SCAA

Azerbaijan Republic

ATM measures fuel efficiency impact assessment

Bahruz Malikov

APER TF

Virtual Meeting, 21 March 2023

ENVIRONMENTAL PRIORITIES

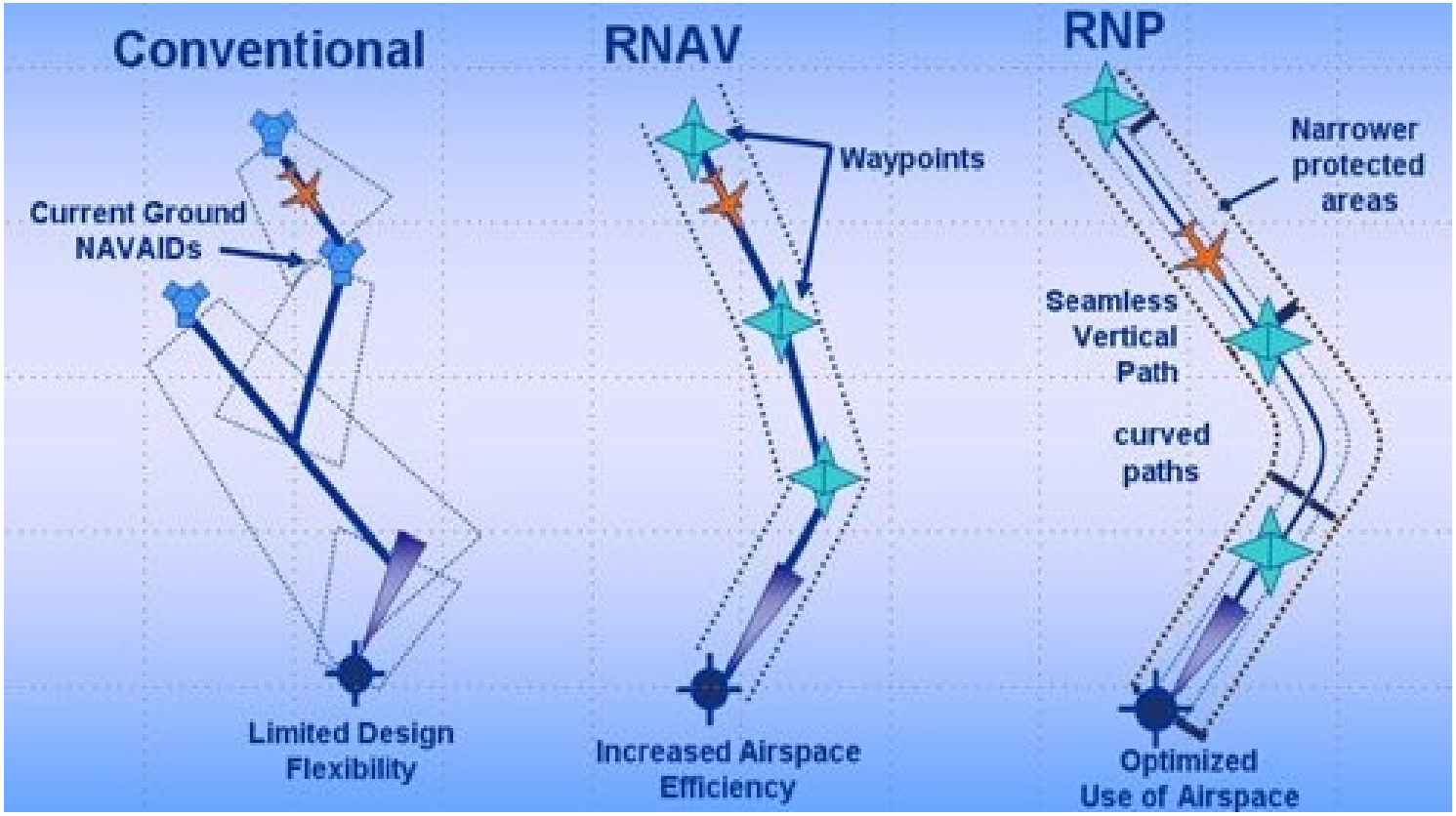
- ✓ ICAO GA Consolidated Resolutions
- ✓ Civil Aviation Development Policy and Strategy
- ✓ Primary Legislation
- ✓ Regulations
- ✓ APER – Action Plan on Emission Reduction 3rd edition
- ✓ CORSIA Membership

GANP

- ✓ EU Single European Sky Air Traffic Management Research (SESAR) initiative
- ✓ ASBU Block modules 0 and 1 by 2025
- ✓ Total annual global fuel saving in 2025 - 167 to 307 kg per flight
- ✓ CO_2 reduction - 26.2 to 48.2 Mt

Airspace upgrading measures

PBN, RNAV, STAR, & SID



Utilized statistical data

- Overflights and
- Arrival-departure traffic

Traffic growth
Period 1996-2019's

FIR Baku - from 35000 up to 158057 (139822 IFR)

EUROCONTROL forecast for 7 years, traffic annual growth would average from 2.6% to 6.6%, with the baseline of growth by 4.4%

"Azeraeronavigation"

Air Traffic Statistics Reports

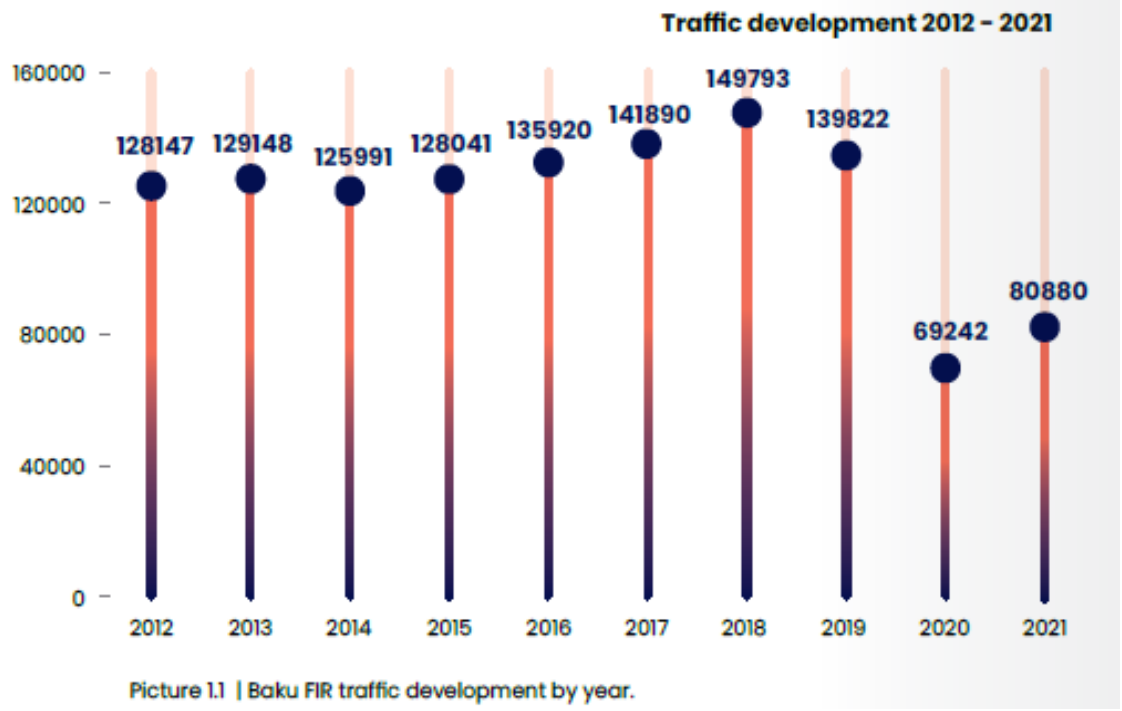
AZƏRAERONAVİQASİYA

FIR Baku 2015-2021

80880
THE NUMBER OF FLIGHTS UNDER INSTRUMENT FLIGHT RULES [IFR]

16.8%
A GROWTH COMPARED TO 2020

222
AVERAGE FIGURE OF NUMBER OF IFR FLIGHTS



Picture 1.1 | Baku FIR traffic development by year.

