

Pegasus AeroGroup

Protecting people and the environment since 1966

8th International Wildland Fire Conference
May 18th 2023, Porto





GENERAL CONFERENCE OUTLINE

Pegasus: A global specialist in aerial firefighting

- Company background
- Operations and strategy
- Safety and training
- Environmental commitment

Aerial firefighting benefits quantified

- Objectives
- Methods
- Results (pilot experience)

The vision of Pegasus about aerial firefighting

- Public service model
- The fleet mix
- Air service concept

A global specialist in aerial firefighting

Pegasus Aero Group: Protecting people and the environment since 1966





OUR BACKGROUND

FLIGHT VOCATION SINCE 1966



The XX century

The origins of the company

1966-1999

1966: Established by Sebastian Almagro in Palma del Río, Spain

1988: Start of forest firefighting operations

1991: Start of HEMS operations

1999: Start of Aviation technicians training activity.



Specialisation and international presence

Fighting wildfires in two continents

2000-2014

2000: Start of pilots training activity

2000: First operations in Chile in collaboration with local operators.

2005: Establishment of the first group Branch in LATAM: FAASA Chile

2006: Joint Venture with Era Helicopters

2007: New corporate headquarters and principal Maintenance facility in Palma del Río

2008: Second facility in Spain with operations and Maintenance capabilities.

2011: In collaboration with Indra® development of SEILAF, first full flight simulator in the world for aerial firefighting misión training.



Inorganic growth, volume and diversification

Sustained growth through M&As and JVs

2015-2022

2016: Acquisition of Calquin, second branch in Chile

2016: Acquisition of Elitellina in Italy enlarging aerial works market presence

2017: Acquisition of Elifly in Italy

2017: Acquisition of HASA in Spain, incorporating SAR capabilities and a branch in Uruguay

2018: Start of operations in Portugal.





WHAT WE DO

A WHOLISTIC APPROACH TO AERIAL SERVICES

A broad set of services aimed to support emergencies and protect the environment from the air



AERIAL OPERATIONS

- Firefighting
- Search & Rescue



TRAINING

- Pilots & Mechanics
- Airborne crews
- Incident mgmt.



MAINTENANCE

- Owned and 3rd party
- Engineering

Integrated services

Broad set of aircraft

- Covering all segments
- Mission equipped, high tech.
- Multi – purpose configuration

Experienced crews & airborne personnel

- Pilots & AMTs
- Firefighters, rescuers, hoist ops, medical.

EASA 147 training

- Pilots & AMTs
- *Ab initio* & Type Rat.

Simulation based mission training

- Pilots
- Incident command
- Aerial coordinators

Airborne personnel

- Firefighting brigades, rescuers, hoist ops, medical

EASA 145

- Base Maintenance
- Line (ops)
- Overhaul capabilities

Leonardo @ CSF

Engineering services

- Modifications and STCs
- Design and production
- Refurbishing





WHAT WE FLY

OUR FLEET

A complete set of aircraft in all segments, from light to heavies, fix and rotary wing, set for the missions, multipurpose configured, exhaustively maintained, safe and efficiently operated



Kamov

- Engine: Klimov TB3-117BMA
- Speed (knots): 130
- Flight range: 2h 15m/570km
- Transport capacity: 13+2
- Loading capacity: 4.500 l
- Number of aircrafts: 4



Augusta A 119 Koala

- Engine: P&W PT6B-37 A 1.002 CV
- Speed (knots): 150
- Flight range: 3h 50m
- Transport capacity: 7+1
- Loading capacity: 1.000 liters
- Number of aircrafts: 24



Sokol

- Engine: Biturbina con Sistema N1
- Techo de crucero: 6.000m
- Flight range: 4h
- Transport capacity: 12+2
- Loading capacity: 1.600 l
- Number of aircrafts: 4



Airbus H125

- Engine: 1X847 H P
- Speed de crucero: 235km/h
- Flight range: 4h/665km
- Transport capacity: 6
- External payload: 1.300 kg
- Number of aircrafts: 40



Bell 212

- Engine: P&W pt63-3b
- Speed (knots): 130
- Flight range: 2h
- Transport capacity: 11+2
- Loading capacity: 1.300 l.
- Number of aircrafts: 15



AT802

- Engine: P&W PT6A - 67AG - 1.350 H.P.
- Speed (mph): 167
- Flight range: 5h
- Transport capacity: 2
- Storage capacity: 3.100 liters
- Number of aircrafts: 17



Bell 412

- Engine: P&W PT6T-3B Twin Pack
- Speed (knots): 135
- Flight range: 3h
- Transport capacity: 12+2
- Loading capacity: 1.500 l
- Number of aircrafts: 20



AT 502

- Engine: P&W PT6A-34AG
- Speed (mph): 145
- Flight range: 2h 30m
- Transport capacity: 2
- Storage capacity: 1.893 liters
- Number of aircrafts: 1

Fleet segments & sample mission configuration

Customer

- Emergencies Canary Islands, Spain

Missions

- Firefighting
- Search and Rescue (mountain and shore)
- Surveillance
- Cargo
- MedEvac

Configuration and equipment

- Bell 412 EP
- Up to 12 battle seats
- IFR equipped
- Radioaltimeter
- Cargo hook
- Bamby Bucket ® / Foam dispenser
- WSPS
- ELT
- Marine and terrestrial radio eq.
- Search light
- Emergency floats
- Rescue Hoist
- 360° camera
- GPS Tracking system
- Airborne mobile phone detection

Light, 68

Mid, 39

Fixed Wing,
17

H...
4



WHERE WE ARE TODAY

PEGASUS FOOTPRINT IN TWO HEMISPHERES

Management, maintenance and operational support for customers through locations and permanent structures in Southern Europe and South America

Pegasus South America

(Concepción, CL). Maintenance center and operational support for service delivery in Chile and Peru.



Foresbal – Pegasus Uruguay

(Melilla, UR). Maintenance center and operational support for service delivery in Uruguay.



Elitellina – Pegasus Italy

(Lombardy, IT). Maintenance centre and operational support for service delivery in Italy



Pegasus Headquarters

(Palma del Rio, ES). Corporate services. Main aircraft maintenance center. Pilots and AMTs training



Pegasus Matilla

(Valladolid, ES)
Maintenance and operations for the north or Spain



CTCA-SEILAF

(Seville, ES): Integrated simulation facility for firefighting pilots, incident command managers and aerial coordinators. Simulators facility provides training services for fire-fighting helicopter pilots through its specialized fire-fighting simulators.



Pegasus South America

(Concepción, CL). Maintenance center and operational support for service delivery in Chile and Peru.



