CONNECTING CHINA

TURBOPROP MARKET FORECAST FOR CHINA 2018-2037
EXECUTIVE SUMMARY

TRAFFIC GROWTH

IN A NUTSHELL

ROUTES TO BE CREATED BY TURBOPROPS

AVAILABLE SEAT-KILOMETERS FORECAST

NEW TURBOPROP ROUTES

+4.6% GDP

X8 REGIONAL TRAFFIC

87% OF 2037 ACTIVITY WILL COME FROM NEW ROUTES

53% New General Aviation Routes

34% New Regional Aviation Routes

13% Existing Network

GDP X8

REGIONAL TRAFFIC +4.6%

NEW ROUTES 2,110

TRAFFIC GROWTH

2016 2018 2020 2022 2024 2026 2028 2030 2032 2034 2036 2037

FORECAST

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<tr>
<th>SOUTHWEST</th>
<th>PAN-NORTHWEST</th>
<th>PAN-NORTH</th>
<th>MID-EAST</th>
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ACTIVITY WILL COME FROM NEW ROUTES 87%
IN A NUTSHELL

TURBOPROP DEMAND

While it is still at an early stage of development, regional connectivity in China is the next big thing.

With over 500 airports to connect, through the opening of new routes, the market is expected to be boosted by both Regional and General Aviation development plans.
EXECUTIVE SUMMARY

ECONOMIC IMPACT OF REGIONAL AVIATION

Either through tourism development or by establishing business, interlinking secondary and tertiary cities allows every community to be connected and benefit from global economic growth - a key component of sustainable development.

WORLDWIDE MARKET TRENDS
CONNECTING LOCAL COMMUNITIES

AIRPORTS SERVED EXCLUSIVELY BY REGIONAL AIRCRAFT

Many communities rely on regional aircraft to connect to other countries and regions throughout the world. Through an adapted technology and capacity, turboprops efficiently answer this essential market need.

Turboprops are the benchmark as they provide specifically adapted economics for the average worldwide route length of 300 NM.

Furthermore they ensure accessibility to all airfield profiles and are the lifeline of many communities.

ECONOMIC IMPACT OF REGIONAL AVIATION

- More Social Development
- More Employment
- +5% Tourists
- +6% Regional GDP
- +8% Foreign Direct Investment
- +10% FLIGHTS GENERATES

AIRPORTS SERVED EXCLUSIVELY BY REGIONAL AIRCRAFT

50%
Airports relying exclusively on regional aircraft

36%
Airports relying exclusively on turboprops

3,800+ COMMERCIAL AIRPORTS
EXECUTIVE SUMMARY

WORLDWIDE MARKET TRENDS
TURBOPROPS PLAY A KEY ROLE
IN REDUCING EMISSIONS

POTENTIAL EMISSION SAVINGS BY REPLACING REGIONAL JETS WITH TURBOPROPS

> Assuming all short haul flights worldwide operated by regional jets today were replaced by modern turboprops, 11% of overall regional aviation CO₂ emissions could be saved.

> These 4,100,000 tonnes of CO₂ overall regional aviation emissions are equivalent to the annual absorption of 200,000,000 trees.

> Although some are very well populated, many countries still have poor regional connectivity, contrasting with mature European and North American markets.

> Leveraging turboprop advantages (cost efficiency, access to challenging airfields), China will lead market growth while developing the economies of secondary and tertiary cities.
Regional fleets of aircraft with less than 100 seats are lagging behind China’s tremendous fleet growth and barely reaching a 2% share of the total fleet size against a worldwide average of 25%.

To sustain regional route development, China requires adapted capacities.

Answering demand for air transport between large cities as well as their international connectivity has been prioritised so far.

There are still many opportunities to connect all of the smaller cities through an efficient regional network.
EXECUTIVE SUMMARY

CAPACITY

CHINESE MARKET TRENDS
DIFFERENT FLOWS, DIFFERENT CAPACITIES

HIGH SPEED TRAIN & AIRPORT MAP

CAPACITY ALLOCATION VS TRAFFIC

In main cities, high speed train is the solution when large traffic demand generates airport and air space constraint.

Yet many smaller cities can not access high speed train directly. Their air connection to these wider air and train networks is crucial for their development.

Traffic flows between secondary and tertiary cities require adapted capacity **sub-80 seats to allow a good level of service** frequencies **as well as adapted economics** to enable affordable fare without subsidies.