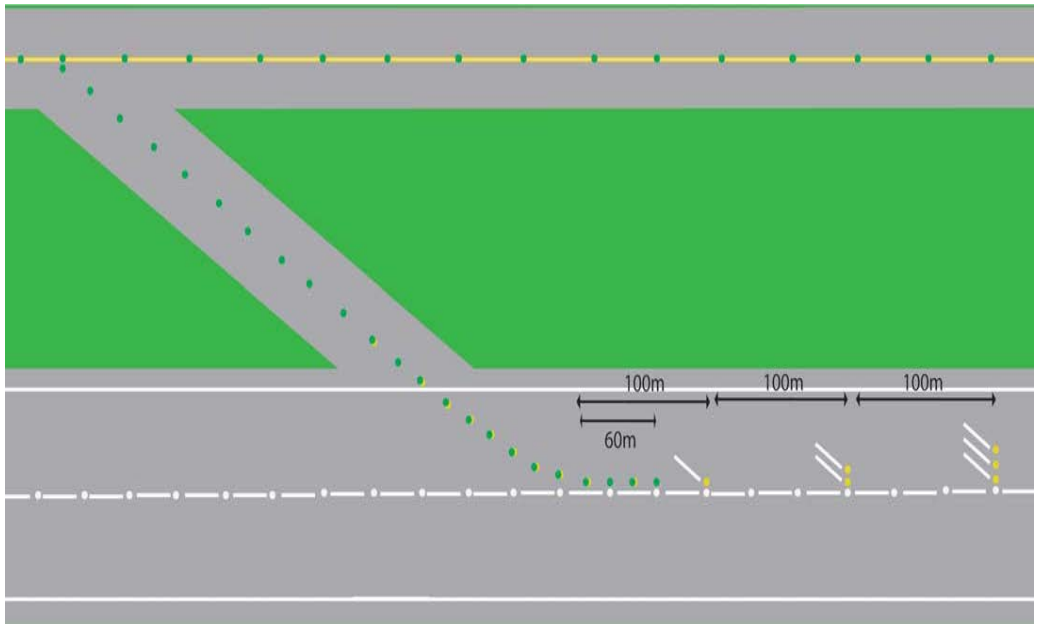
Airspace capacity 40 - 65 aircraft per hour

Flexible ATS Route System

Benefits:

- reduced route distances;
- optimized routes selection options;
- optimization of route networks and flight levels (fuel-efficient route structure);
- optimized vectoring;
- strict adherence to planning;
- utilize RNAV/RNP APRCH operations capabilities;
- perform Continuous Decending Operation (CDO);
- reducing go-arounds.

Ground operations



Rapid Exit TWY Indicator Lights

- ✓ SMGCS - surface movement guidance and control systems
- ✓ One engine running taxiing
- ✓ Rapid taxi exit

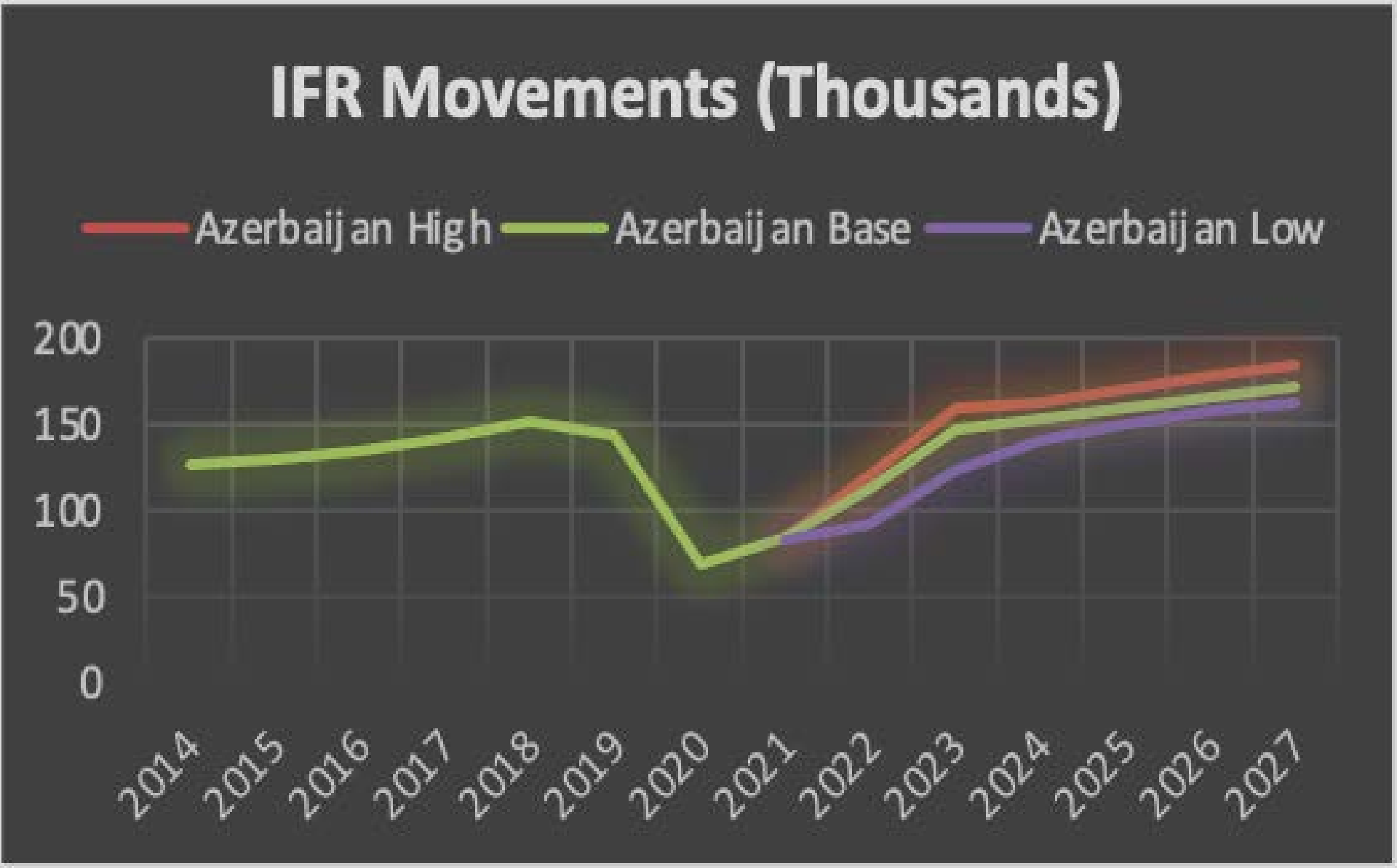
Number of IFR flights within boundary of FIR Baku and TMA, for the period 2015-2021

Year	Total number of flights	Overflight traffic IFR	ATC operations	Int'l arrive-departure
2015	128041	82201	RNAV1 SIDs and STARs CCO/CDO	37500
2016	135920	87415		39560
2017	141890	88281		45917
2018	149793	94806		47906
2019	139822	83844		47678
2020	69242	44271		21138
2021	80880	47065		28596
Total	845588	527883		268295

Traffic growth scenarios (2015-2027)

IFR Movements (Growth)		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	AAGR 2020-2027 (vs 2019)
Azerbaijan	High	.	.	.	.	.	.		41%	34%	2%	4%	5%	4%	3,3%
	Base	1%	5%	5%	7%	-6%	-52%	22%	36%	29%	5%	4%	4%	4%	2,3%
	Low	.	.	.	.	.	.		13%	35%	14%	6%	4%	4%	1,6%