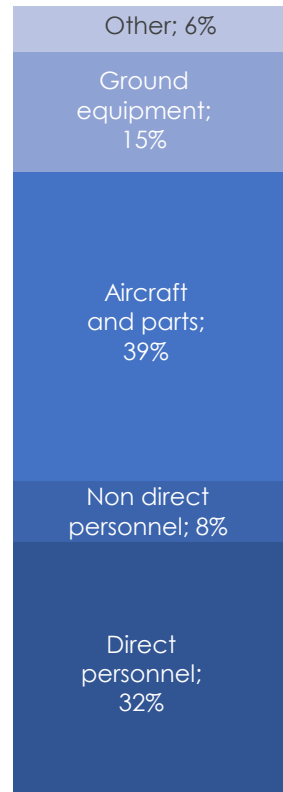


HOW WE OPERATE: THE COUNTER – SEASON MODEL

MAKING CONTINUOUS AN INTRINSICALLY SEASONAL ACTIVITY

Pegasus is capable to timely deploy aircraft of all segments – from light to heavies – crewed with highly trained personnel in two hemispheres generating benefits in technical – economical efficiency and safety

Cost drivers⁽¹⁾



Fix and variable



- Most of **operational cost is fix** including aircraft availability, administration and crew
- Seasonal operations result **poorly efficient economically** wise
- Low flight time (~120 hours) activity results in **weak opportunity to gain experience** for crews
- Key skills developed: **capacity planning** and international shipping
- The “counter seasonal model”, resulting in:
 - **Highly competitive** value proposal for customers
 - **Improved safety** standards in operations
- Performed by Pegasus in a worldwide **unique scale**:
 - 60-70 aircraft per year **in all segments of aircraft**.
- Why **Southern Europe and LATAM**?
 - Convenient and available shipping modalities
 - Seamless forest fire characteristics, preferred fleets, firefighting systems, etc.
 - Longer fire seasons
 - Maximum efficiency & synergies
 - Improved safety

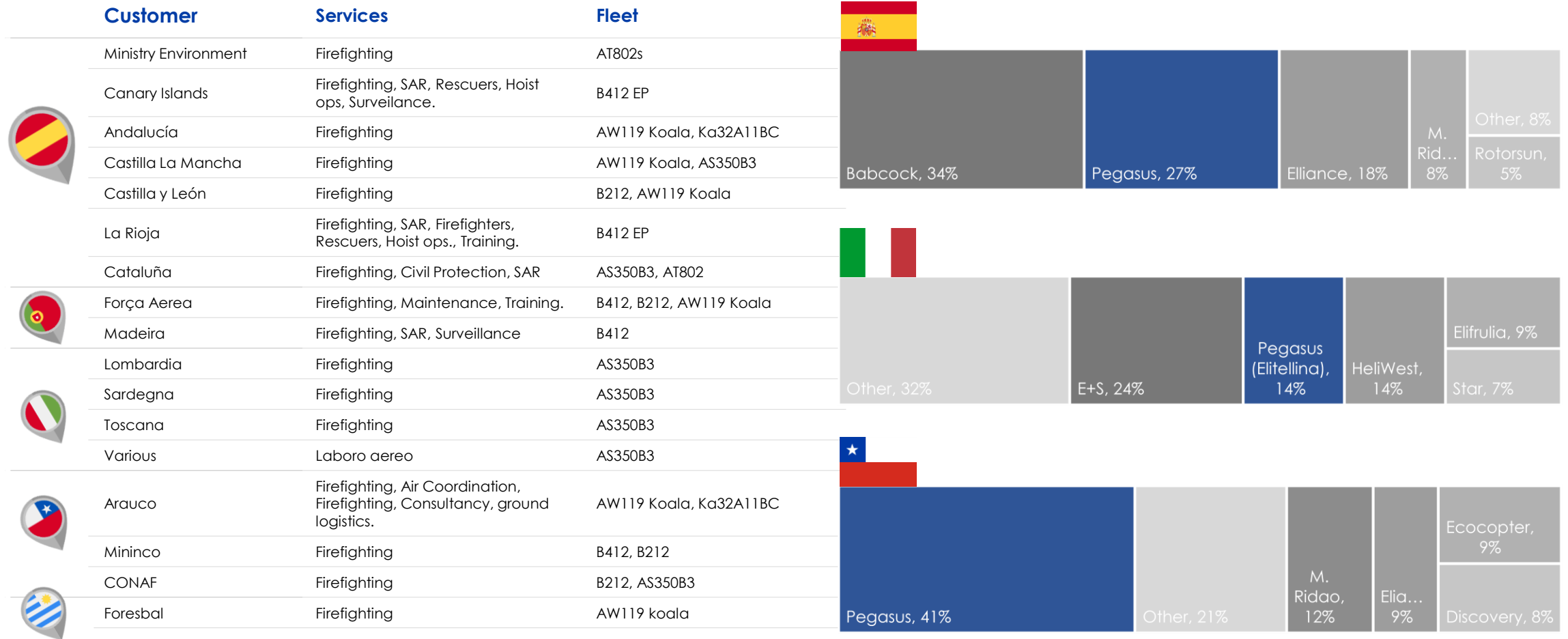
(1) Bell 412 operation, 60 months, 120 hours in firefighting. Pegasus elaboration from internal management reports



TO WHOM WE DELIVER SERVICES

PUBLIC ADMINISTRATION AND LARGE CORPORATIONS MANAGING EMERGENCIES

Public and public entities in charge of people safety in emergencies and the protection of environmental resources