Air connectivity is **essential** to many smaller communities that do not have access to the High Speed Train

Regional Aviation and General Aviation have ideal capacity ranges to fly smaller flows
It's encouraged to build GA airports around hubs with flows of 10 million passengers or above, per year or above, to undertake non-competing services from hubs. It's also encouraged to build GA airports to conduct short haul transportation and improve transportation conditions in remote areas or where ground transportation is under developed.

CAAC 13th 5 Year Development Plan
Using gravity modelling, one can correlate each route activity with its characteristics.

**ATR’s forecast for China considered variables**

- Route distance,
- Time to travel by road,
- HST availability,
- Airport activity in size and quality,
- Cities’ local demographics, economic indicators (e.g. income, tourism, …),
- Province’s economic indicators

The resulting mathematic model is calibrated on 5,000 existing Chinese domestic routes. It is used to estimate activity potential on every airport pair not yet flown.

Famous for rich natural resources and tourist attractions. The challenging terrain makes the HST connection extremely difficult and costly.
A vast region where travelling by road is time consuming and the cost to build a HST connection is high. Nearly all the air traffic is concentrated on Urumqi, while connectivity between other airports is scarce.

The northwestern region is vast, with complex terrain. Regional aviation and GA short-haul transportation requires lower investment than HST and road construction, but always brings quicker turnarounds and development opportunities to local communities.
FORECAST BY MAIN AREA

FOCUS ON PAN-NORTH-EAST CHINA

A vast region where road transportation is time consuming and HST connection only connects a handful major cities. Many regional airports require inter-connection. Bohai Bay could be better served by combining complementary air transportation with the HST.

- 30 seat turboprops
  - General Aviation
  - 230 deliveries
- 50 seat turboprops
  - Regional Aviation
  - 20 deliveries
- 70 seat turboprops
  - Regional Aviation
  - 95 deliveries

650 NEW ROUTES

FORECAST BY MAIN AREA

FOCUS ON MID-EAST CHINA

This region has a dense HST train network however as development spreads to secondary and tertiary cities Regional Aviation and GA transportation can bring complementary connectivity to these markets, for which the HST network is not designed.

- 30 seat turboprops
  - General Aviation
  - 210 deliveries
- 50 seat turboprops
  - Regional Aviation
  - 15 deliveries
- 70 seat turboprops
  - Regional Aviation
  - 75 deliveries

540 NEW ROUTES
ASSUMPTIONS

Geographic scope

Only domestic routes are considered

- **Pan-Northwest:** Qinghai, Gansu, Ningxia, Shaanxi, Shanxi and western Inner Mongolia (airports west of Hohhot)
- **Pan-Northeast China:** Hebei, Shandong, Heilongjiang, Jilin and Liaoning, north-eastern Inner Mongolia (airports east of Hohhot)
- **Mid-East China:** Henan, Jiangsu, Anhui, Hunan, Jiangxi, Hubei, Zhejiang, Fujian, Guangdong, Hainan
- **Southwest China:** Sichuan, Guizhou, Yunnan, Chongqing and Guanxi
- **Xinjiang:** Xinjiang Autonomous Region

This study does not cover market in Beijing, Shanghai, Tibet Autonomous Region, Hong Kong, Macau and Taiwan

Definitions & assumptions

- **GDP:** Gross Domestic Product
- Turboprop in-service fleets are considered in the range of 30-80 seats in standard configuration.
- Turboprop aircraft supply is based on in-production and launched programs.
- Network range up to 900 NM ~ 1,700 km ~1,000 mi.
- Route size considered: up to 450 daily seats each way per carrier.
- Depending on distance and traffic flow criteria, each route is allocated to most probable aircraft category, from 30 to 200 seats, jet and turboprop technologies.
- General Aviation airports considered of Level 1.

Sources

- ATR Studies and survey
- CAAC
- Flightglobal, OAG, Oxford Economics
- Acknowledgement to Mr. QI Qi and Mr. GAO Yuanyang for their valuable contributions.

SAFE HARBOUR STATEMENT

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This presentation includes forward-looking statements. Words such as anticipates, believes, estimates, expects, intends, plans, projects, may, forecast and similar expressions are used to identify these forward-looking statements. Examples of forward-looking statements include statements made about strategy, rampup and delivery schedules, introduction of new products and services and market expectations, as well as statements regarding future performance and outlook.

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