IFR traffic growth



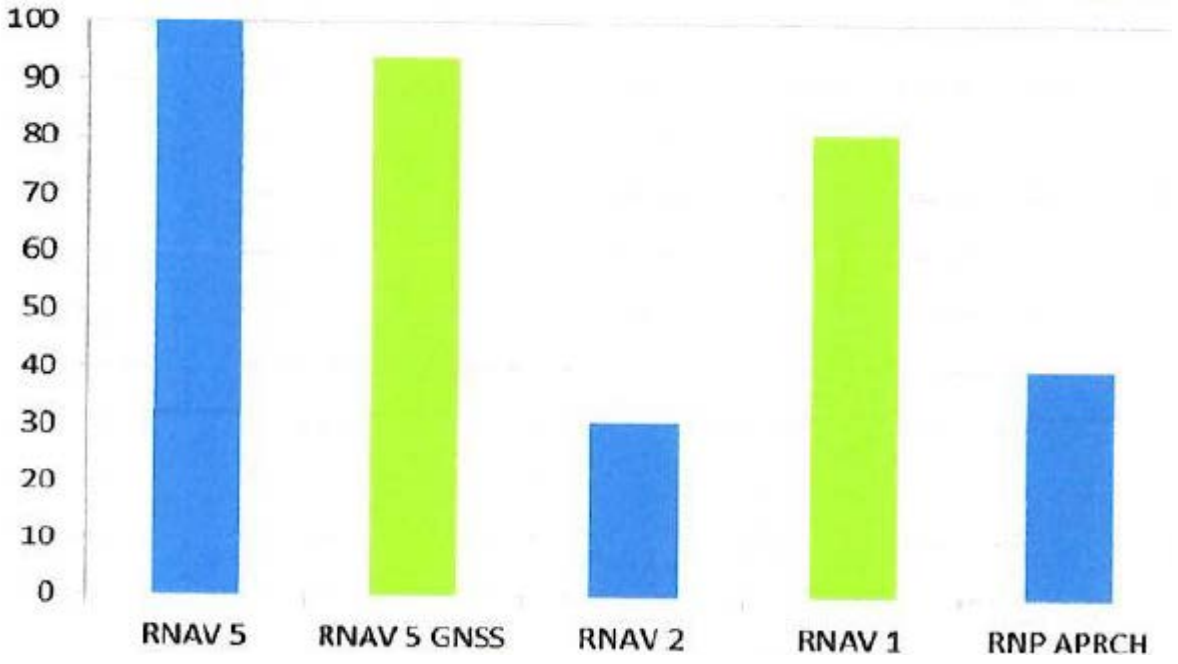
PBN current status

Airspace	Navigation Specification
En-route	RNAV-5
TMA Arrival/Departure	
UBBB	RNAV-1 SID AND STAR/RNP APCH RWY16 (BARO VNAV/LNAV)
UBBG	NIL
UBBL	NIL
UBBQ	NIL
UBBN	NIL
UBBY	RNAV-1 SID AND STAR/RNP APCH RWY33 (BARO UNAV/LNAV)

From 06 March 2014 Azerbaijan implemented RNAV 5 on ENROUTE.
RNAV 5 specification have been implemented UBBA FIR of Azerbaijan.
RNAV1 SID/STAR implemented at Heydar Aliyev and Zagatala Airports.
RNP APCH implemented for RWY16 at Heydar Aliyev and RWY33 at Zagatala.

AC's with equipped with RNAV / RNP

Fig shows that major scheduled carriers flying to Azerbaijan airports are equipped with RNAV5 100%, RNAV5 with GNSS only for 94%, RNAV2 – 32%, RNAV1 – 81%, RNP APRCH 40%.

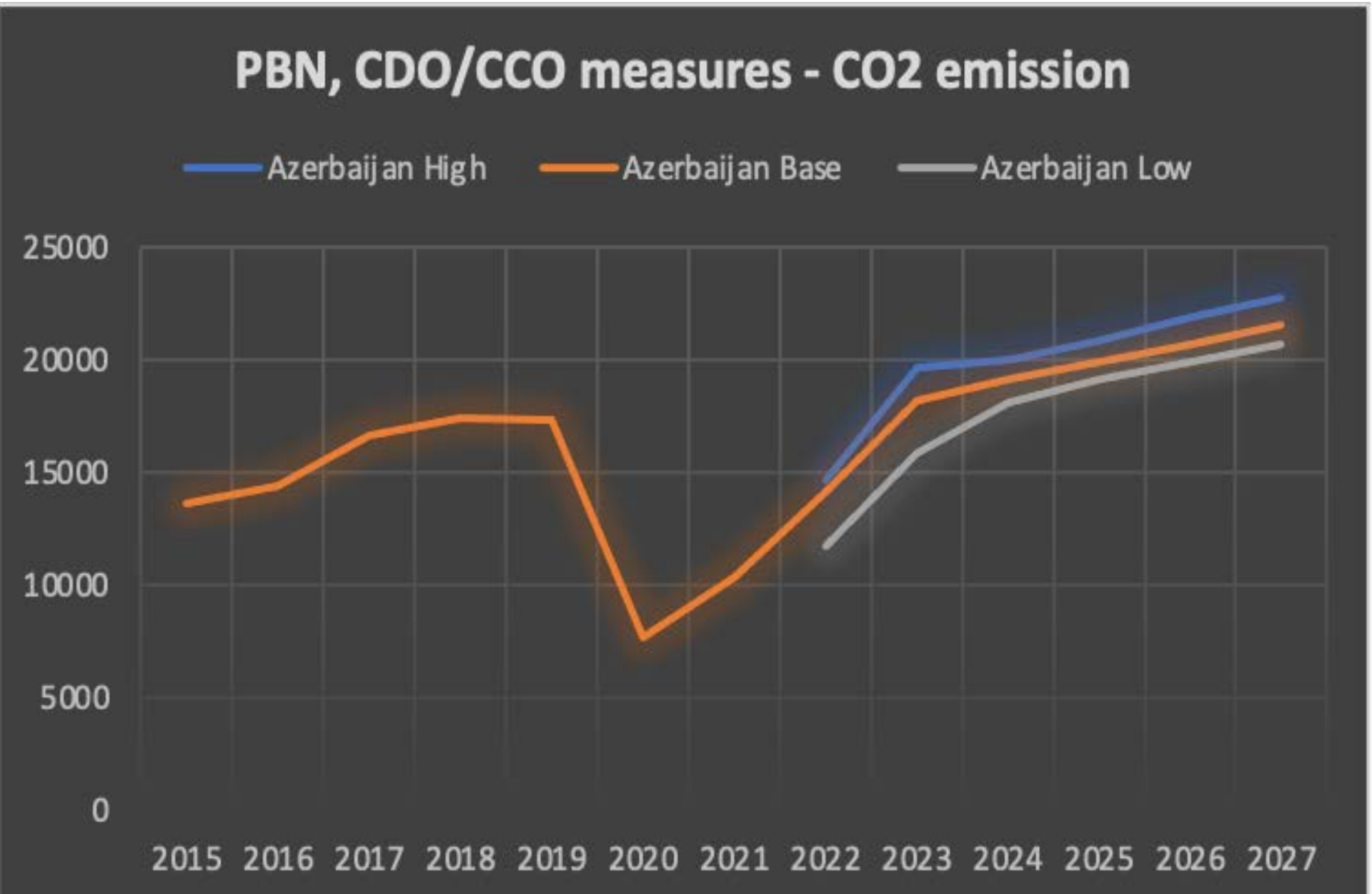


Continuous Climb and Descent Operations

Measures to improve fuel efficient departure and approach procedures – CDO Continuous Descent Operation is an operation, enabled by airspace design, procedure design and ATC facilitation, in which an arriving aircraft descends continuously to the greatest possible extent, by employing minimum engine thrust, ideally in a low drag configuration, prior to the final approach fix. Continuous Descent Operations CDO and can result in a fuel gains in the range of around 50 kg of fuel.