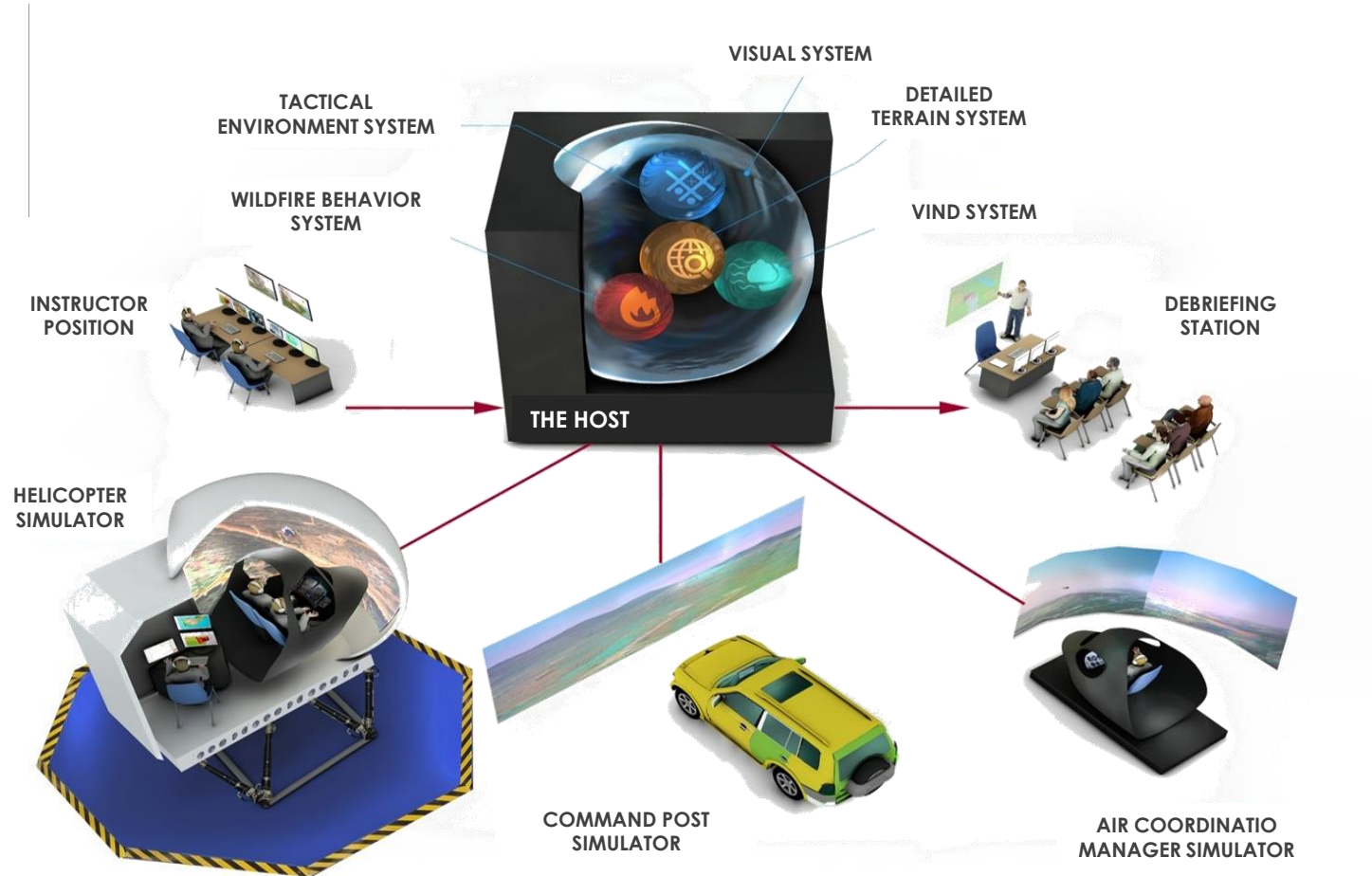




SEILAF – “WILDFIRE EXPERIENCE”

COMPREHENSIVE FIREFIGHTING MISSION TRAINING

A unique training facility in the world where pilots, incident command managers and air coordinators gain experience in an immersive synthetic wildfire scenario with AI capabilities





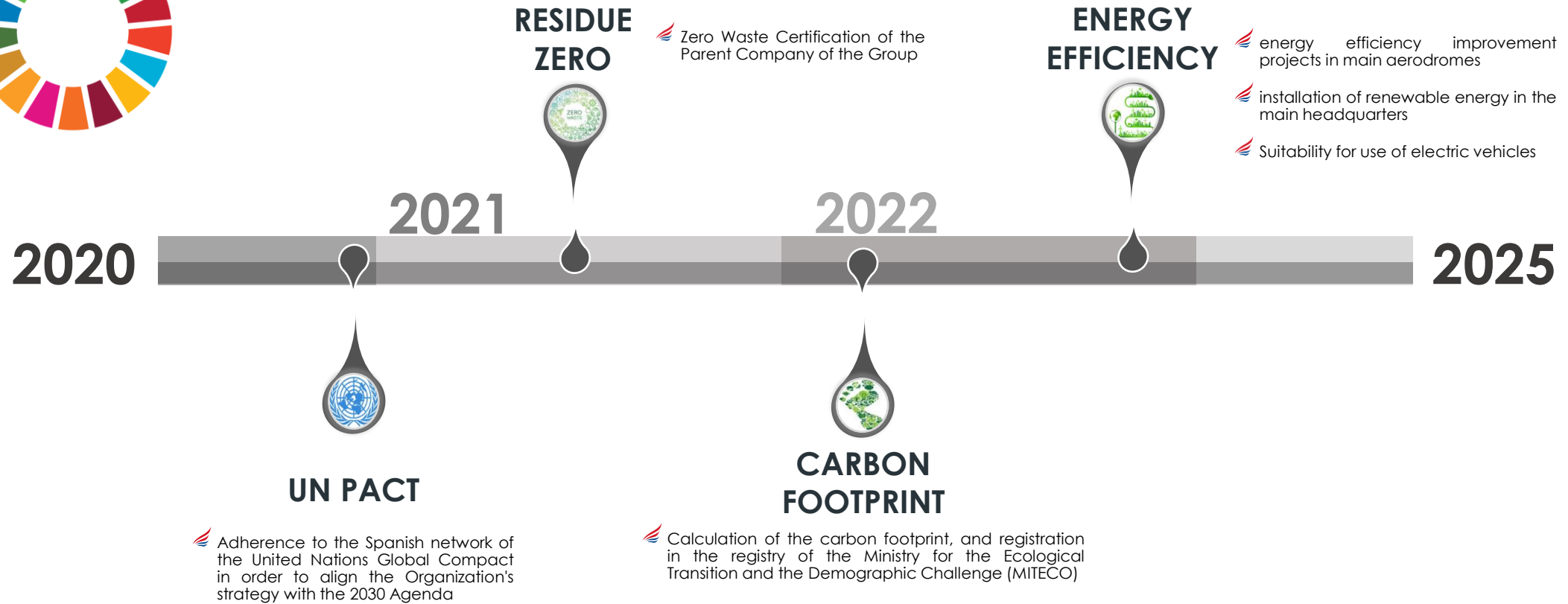
SEILAF

TRAINING · SIMULATION · RESEARCH



ENVIRONMENTAL STRATEGIC PLAN

The Organization has defined the following environmental strategic lines in its 2020-2025 Strategic Plan





Impact on emissions

Total Flight hours 34203,51 FH

Emissions 18434, 34 tn CO₂

Indicator Emissions/flight hours 0,54 tn CO₂ /HV

Avoided emissions

Use of flight simulators

- 2.500 flight hours
- 2.657 tn CO₂ avoided

Use of renewable energy

- 48.190 kwh produced
- 12.433 tn CO₂ avoided

Sustainable Aviation Fuel

- 5% reduction in total emissions generated per flight hours

Aerial firefighting benefits quantified

A methodology for quantifying carbon emissions prevented by the increase in efficiency provided by firefighting aircraft

