



低空经济及中国通用航空发展趋势

Low Altitude Airspace Economy and Chinese General Aviation Development Trend

1. 低空经济 Low Altitude Airspace Economy

何为低空经济？

—低空开放背景下，利用低空空域资源发展通用航空，带动通用航空及其相关产业发展，并对相关经济领域产生协同发展效应的一种经济形态。

Low Altitude Airspace Economy — LAAE

What's is?

LAEE is a kind of Economy pattern: Under Altitude Airspace opening, utilizing Altitude Airspace resource to develop General Aviation, driving General Aviation and related industry development, and causing coordination development affections on other economic area.



1. 低空经济 Low Altitude Airspace Economy

低空经济的特征

- 是一种“立体经济”，包含了从“天”到“地”经济元素
 - “天”——飞机、飞行员、乘客、货物、航油航材保障
 - “地”——机场、FBO、MRO、通用飞机制造、航空社区
 - “天-地”之间——空管、导航、气象、FSS

Key Points of LAAE

- a kind of stereo economy, including the economy factors from **Sky** to **Ground**.
 - “**Sky**” —airplane、pilot、passenger、cargo、avi-gas...
 - “**Ground**” —airport、FBO、MRO、General Aviation manufacturing, air park
 - “**Sky to Ground**” —air traffic control, FSS, navigation, flight information service





1. 低空经济 Low Altitude Airspace Economy

低空经济的特征

➤ 产业涵盖领域广

通用飞机—生产工具、交通工具、大玩具、奢侈品

通航市场 — 从公务航空、作业航空到航空运动，高富帅、屌丝人群

➤ 经济影响广泛

就像是水融于大地，广泛融入社会经济的各个方面——工农林业、交通运输、旅游、消费、教育文化、社会服务。。。。

Characteristic of LAAE

➤ Industry Cover Widely

GA Aircrafts — Both of the production tools, transportation tools, big toys, luxuries

GA Market — from business jet to sport aviation, from rich man, business man, aviation fans to common people, cover a widely market field

➤ Economy effect extensively

like water drop into ground, Its economic affection extensively **integrate** into the various aspects of society and economy — industry production, agriculture, forestry, transportation, tourism, consumer, education, culture, social service.....



1. 低空经济 Low Altitude Airspace Economy

“低空经济”起源于中国 / LAAE originate from China. Why?

- 随着中国社会经济的发展，中国蕴藏着通用航空巨大的市场与社会需求。
with the development of Chinese society and economy, there is great market needs for GA
- 受制于空域管制及基础设施条件限制，中国的通用航空发展滞后，是中国最后一个尚未放开发展的巨大产业
Be restricted to the strict airspace control, Chinese GA cannot get proper development, is still a great industry not opening to development
- 中国中央政府发出了开放低空空域的政策信号，随着中国低空空域的开放，中国通用航空将迎来迅猛发展，低空经济现象有望在中国集中性体现
Now, Chinese government released the policy signal of opening the low altitude airspace to development GA, with the altitude airspace opening, Chinese GA will get rapid development and LAAE phenomenon will likely appear concentratedly in China