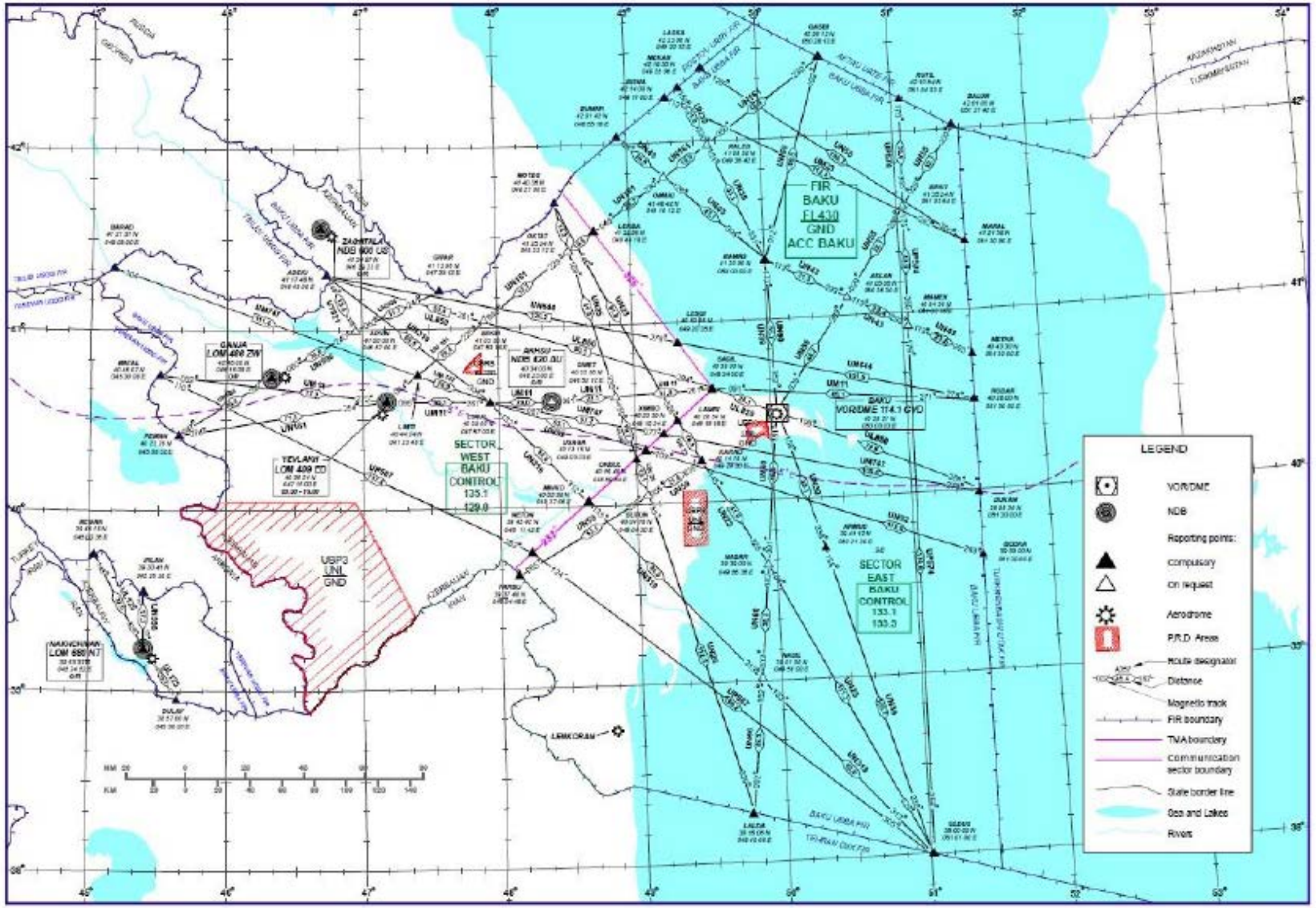
Number of flight using CDO x 0,060 tone = X fuel saved (tone)= 3,16* X= CO2