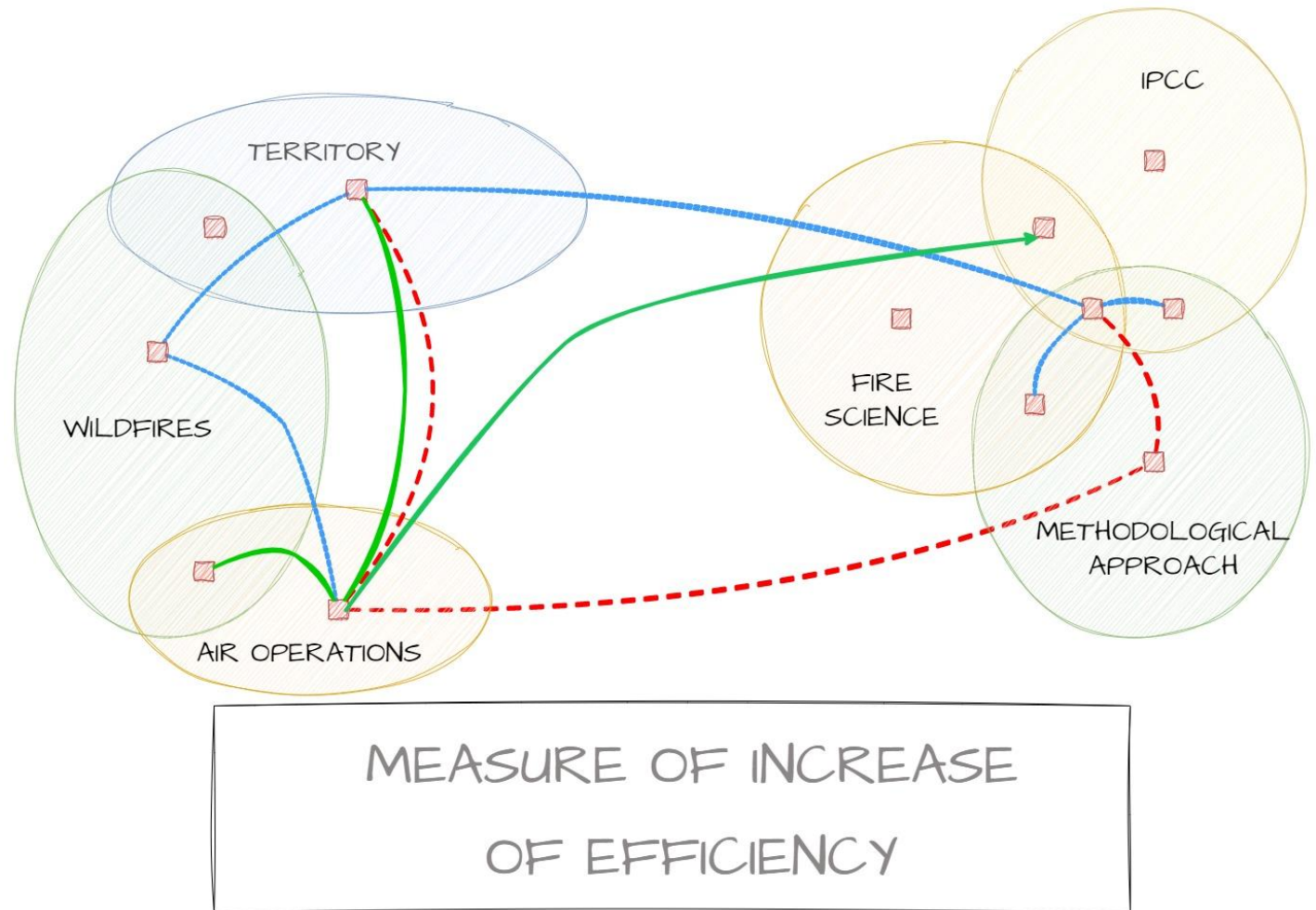




OBJECTIVES

A methodology for quantifying **carbon emissions prevented** by the increase in efficiency provided by **firefighting aircraft**

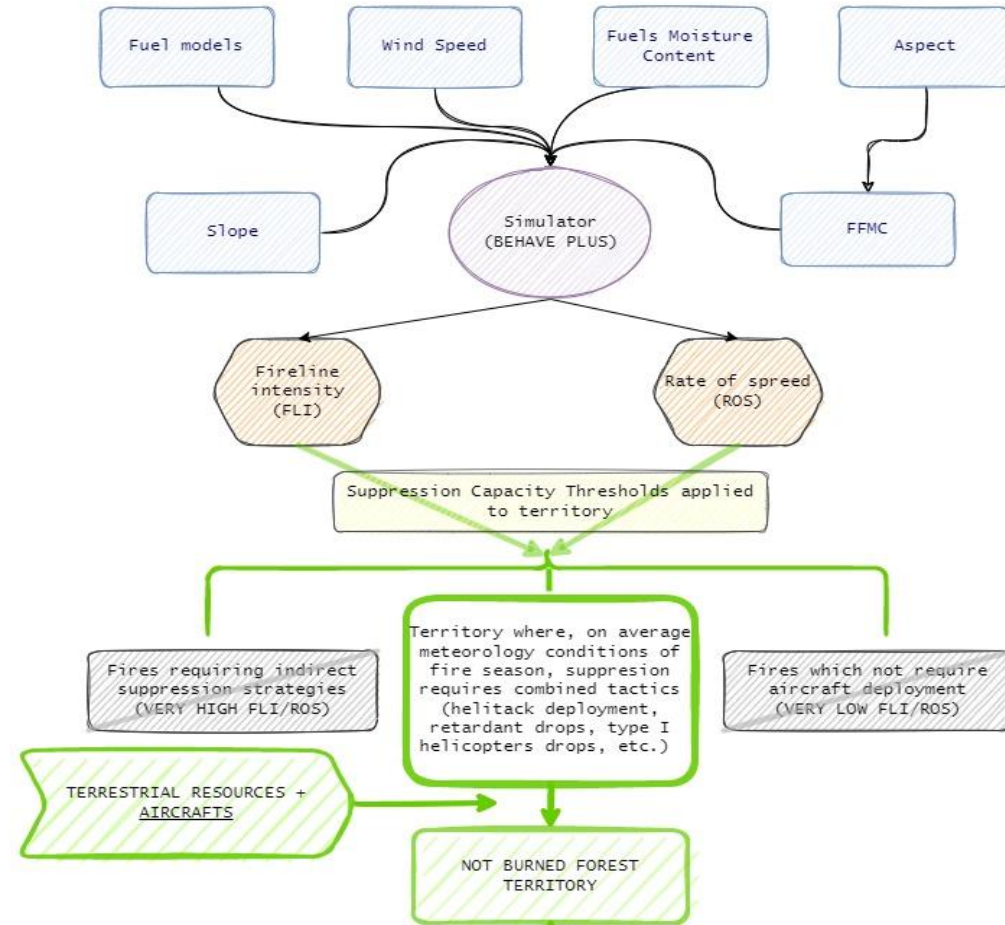
- Generate a methodology following **IPCC rules and procedures and fire science**, applicable at the regional scale at global level.
- Establish the thresholds of **increase in firefighting efficiency** provided by air means, according to the territorial variables that define **fire behaviour**.
- Quantify this increase in terms of **prevented GHG emissions** by **biomass protection** achieved.



- **Fuel models** were linked with fire behaviour and the **IPCC** methodology to calculate emissions produced by natural disturbances.

- Thresholds of fire behaviour where aircrafts provide a **real increase on efficiency** were identified, and related with territory and fuels.

- The difference between the **potential burned area** without aircrafts and the **real burned area** was calculated, and consequently, the **biomass saved**.



