

An aerial photograph of a white commercial airplane, likely an Airbus A320, taxiing on a dark asphalt runway. The runway has yellow double lines. To the right of the runway is a green grassy area. In the bottom right corner, a portion of a runway with white diagonal stripes is visible. The entire image is framed by a thick green border.

**LANDING SYSTEMS**

# **ELECTRIC TAXIING BY SAFRAN**

**ICAO Seminar on Green Airports  
Montréal – 29<sup>th</sup> November 2017**

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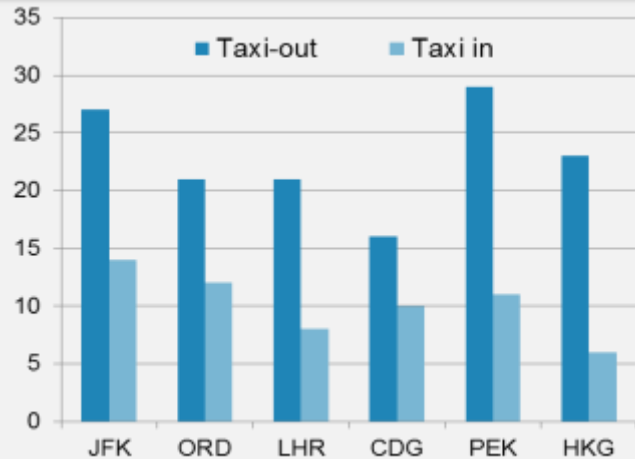




**30%-40% of Airline Cost is Fuel**

**6% of Fuel is Burnt on Ground**

At congested airports, taxi time is significantly higher than the average



Source: Eurocontrol CODA  
Taxi time for 2016-2017 winter period

A320 Family in-service fleet  
average taxi time\*:  
20 minutes per flight

- fleet average for the preceding 12 months at September 2013  
Average taxi time from Airbus study (taxi out + taxi in)