Fuel efficiency evaluation



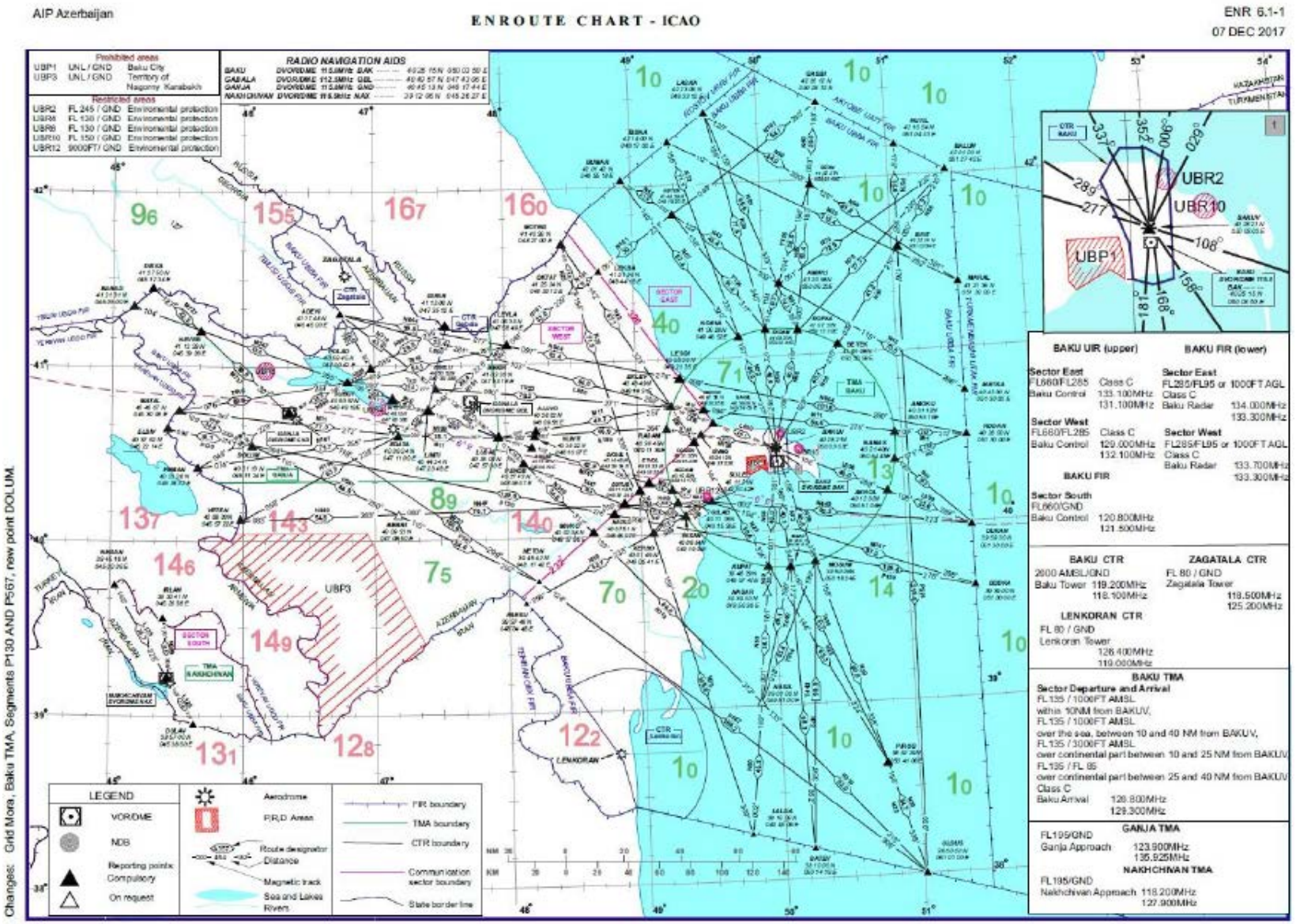
OLD ENROUTE CHART

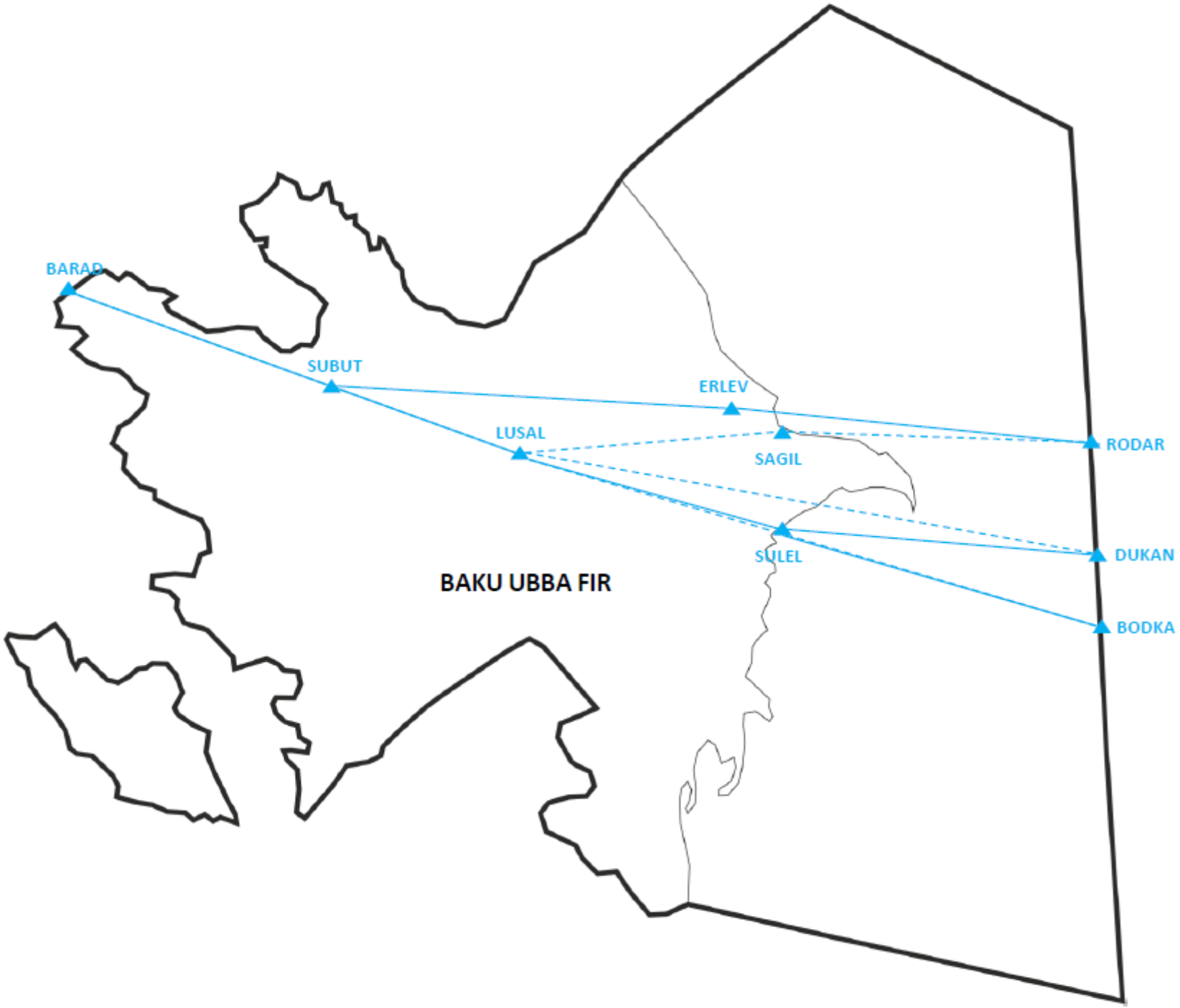
ENROUTE CHART - UPPER AIRSPACE

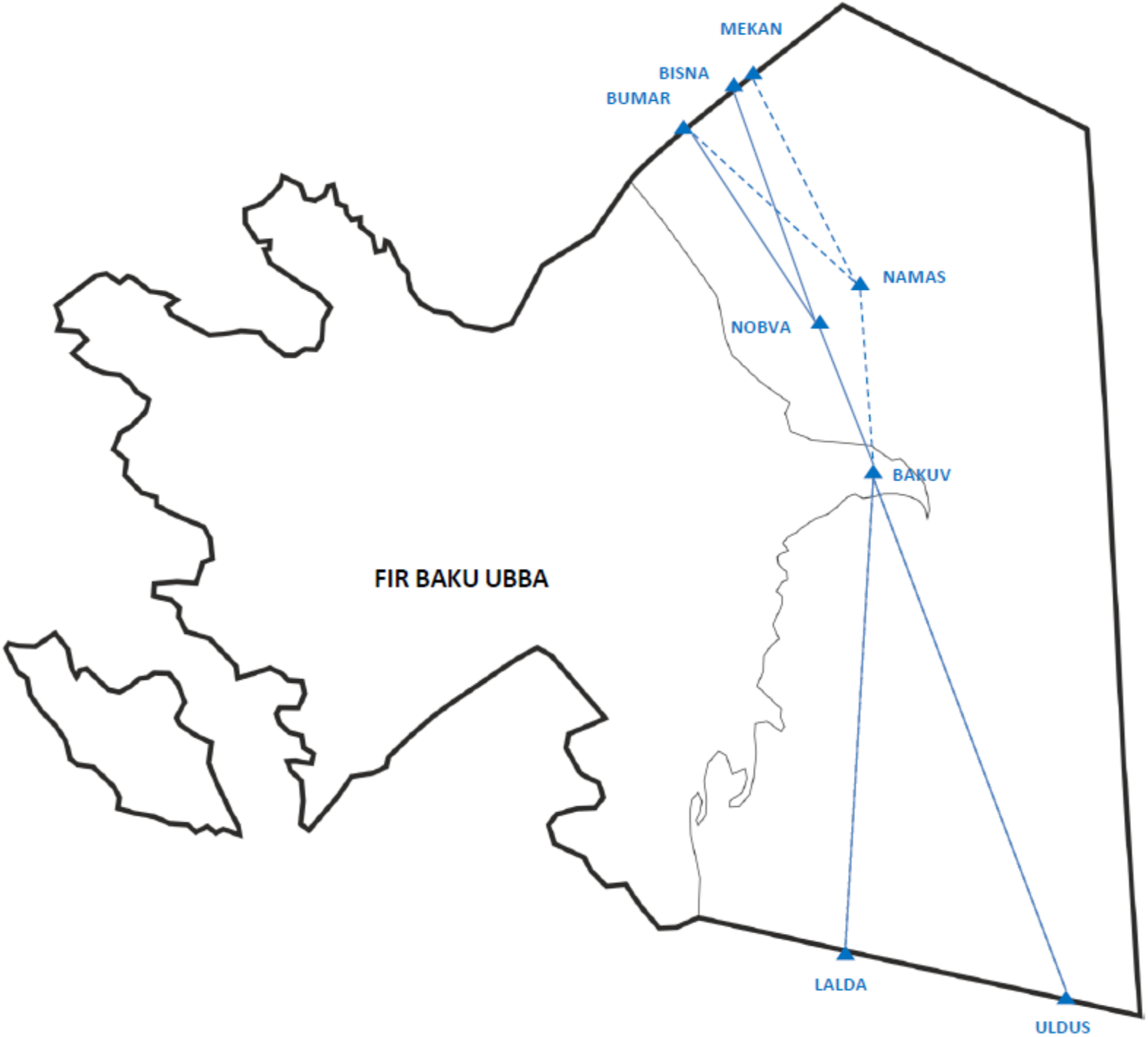


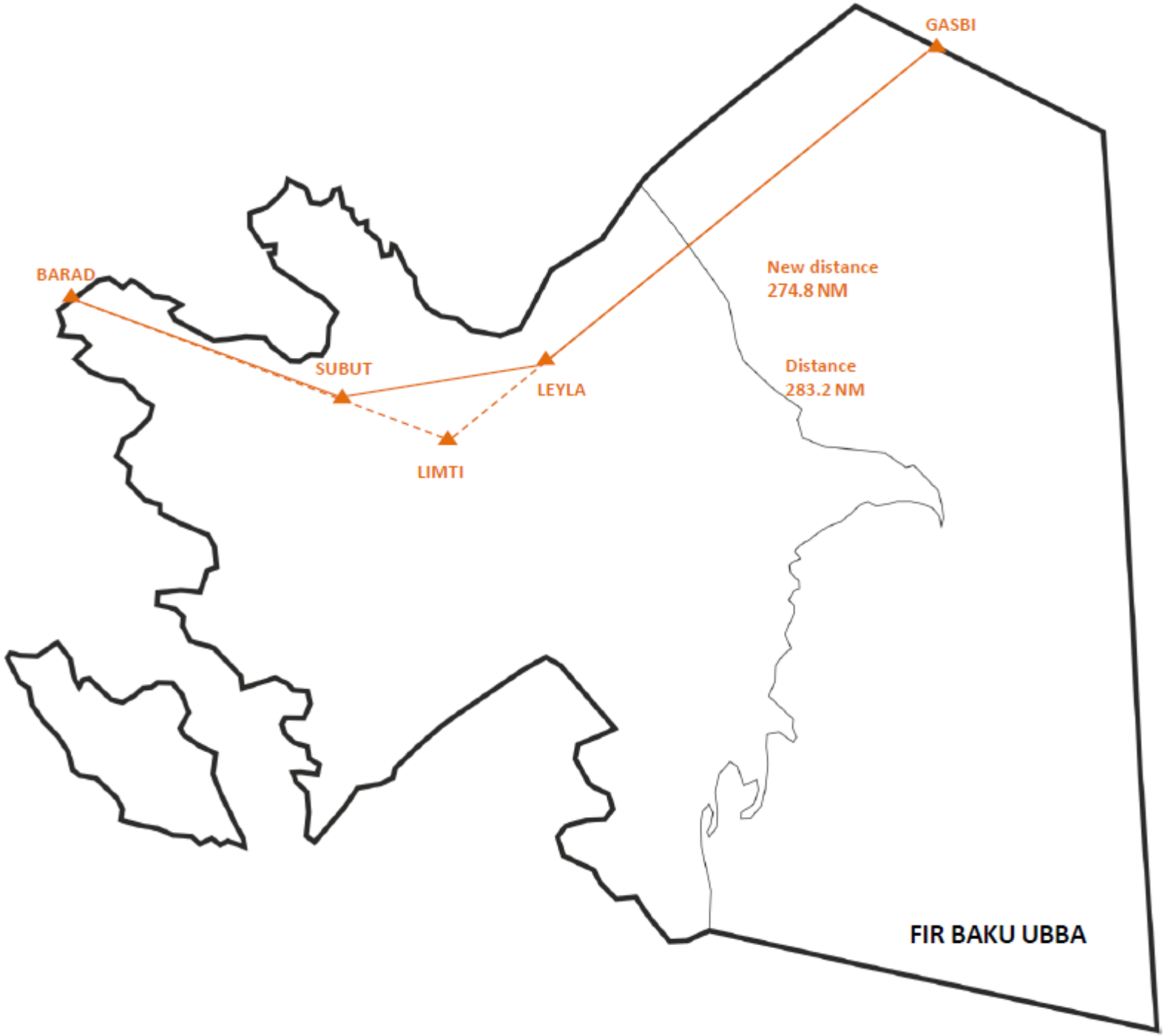