A methodology for quantifying **carbon emissions prevented** by the increase in efficiency provided by **firefighting aircraft**

Through **IPCC GHG emissions calculation rules**, the protected biomass was converted into avoided emissions

PHASE 1



■ BURNT AREA ■ UNBURNED FOREST AREA



NOT CONSUMED BIOMASS BY FIRELINE



PHASE 2

FOREST CARBON RESERVOIR SAFEGUARDED

GREEN BIOMASS



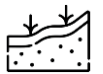
LITTER AND DEAD WOOD



BIOMASS, WOOD PRODUCTS



CARBON IN SOIL



Publications

2006 IPCC Guidelines for National Greenhouse Gas Inventories

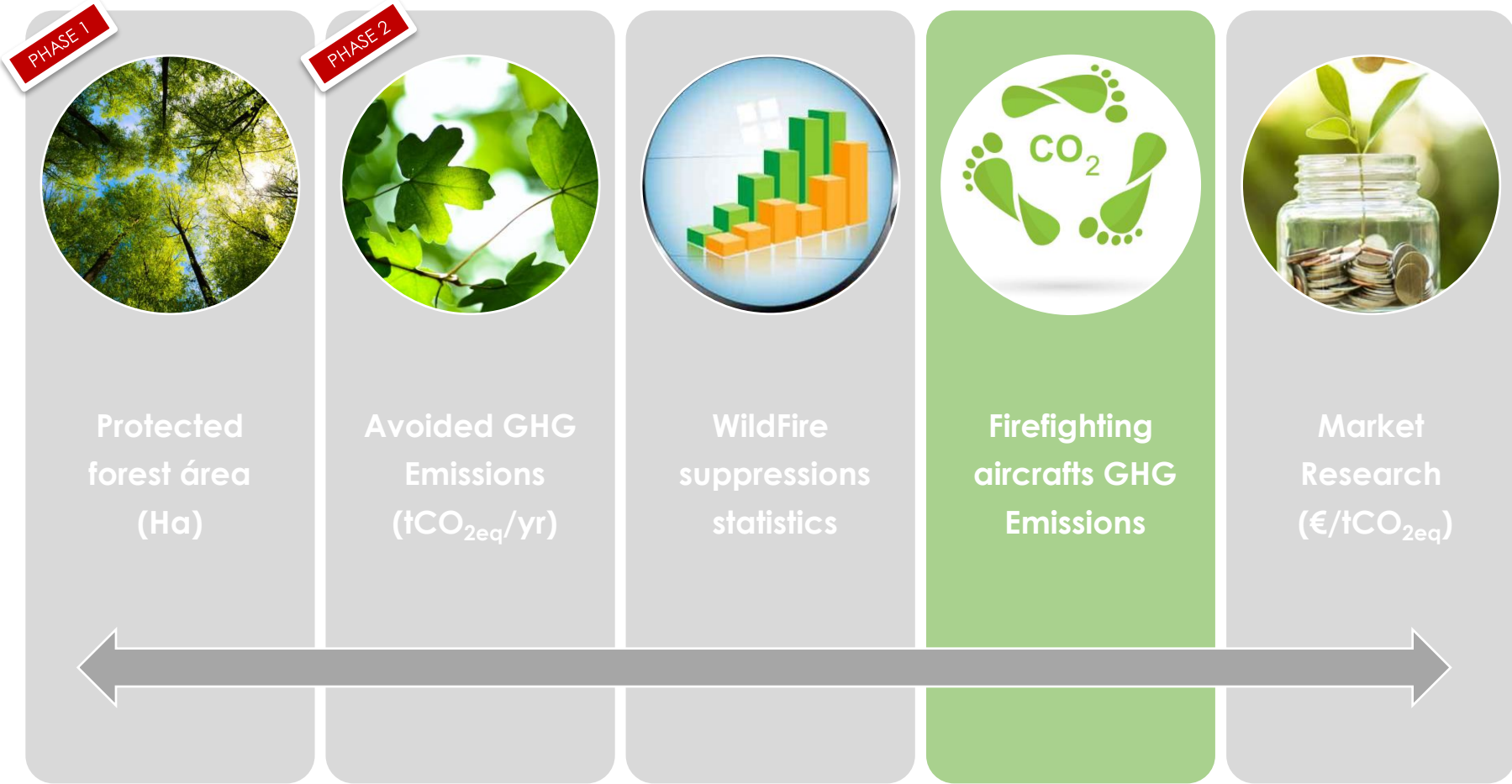
Equation 2.27
Estimated greenhouse gas emissions from fire
 $L_{fire} = A * M_B * C_f * G_{ef} * 10^{-3}$

GHG NOT- EMISSION (SOURCE)

INCREASE ON CARBON RESERVOIR (SINK)



A methodology for quantifying **carbon emissions prevented** by the increase in efficiency provided by **firefighting aircraft**



PHASE 3: KPI

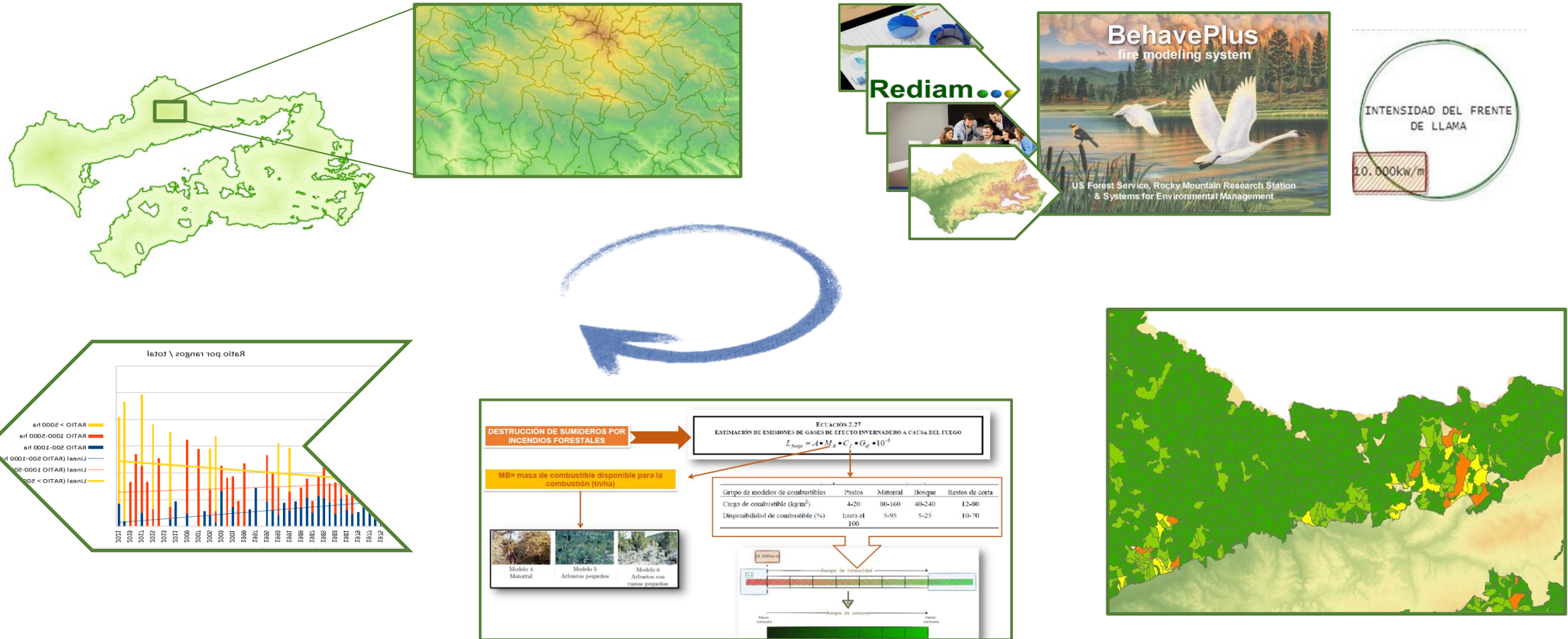
Real emissions by air operations deployed were calculated and related with **avoided emissions**.