2. 中国正成为全球通用航空最为重要的新兴市场

China is going to be the most important GA market globally

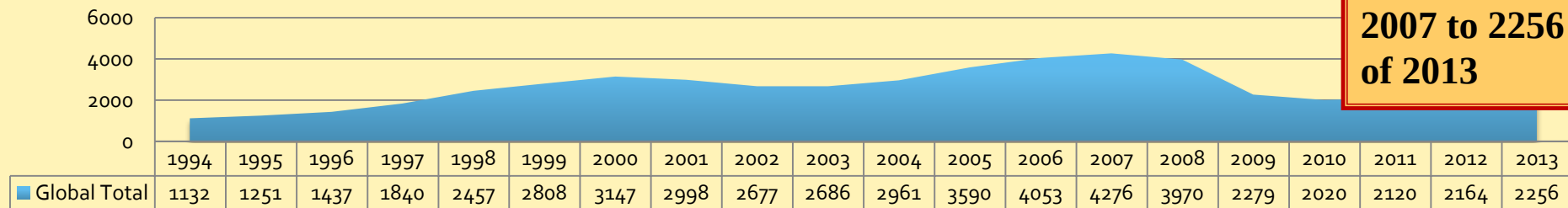
Year	Grand Total	Single-Engine Piston	Multi-Engine Piston	Total Piston	Turboprop	Turbine	Unmanned
1994	1,132	544	77	621	233		
1995	1,251	605	61	666	285		
1996	1,437	731	70	801	320	316	636
1997	1,840	1,043	80	1,123	279	438	717
1998	2,457	1,508	98	1,606	336	515	851
1999	2,808	1,689	112	1,801	340	667	1,007
2000	3,147	1,877	103	1,980	415	752	1,167
2001	2,998	1,645	147	1,792	422	784	1,206
2002	2,677	1,591	130	1,721	280	676	956
2003	2,686	1,825	71	1,896	272	518	790
2004	2,961	1,999	52	2,051	319	591	910
2005	3,590	2,326	139	2,465	375	750	1,125
2006	4,053	2,513	242	2,755	412	886	1,298
2007	4,276	2,417	258	2,675	465	1,136	1,601
2008	3,970	1,943	176	2,119	538	1,313	1,851
2009	2,279	893	70	963	446	870	1,316
2010	2,020	781	108	889	368	763	1,131
2011	2,120	761	137	898	526	696	1,222
2012	2,164	817	91	908	584	672	1,256
2013	2,256	831	102	933	645	678	1,323

Data from GAMA

全球飞机交付量从2007年的4276急剧下降到2013年的2256架

GA airplane global shipments drop sharply from 4276 of 2007 to 2256 of 2013

全球通用飞机交付量 General Aviation Airplane Shipments Worldwide (1994–2013)





2. 中国正成为全球通用航空最为重要的新兴市场

China is going to be the most important GA market globally

全球通用航空飞机各地区的交付量占比（按飞机制造类型）（2007-2013）

Customer Delivery Region for General Aviation Airplane Shipments（in Percent of Total）

Year	Piston					Turboprop					Business Jet				
	North America	Europe	Asia-Pacific	Latin America	Middle East & Africa	North America	Europe	Asia-Pacific	Latin America	Middle East & Africa	North America	Europe	Asia-Pacific	Latin America	Middle East & Africa
2007	66.5	16.3	9.2	5.4	2.7	57.2	16.3	8.6	14.4	3.4	58.3	24.9	4.2	7.5	5.2
2008	68.1	15.2	7.5	7.3	2.0	57.3	21.9	6.0	7.4	7.4	53.8	25.9	4.7	9.4	6.3
2009	59.4	21.2	9.5	6.8	2.8	57.8	17.5	8.7	8.1	7.8	49.4	26.3	8.6	9.2	6.4
2010	53.4	18.6	13.7	8.8	5.5	43.2	15.2	16.8	14.7	10.1	42.1	22.8	11.8	14.3	9.0
2011	57.7	12.0	15.6	10.0	4.6	52.6	14.1	14.4	13.6	5.3	50.0	20.2	12.9	10.1	6.8
2012	50.4	19.6	16.3	9.7	4.1	48.6	12.6	17.4	14.5	6.9	49.7	20.8	11.8	11.6	6.1
2013	52.8	17.2	15.1	10.0	5.0	57.1	10.5	14.0	13.2	5.3	52.4	15.6	11.9	11.1	9.0

“西边不亮东边量”，亚太地区市场增长迅猛，通用飞机交付量在全球的占比逐年上升

Contrast to the decline of global market, Asia-Pacific's market growth rapid, the market share got raised year and year.

Data from GAMA

2. 中国正成为全球通用航空最为重要的新兴市场

China is going to be the most important GA market globally



- 中国市场则是持续增长。2004-2013, 年复合增长率达12.6%, 2012-2013, 年增长率23%

Chinese market going up in 12.6% from 2004

中国通用飞机保有量和增长量 (2004-2013)