Change: Lenkoran airport

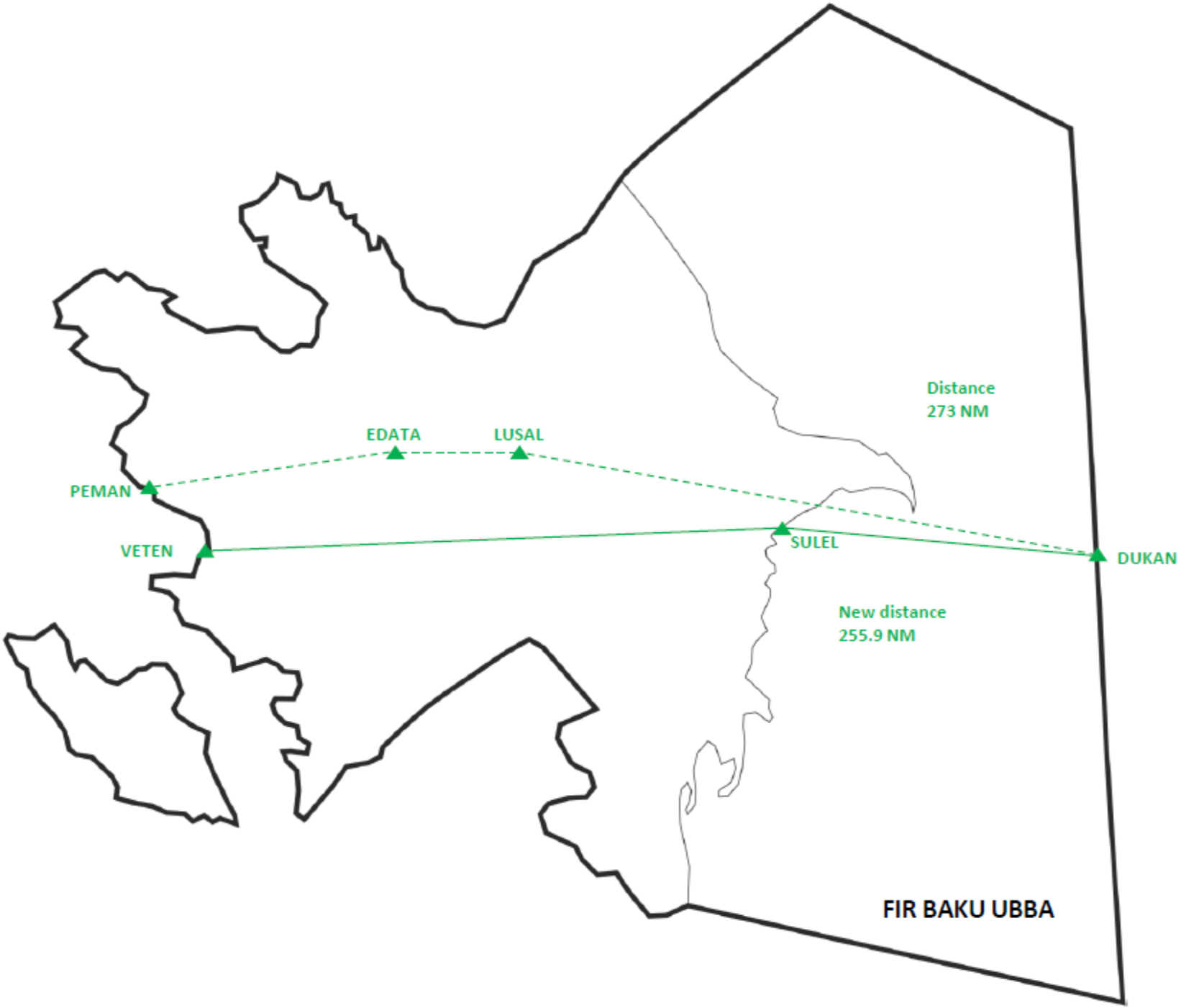
NEW ENROUTE CHART

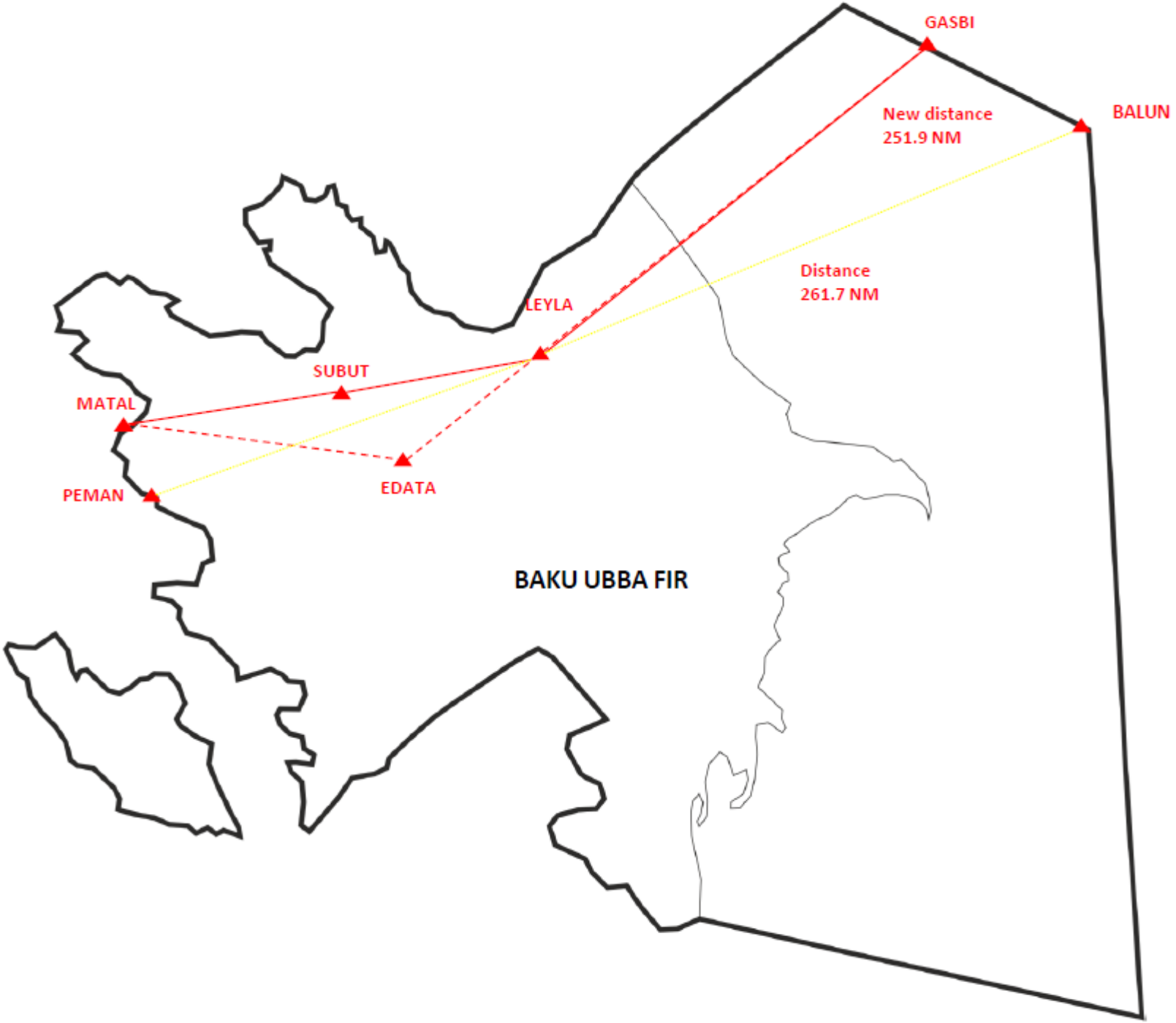



BARAD
SUBUT
ERLEV
LUSAL
SAGIL
RODAR
SULEL
DUKAN
BODKA
BAKU UBBA FIR

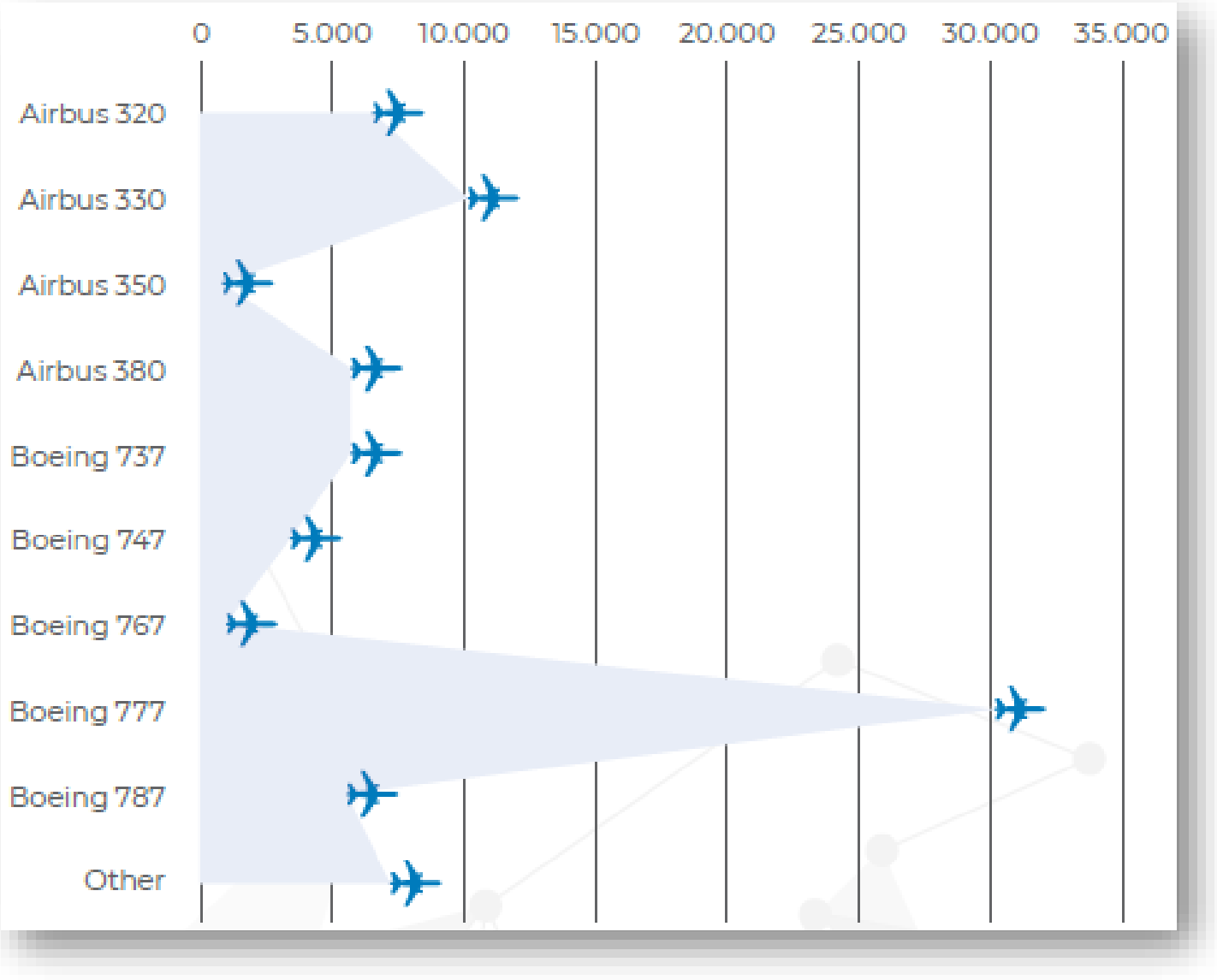

MEKAN
BISNA
BUMAR
NAMAS
NOBVA
BAKUV
FIR BAKU UBBA
LALDA
ULDUS


GASBI
BARAD
SUBUT
LEYLA
LIMTI
New distance
274.8 NM
Distance
283.2 NM
FIR BAKU UBBA


Distance
273 NM
EDATA
LUSAL
PEMAN
VETEN
SULEL
DUKAN
New distance
255.9 NM
FIR BAKU UBBA