Several **KPI** were designed.



RESULTS (PILOT EXPERIENCE)

A methodology for quantifying **carbon emissions prevented** by the increase in efficiency provided by **firefighting aircraft**





RESULTS (PILOT EXPERIENCE)

A methodology for quantifying **carbon emissions prevented** by the increase in efficiency provided by **firefighting aircraft**

The Andalusian region results



Overall information	
Total area of Andalusia (ha)	8.760.377
Forest area – (ha)	6.413.599
Percentage of forest area.	73%
Area resulting on average FLI < 10.000kw/m	
Firesheds	8.968,00
Area (ha)	6.163.796
% over forest area	99,7%

Variable	Ud	Result/year
Wildfire events with air operations	ud	252
Burnt area	ha	2.706,25
Potential burnt area without air operations	ha	172.952,25
Saved area	ha	170.246,00
Flight hours on air operations	h	3.347,58
GHG emissions – air ops	tCO2eq	3.675,33



RESULTS (PILOT EXPERIENCE)

A methodology for quantifying **carbon emissions prevented** by the increase in efficiency provided by **firefighting aircraft**

The Andalusian region results



KPIs	Ud	Result
GHG emissions prevented / emitted	adimensional	567
Net balance of GHG emissions	tCO2eq/year	2.081.689
Air operations performance in terms of carbon saveguard	tCO2eq/hour of flight	622

KPIs	Ud	Price of carbon credit(€/tCO2)	Result	
Economic potential	€	Current	6,30 €	13.114.640,81 €
		Proyection	100,00 €	208.168.901,82 €

The vision of Pegasus about aerial firefighting

Public service model

Aircraft fleet mix

Services integration

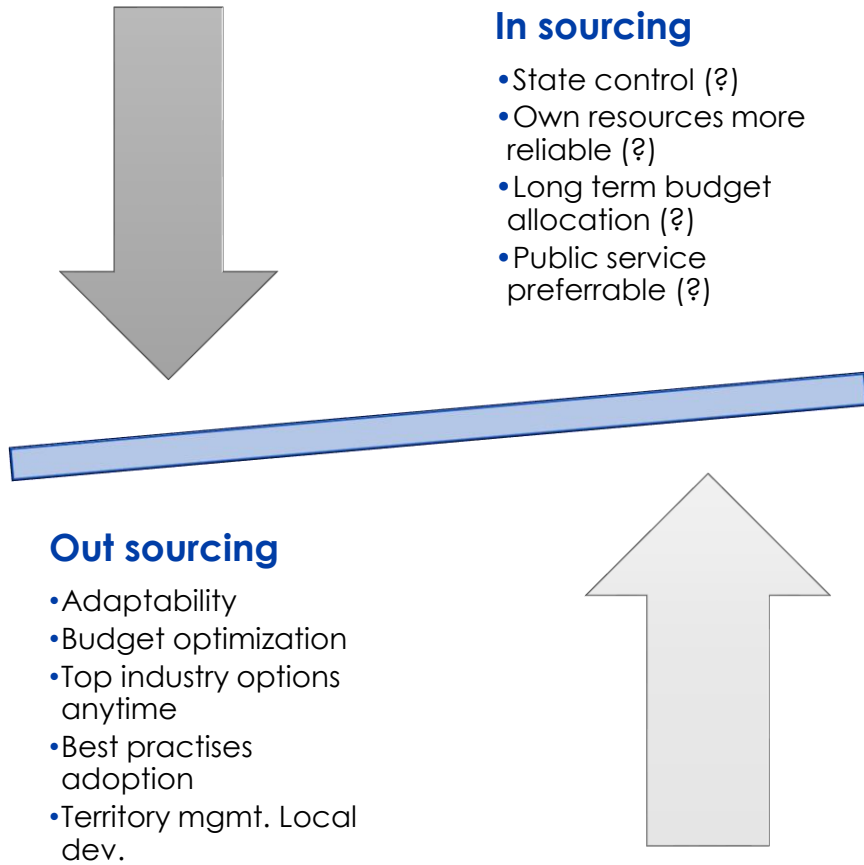




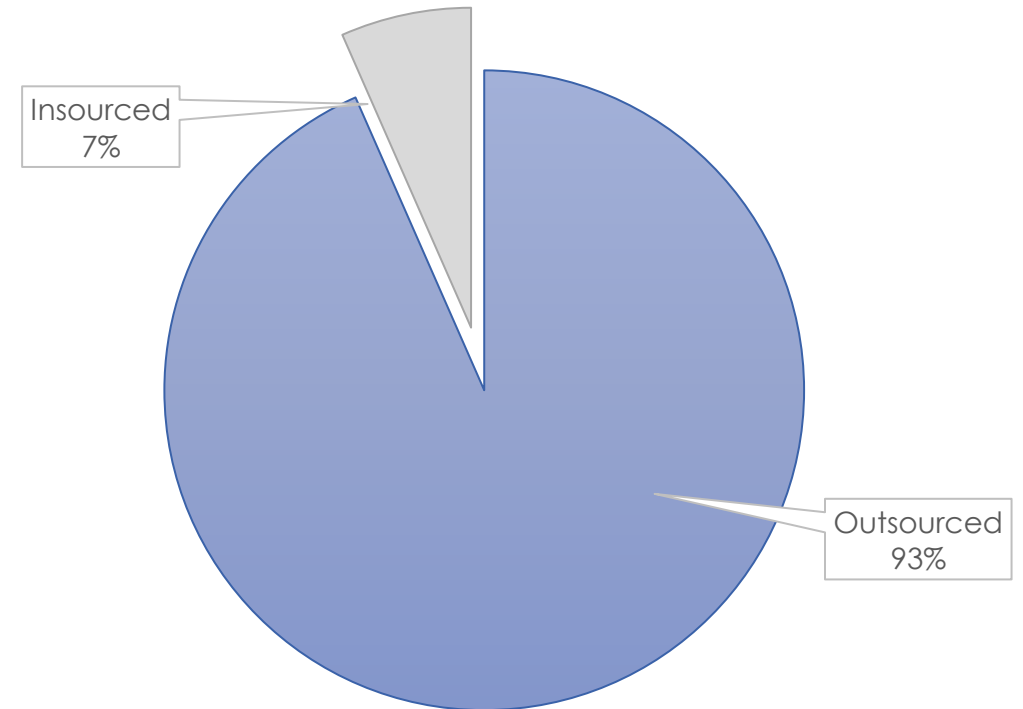
PUBLIC SERVICE MODEL

AIRCRAFT & CREWS: IN – SOURCE VS OUT – SOURCE

*Firefighting services shall always remain public, granted by states but, how to source aircraft and crews?
States buying and operating aircraft or relying in the private industry?*