- 这还只是中国空域正待开放时的市场表现

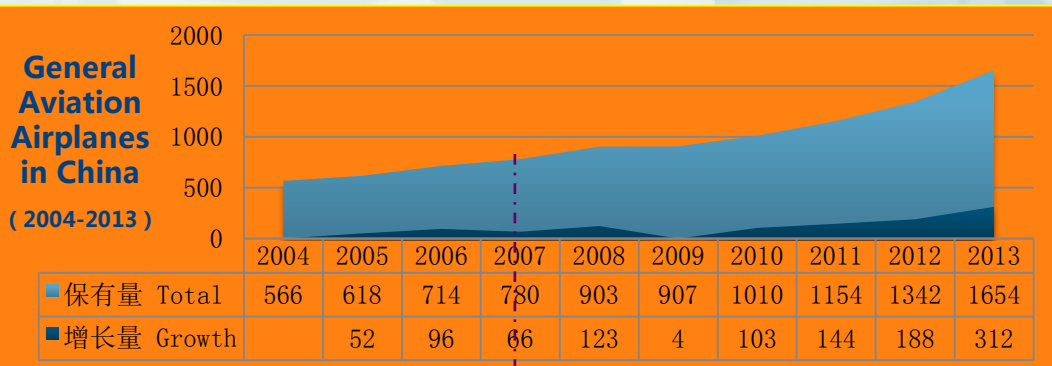
- 且不能只看相对数, 机队规模绝对数是:

中国(China)1654 vs. 美国(US)230000

中国市场空间尽可以让人们去大胆想象

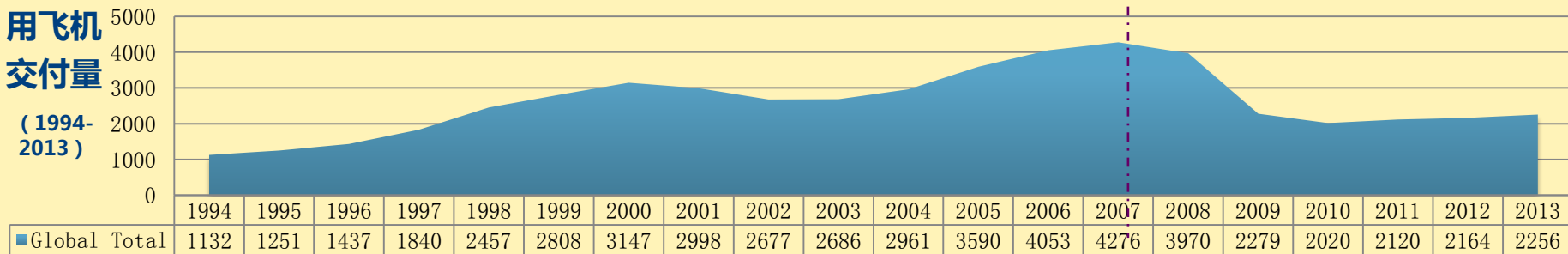
You can imagine how big the Chinese

market is



全球通用飞机交付量
(1994-2013)