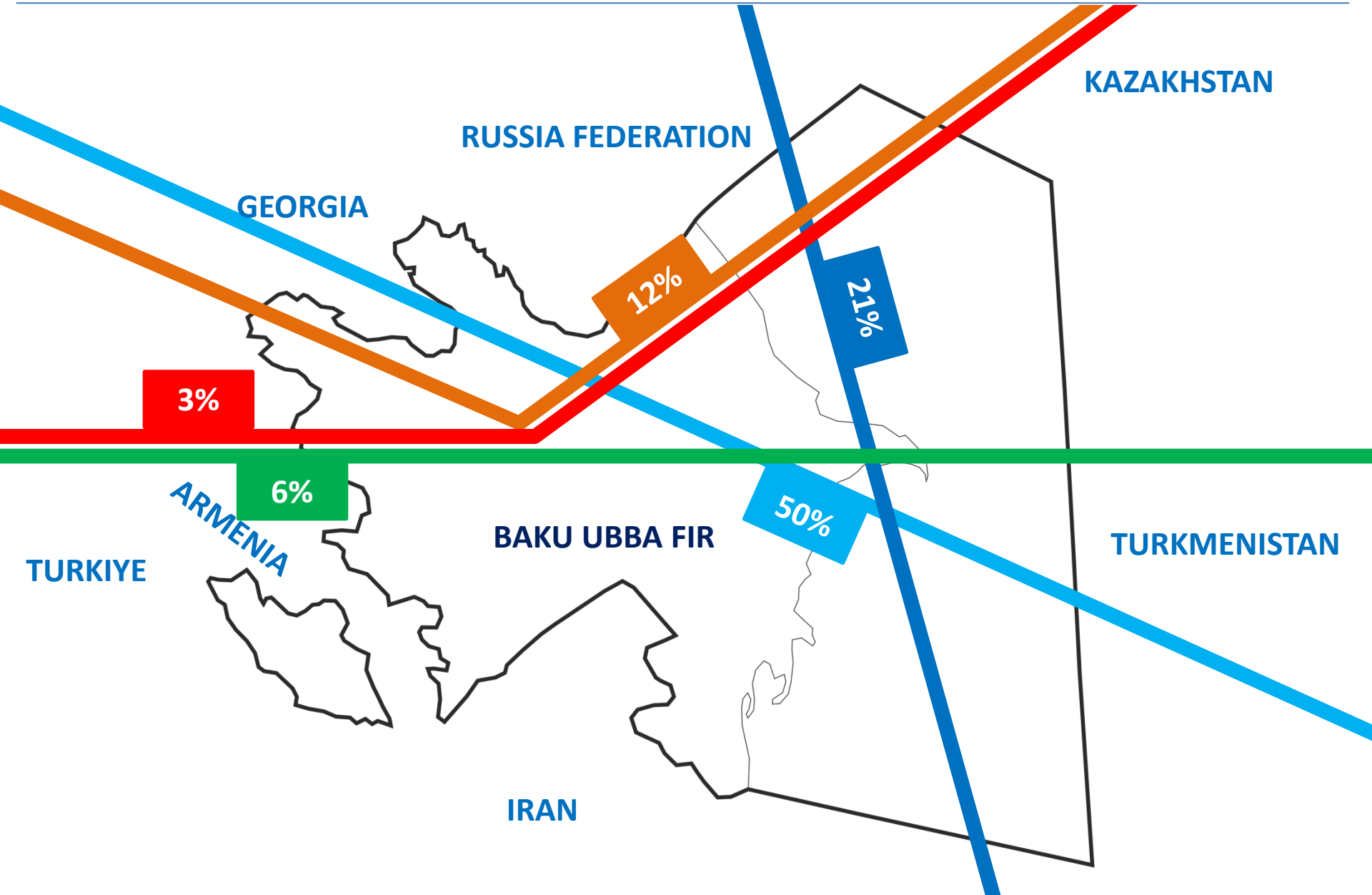

GASBI
BALUN
New distance
251.9 NM
Distance
261.7 NM
LEYLA
SUBUT
MATAL
PEMAN
EDATA
BAKU UBBA FIR

Types of operated AC



About 90% of flights were operated by wide-body, long-haul aircraft including A320, A330, A350, A380, B737, B747, B767, B777, B787

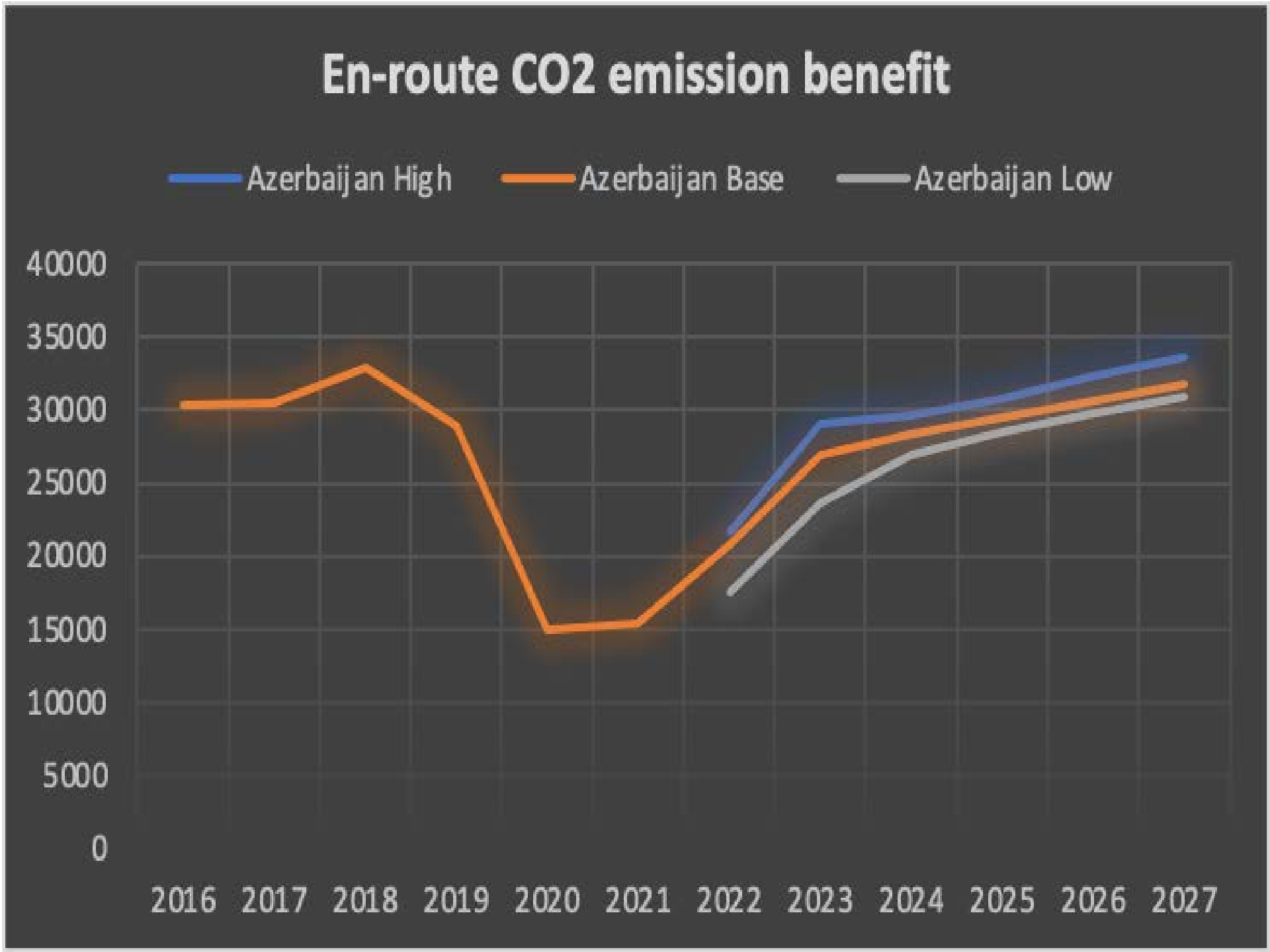
Assumed Average fuel consumption – 6.3 kg/NM


KAZAKHSTAN
RUSSIA FEDERATION
GEORGIA
12%
21%
3%
6%
ARMENIA
BAKU UBBA FIR
50%
TURKMENISTAN
TURKIYE
IRAN

The reduced emissions on shortened routes within FIR Baku (UBBA) in terms 2015-2021

Main overflight traffic flows	Route	Reduced dist. per route (NM)	Traffic flow	Total reduced distance (NM)	Fuel saved (in tonnes)=Reduced dist/1000*6,3 tonnes	Emission reduced (tonnes)
Georgia – Turkmenistan	BARAD - DUKAN	21,6	218657	4722991,2	29755	94025
	BARAD - BODKA					
Iran – Russia	LALDA - MAKAN	15,3	106776	1633672,8	10292	32523
	ULDUS - BUMAR					
Turkmenistan – Armenia	VETEN - DUKAN	38	38465	1461670	9209	29099
Georgia – Kazakhstan	BARAD -SUBUT-LEYLA-GAZBI	8,6	59872	514899,2	3244	10251
Total totals		83,5	423770	8333233,2	52500	165898

*In calculations wide-body mid and long-distance aircrafts with average 6,3 tone fuel combustion per 1000 NM were considered.


En-route CO2 emission benefit
Azerbaijan High
Azerbaijan Base
Azerbaijan Low
40000
35000
30000
25000
20000
15000
10000
5000
0
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027

Emission Benefit from ATM measures

Total benefit: 250534 tonnes,
165898 tonnes - en-route flights,
84636 tonnes - PBN, CDO/CCO.

Thank you for attention