The case of Spain
(273 aircraft in operation)



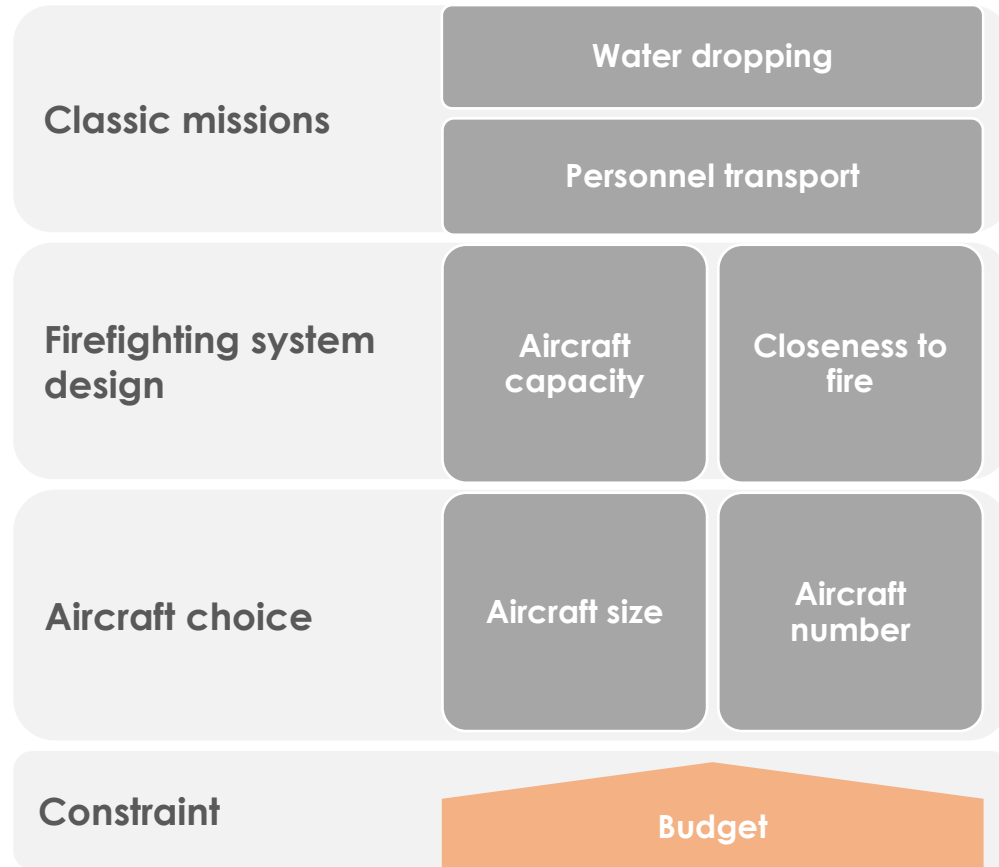
Source: Pegasus from ATAIRE (National Helicopters Association of Spain) data updated 2021



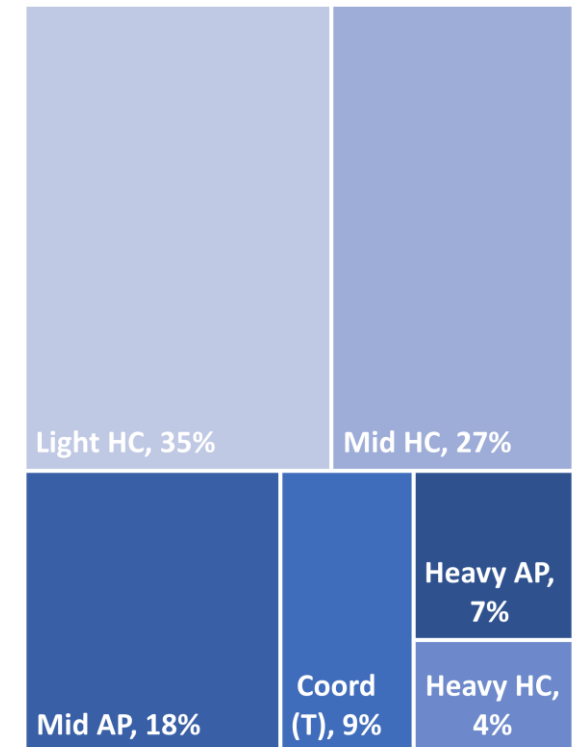
THE FLEET MIX

DETERMINED BY FIREFIGHTING STRATEGY

Weather, topography and fuel determining the firefighting strategy and subsequently the fleet mix



Firefighting aircraft in Spain per type and segment (%)





AERIAL MEANS DEDICATED TO FOREST FIREFIGHTING

NOT ONLY A DECISION IN THE SEGMENT BUT ALSO ON THE SPECIFIC AIRCRAFT MODEL

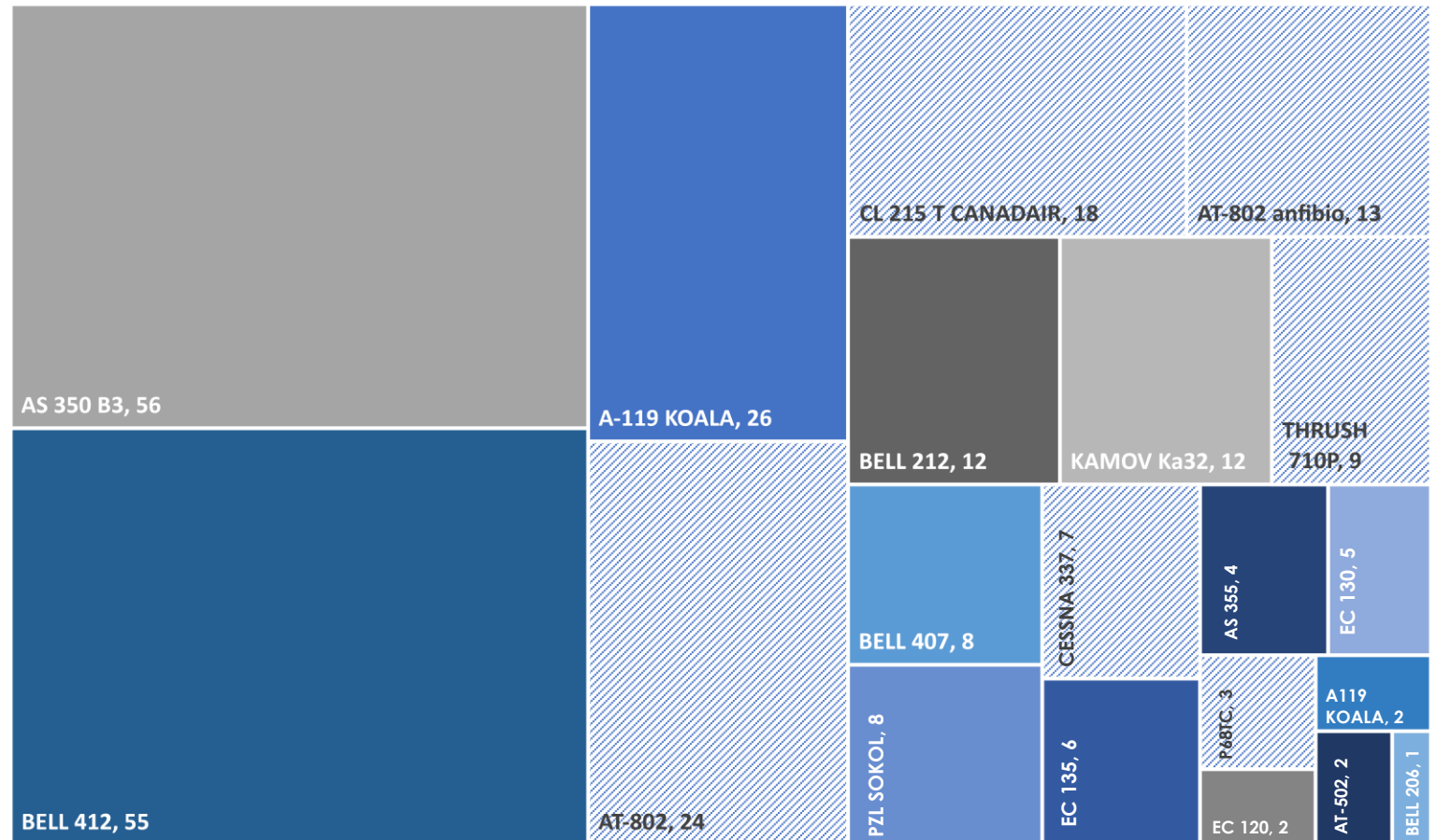
Use of 'industry standards' for the vast majority of interventions and 'specialised niche platforms' for non routine operations demanding extra features or performance