General Aviation Airplane Shipments Worldwide (1994 - 2013), Data from GAMA



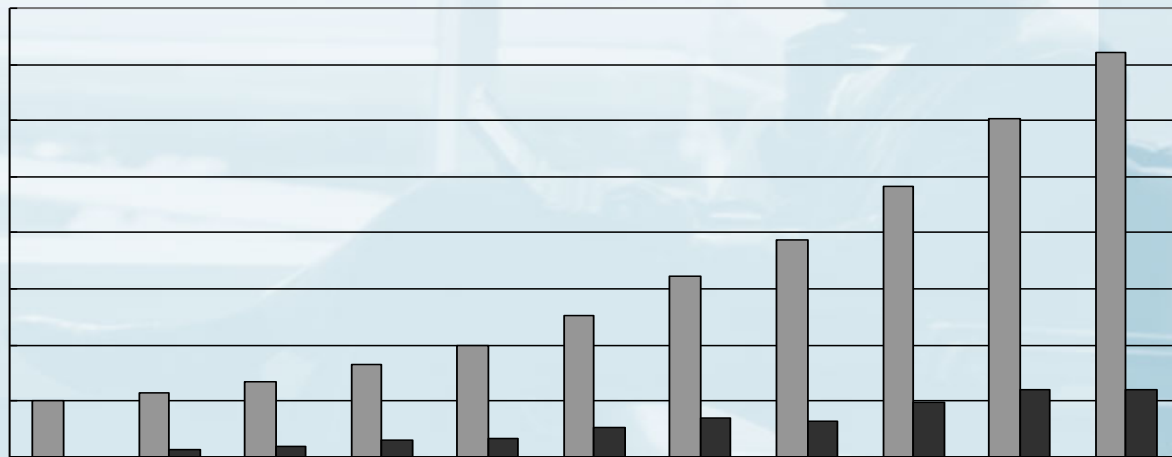


2. 中国正成为全球通用航空最为重要的新兴市场

China is going to be the most important GA market globally

中国通用飞机未来需求预测

The market prediction of GA aircrafts in China



■ 年新增量		144	188								
--------	--	-----	-----	--	--	--	--	--	--	--	--

24



3. 中国也正成为全球通用航空产业链重要的一员

China is also an important player of global GA industry chain

中国不仅仅是全球通用航空最为重要的新兴市场，也是全球通用航空产业链重要的一员

China is not only the most important emerging markets to the global general aviation, but also an important part of global general aviation industry chain

美国EAA飞来者大会中的“中国元素”

“China Element” in the EAA AirVenture, Oshkosh US

初教六机队
CJ-6

卓越航空
Superior

Fling Tiger

LISA

ICON

西锐
Cirrus

Mooney

巴西航空工业
Embraer

大陆航空发动机
Continental

Enstrom

Pilatus

塞斯纳
Cessna





4. 运营环境急待改善

GA Operation Environment need to be improved

2013年全国飞行总量58万小时，较上年增长约8%

➤ 业务增长量滞后于机队规模的增长

原因：新飞机买了，飞起来难，还没有派上用场

许多新飞机是为开展新兴业务而买，新兴业务开展难

The total flight hours is 580 thousands in 2013 over the country, the growth rate is only 8%, behind the fleet growth

业务结构：目前主要集中在农林化、海上石油、训练飞行等传统业务领域。**新兴业务**——除公务机外，几乎还是空白

公务机、通勤、空中的士、空中游览、私人飞行、娱乐飞行、小飞机快递

Many new aircrafts were bought, but remain on ground due to the difficulties of operation -- Limited to Airspace control, inadequate infrastructure, shortage of pilots

受制于

空域管制、基础设施不足、飞行员短缺

通用航空中最为精彩的业务领域

6. 运营环境急待改善



5. 中国通用航空目前发展态势

The current situation of Chinese GA Development

- 中央政府政策信号强劲

Strong policy signals from Central Government

- 地方政府热情高涨

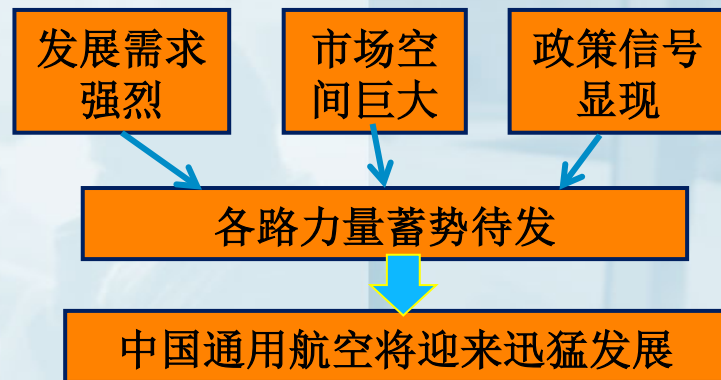
Passionate local governments

- 产业资本\投资基金高度关注

High-attention from the industrial capital / funds

- 国外产业主力开始在中国布局

Strategic layouts of foreign main industrial powers in China





5. 点-线-面 —— 中国通用航空发展之路径

Point-Line-Area— Chinese GA Developing route

● 政策试点 / 园区试点 / 通用航空机场 单点建设

点

Point

从“点”看 - 呈星星之火之势

— 珠海、武汉、南宁、渭南、广汉、法库、莱芜、
安阳、千岛湖、厦门、北京、天津、海南、郑州。。。

More and more cities are starting or planning to construct GA airports, but just in “points” not in “network”

- 仅仅单点开花、本场空域开放是不够的
— 能飞，但飞不出去
- 只有实现点到点个人飞行，并达到低空飞行常态化，方能成就通用航空产业

- Only “point” – the limited airspace’s opening - is not enough – can take off, but cannot fly out
- The point-to-point private flight’s normalization should be the key to accomplish GA industry

