel who are working within an airport environment, so that they are able to respond to various threatening situations appropriately (CAA, 2009b)

Risk Assessment tool for aviation accidents (CSIR, 2009)

Accident type	Incident, Major, Minor, fatal
Geography details	Airport name or nearest city , country
Year	In which the accident occurred
Time	Some accident records had recorded time
Manufacturer, make type	(Boeing, Airbus, Cessna, Illunov, Fokker,) type and description
Aircraft Details	Plane, helicopter, etc
Airline details	Name as registered , country and type of airline
Flight log	Scheduled/unscheduled (chartered), flight plan filed
Phase of flight	Take-off, landing, cruising, emergency landing
Runway landing defect	Overshot, undershot runway
Collision	Mountainous areas, buildings, water bodies during collision course
Weather	Fog, rain, misty conditions, etc
Security attack	Rebel/Terrorist attacks, hijacks,
Flight plan filed	Detail of flight movement logged prior to the accident
Accident effects	Hull loss, Hull damage, Fire, engine failure, fatalities,
Unknown cause	As registered within the accident report
Total on board	Total passengers recorded
Number of pilots	Number of flight crew as a human factor test for the accidents

Risk Matrix developed

			P (accident)			
			Incident	Minor	Major	Fatal
Risk factors			0.0746	0.0470	0.3564	0.4475
	Night	0.4316	0.0322	0.0203	0.1538	0.1931
Manufacturer	Day	0.2094	0.0156	0.0098	0.0746	0.0937
	Plane	0.9724	0.0725	0.0457	0.3465	0.4352
	Helicopter	0.0110	0.0008	0.0005	0.0039	0.0049
	Passenger flight	0.5138	0.0383	0.0241	0.1831	0.2299
	military	0.1022	0.0076	0.0048	0.0364	0.0457
	Training flight	0.0221	0.0016	0.0010	0.0079	0.0099
	Cargo	0.1713	0.0128	0.0080	0.0610	0.0766
	charter	0.0414	0.0031	0.0019	0.0148	0.0185
	Scheduled	0.4530	0.0338	0.0213	0.1614	0.2027
	Unscheduled	0.1271	0.0095	0.0060	0.0453	0.0569
	unknown	0.2182	0.0163	0.0102	0.0778	0.0977
	Training flight	0.0028	0.0002	0.0001	0.0010	0.0012
	Take-Off	0.2431	0.0181	0.0114	0.0866	0.1088
	Cruising	0.2044	0.0152	0.0096	0.0728	0.0915
	Landing	0.4641	0.0346	0.0218	0.1654	0.2077
	Human factor	0.0801	0.0060	0.0038	0.0285	0.0359
	Weather	0.2238	0.0167	0.0105	0.0797	0.1001
	security	0.2348	0.0175	0.0110	0.0837	0.1051
	Fire	0.2569	0.0192	0.0121	0.0915	0.1150
	Hull loss	0.8646	0.0645	0.0406	0.3081	0.3869
	Emergency landing	0.1105	0.0082	0.0052	0.0394	0.0494
	Runway misaim	0.1298	0.0097	0.0061	0.0463	0.0581
	Collision	0.2293	0.0171	0.0108	0.0817	0.1026
	Engine damage	0.2072	0.0155	0.0097	0.0738	0.0927
	Internal deaths	0.4448	0.0332	0.0209	0.1585	0.1990
	External death	0.0359	0.0027	0.0017	0.0128	0.0161
	unknown deaths	0.0773	0.0058	0.0036	0.0276	0.0346