- 'Industry standard' aircraft:
 - Capacity:
 - ✓ 1.000 – 1,500 litres bombing ¹
 - ✓ 5 – 11 airborne seats
 - Available worldwide
 - Large # of operators
 - Easiness to operate and maintain
 - Low cost of change

Technical and economically efficient for routine operations

- 'Special purpose' aircraft:
 - Capacity:
 - ✓ 3.000 – 5.000 litres bombing
 - ✓ No airborne seats
 - Fewer available
 - Reduced # of operators
 - High cost of change

Efficient in non routine les frequent events



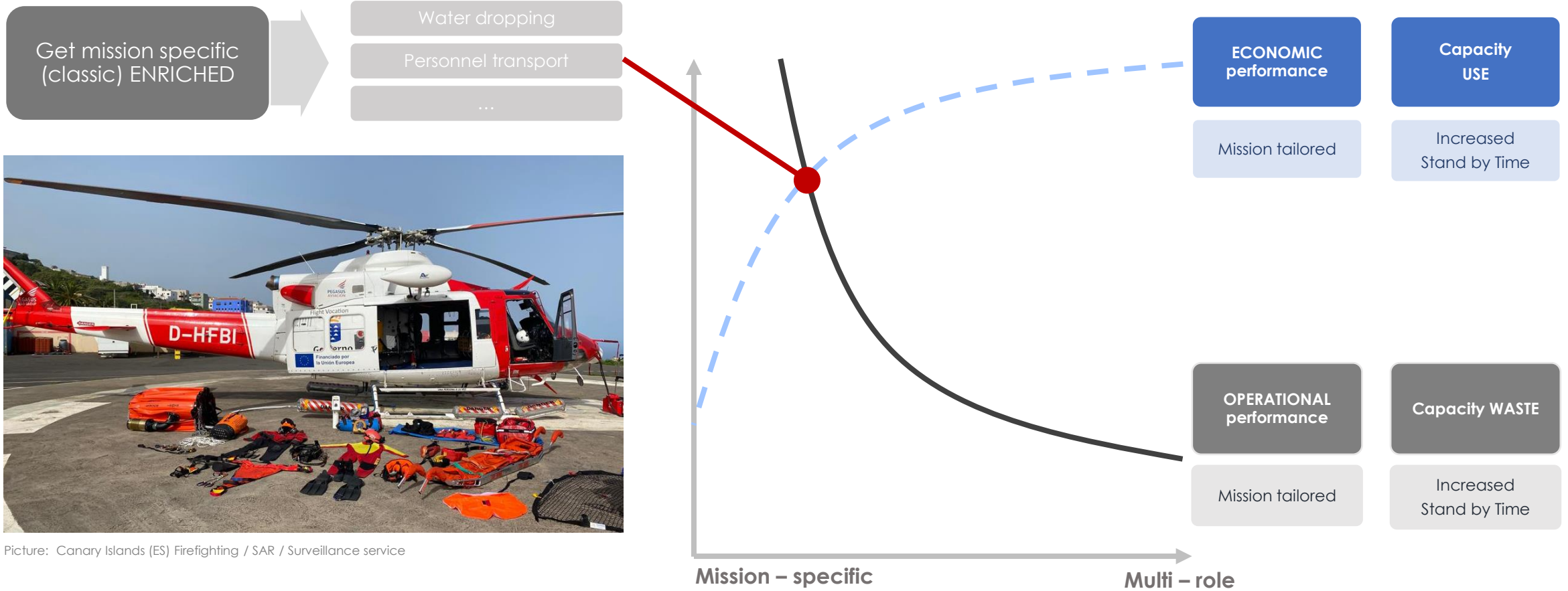
Source: Pegasus from ATAIRE (National Helicopters Association of Spain) data updated 2021

(1) AT802s fix wing able to drop 3.000 litres are considered a "industry standard" as per their availability

AIR SERVICE CONCEPT: SPECIFIC VS MULTIROLE

THE CROSSROADS OF HELICOPTER SYSTEMS DESIGN FOR EMERGENCY SUPPORT

Aerial support to emergencies can potentially benefit from synergies: how much at the expense of efficiency?





IN A NUTSHELL

THE VISION OF AN AERIAL FIREFIGHTING OPERATOR

Pegasus stands for a public aerial firefighting service model that relies mainly on the capabilities of our industry and evolves to enriched missions aiming service quality, safety and public expenditure efficiency

Public service model

Get all benefits, operational and economic, from the experienced and capable helicopter firefighting industry

Keep insourced only a selected set of services part of the state backbone

Aircraft fleet mix

Design the capacity and number of aircraft according to technical requirements and budget constraints.

Preference for standard vs niche platforms for further efficiency and operability.

Air service concept

Evolve from pure specific mission fit to an enriched mission concept

(Limited) rescue, surveillance, basic medical evacuation, capabilities, etc.



Pegasus Aero Group

Flight Vocation since 1966



Carlos Ábrego – Aguilar
Chief Strategy Officer

Isabel Vázquez Garrido
MsC Wildfire Management

from AIR
for PEOPLE
in NATURE
 pgs.aero