点到点
任务飞行



个人飞行
常态化



通用航空
产业

5. 点-线-面 —— 中国通用航空发展之路径

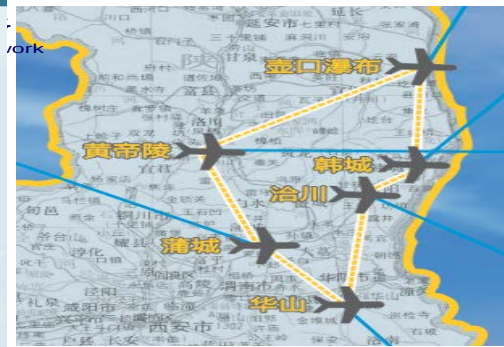
Point-Line-Area— Chinese GA Developing route

线

Line

- 但，指望短期内全面性放开不现实
The expectation of fully opening of China's airspace is unrealistic
- 更为现实可行的做法：由点到线，划设区域性低空飞行航线，开辟非定期固定飞行业务。
Feasible solution: From point to line, set up the regional low-altitude flying route, and operate fixed flying tasks regularly

- 从需求出发，按需划线
- Draw the flying route “Line” based on demand
- 从天到地，沿线构建机场、空管与地面服务体系建设
- From sky to ground, build airport, air traffic control and ground service system along with the “Line”



重要进展

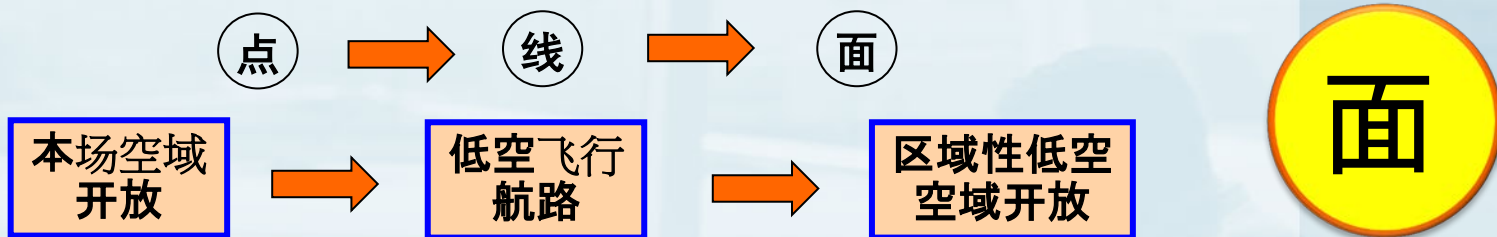
Important progress

目前已在珠海、海南、宁波等地划设了目视飞行低空航线

Now there are some VFR flight route drew in some area
- Zhuhai, Hainan and Ningbo

5. 点-线-面 —— 中国通用航空发展之路径

Point-Line-Area— Chinese GA Developing route



关键点： • 区域通用航空运营环境构建 • 低空空域有效管理

➤ 通用航空运营环境构建 — 是一个系统工程

“看天看地”、“由天到地”、“有软有硬”

- “天” — 空域资源
- “地” — 基础设施、地面服务保障
- “由天到地” — 空地数据链建立、空管
- “软” — 政策法规、飞行行为规则、管理体系、飞行综合信息服务系统
- “硬” — 机场、FBO、FSS、设施设备

➤ 低空空域管理 — 高效、安全、用户友好，动态空域管理

如何构建？

- ◇ 推动主体？
- ◇ 参与机制？
- ◇ 投融资安排？



5. 点-线-面 —— 中国通用航空发展之路径

Point-Line-Area— Chinese GA Developing route



Dot airspace opening
above airport

Low altitude
flight route

Regional area low altitude
airspace opening

Area

Key points:

- set up regional GA operation environment
- Effectively management the low altitude airspace

- set up regional GA operation environment— a system engineering
 - “Sky” 、 “Ground” 、 “From Sky to Ground” , “Software and Hardware”
 - “Sky”— airspace resource
 - “Ground”— airport, FBO, operation facilities, ground service
 - “From Sky to Ground”— flight data chain’s establishing, air traffic control
 - “Software”— law and policy, flight regulations, management system
 - “Hardware”— infrastructure
- Effectively management the low altitude airspace
 - Balance between safety, efficiency and user-friendly; dynamic airspace management



6. 做好产业大发展准备

To prepare for the great GA development of China



- 除了空域开放外，制约通用航空发展的其它一些关键性问题短时间内难以完全解决。

Except airspace's opening, other problems that restrain GA's development can't be completely solved momentarily

- 政策与产业发展环境营造需要过程。

Policy and industry development environment need to process.