3. Cross cutting issues:

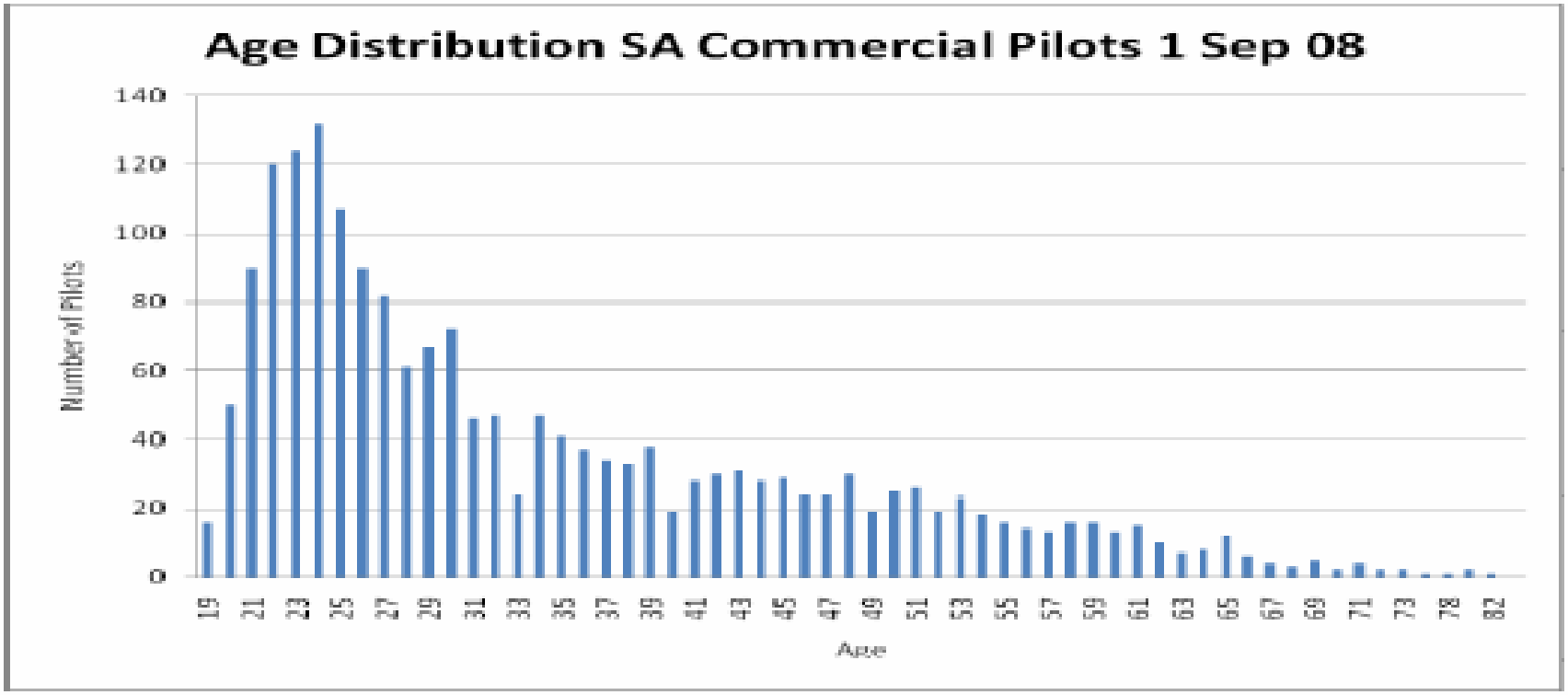
EMISSIONS RESEARCH

- IATA announced in June that the airline industry is committed to achieving carbon-neutral growth by 2020.
- Sasol has received international approval for its 100% synthetic jet fuel, produced through its proprietary coal-to-liquids (CTL) process, to be used by commercial airliners at Johannesburg's ORTIA
- Clean burning alternative fuels for the aviation industry, with the engine-out emissions of Sasol's jet fuel being lower than those from jet fuel derived from crude oil, due to its limited sulphur content

CAPACITY BUILDING

- The South African aviation sector is facing an unprecedented loss of skills, as highly trained technical and air crew leave the country for more lucrative employment in Australia, and the Middle and Far East;
  - Several people in the general aviation industry also self-fund their training, and that flight training is becoming increasingly expensive owing to the fuel price and the price of aircraft maintenance. CAASA is interacting with the Department of Finance and the Department of Education to categorise aviation training as education, and not as vocation training so as for the students not to pay VAT
  - Broad-based black economic empowerment (BBBEE) is also an aspect that CAASA is addressing on behalf of the general aviation sector

ATTRACTING SKILLS(Source: SACAA)



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