- 投资者从了解产业、认识产业到投入需要时间。

From understanding the industry to investing the industry, the investors need time.

- 航空文化建设更是一个长期的过程——得从娃娃抓起…

Aviation culture nurture is an even longer term to process, -- need to start with the children.

■ 空域开放

airspace opening

■ 基础设施及运营保障体系

The infrastructure and operation support system

■ 行业管理政策及行业标准

Industry policies and industry standards

■ 风险控制与管理机制

Risk control and management

■ 终端市场的培育

Market's development

■ 行业规范和行业行为准则

Industry regulations and flight behavior

■ 人才培养

Personnel training

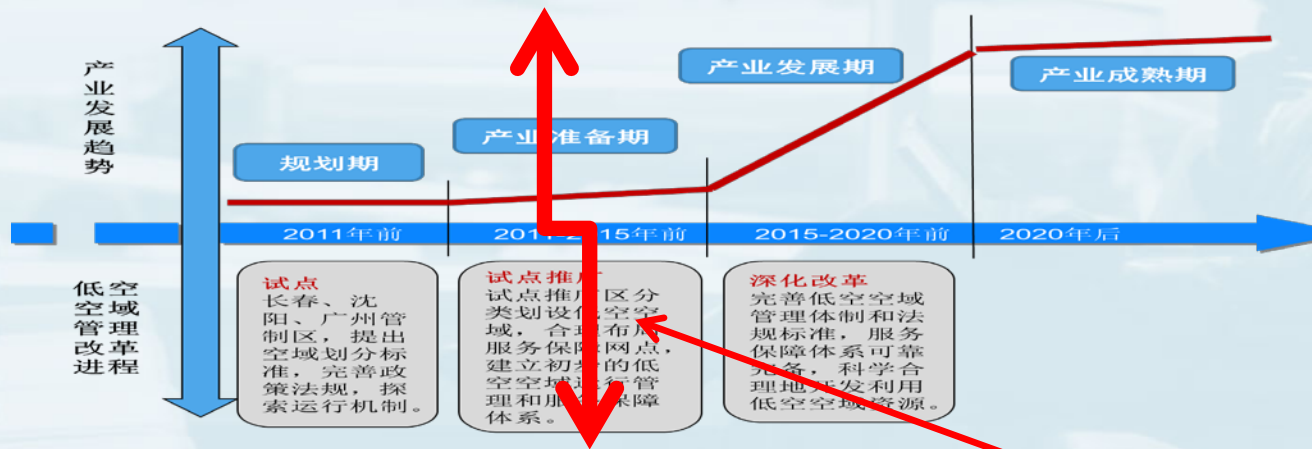


6. 做好产业大发展准备

To prepare for the great GA development of China

我们判断：中国通用航空的大发展尚需要1-2年的产业准备期

there is a 1-2 years preparation period for the great development of China's GA



Central Government
-- make policies

Local Governments
-- make development plan,
build airports

Investors and companies
-- buy aircrafts, find pilots,
make business plans

**All people are very busy
to prepare for**

- 尚未进入实质性发展快车道，仍处于重要的产业发展准备期
- 但从纸面落到了实处，已开始进行实实在在的发展准备
- “都在做发展准备”——出政策、做规划、修机场、建公司、买飞机、卖飞机，引项目。。。

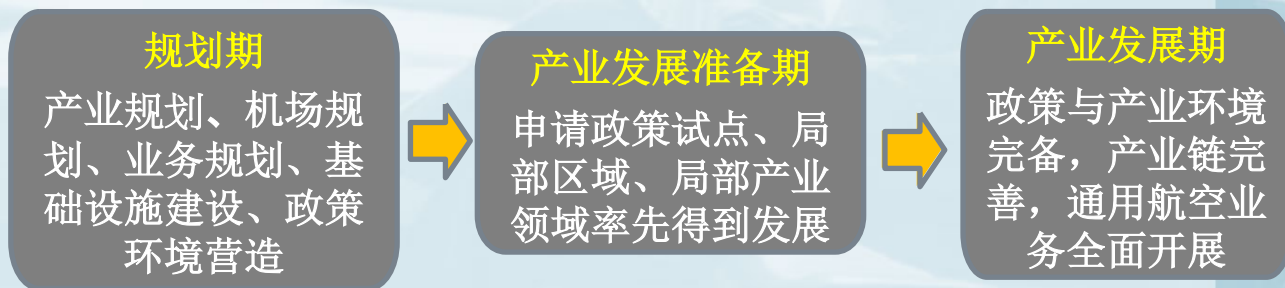


7. 把握产业发展节奏

Step on the rhythm of industry development

尽管还没有做好产业大发展准备，尽管还需要1-2年的产业发展准备期，但并不是说大家都要坐等观望1-2年。

我们认为，即使在产业发展准备期，通用航空也会在局部区域、局部产业领域得到率先迅猛发展。



把握产业发展节奏！

7. 把握产业发展节奏

Step on the rhythm of industry development



Although it would take 1-2 years to prepare for GA great development, but it does not mean that we are just sitting here and waiting for 1-2 years.

We believe that even in the preparation period, GA will be firstly rapidly developed in a certain regions and areas.

Planning

Industry layout, airport building, business plan — set up a good industry and policy environment.



Preparation

Apply for the low aerospace opening and policy test. Partial areas and some industrial got rapid development



Developing

Policy & industrial environment got well, industry chain formed for overall development of GA.

Step on the rhythm of industrial development!



8. 地方政府是推动区域通用航空发展的主导力量

Local government is the leading power to push the GA development

通用航空发展—**地方政府**大有可为、且地方经济是通用航空发展的最大受益者。



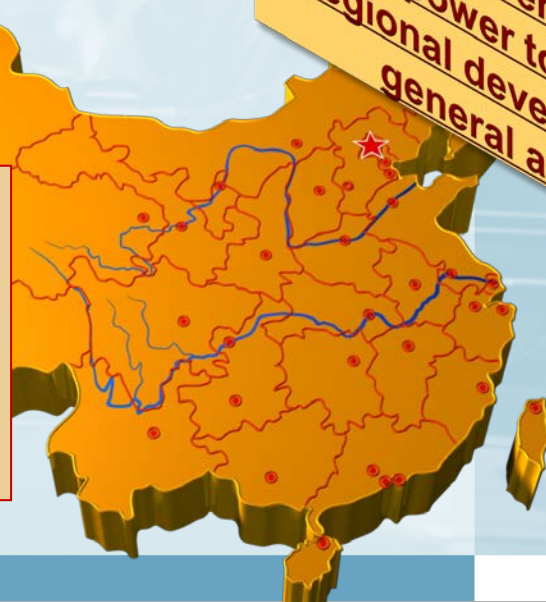
各地发展通用航空的热情高涨，正在谋划和实施通用航空产业大发展



北京航空航天大学通用航空产业研究中心积极为地方通用航空发展提供专业支持，为近30个省市做了通用航空发展研究、编制产业发展规划：

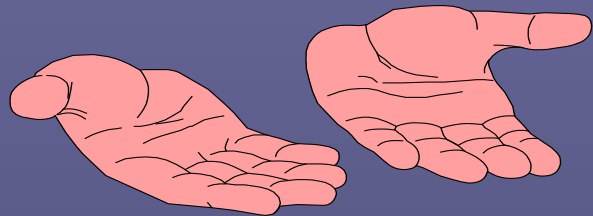
北京、陕西、云南、湖北、珠海、渭南、株洲、三沙、温州、南宁、武汉、锦州、襄阳、广汉、营口、龙岩、溧阳、济源、登封、鄂尔多斯、平泉、庄河。。。

地方政府是推动区域通用航空发展的主导力量！
The local government is the leading power to promote the regional development of general aviation



北京航空航天大学
通用航空产业研究中心
愿与各界合作共促中国通用航空大发展

General Aviation Industry
Research Center
Beihang University



Thanks



北京航空航天大学
BEIHANG UNIVERSITY