A320 fleet spends more than  
15% of its time taxiing

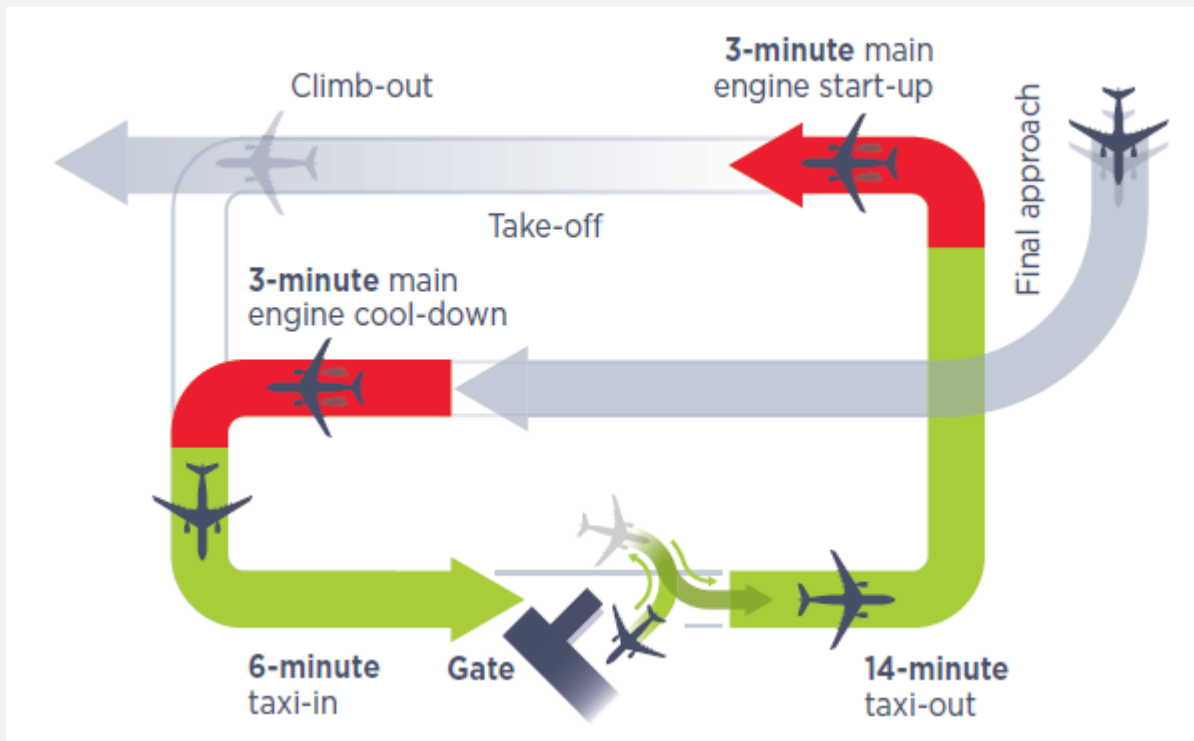


# Electric Taxiing Concept

- ▶ Allows aircraft pushback and taxiing controlled by the pilot, without main engines running
- ▶ Moved by electric motors housed on each main landing gear
- ▶ Powered by existing aircraft APU generator



# Electric Taxiing Concept



# Operations and Benefits

## Airline:

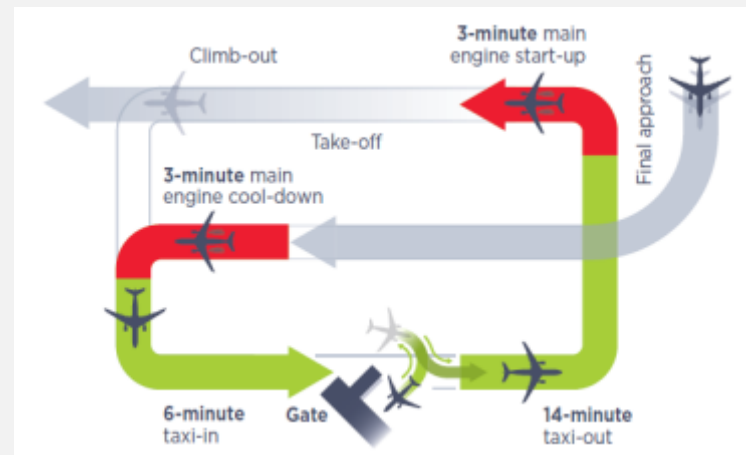
- Cost reductions: Fuel savings and free pushback
- Autonomy: improved on-time performance
- Around 2 minutes time saving per cycle: improved turn around time
- Improved safety on aprons (precise aircraft maneuvering)

## Airport:

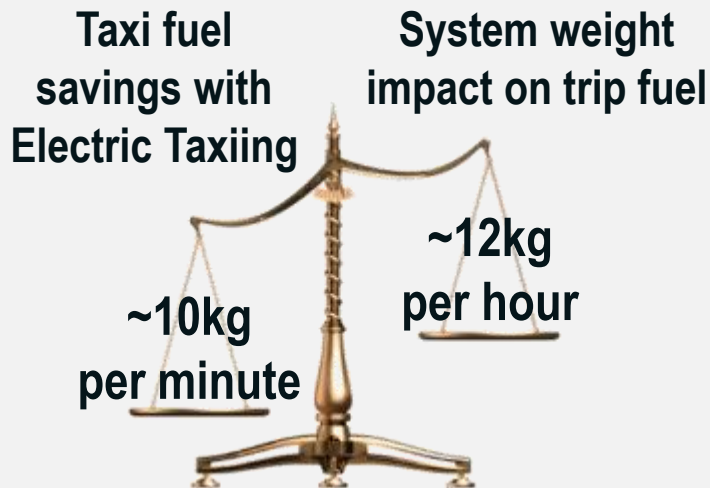
- Gate freed quicker
- No jet blast: Employee safety improved
- Fewer vehicles – Leaner operation

## Local community:

- Reduced ground emissions
- Reduced noise



## Airline Operational Benefits



Up to 4% fuel burn reduction

Additional weight largely compensated by on-ground savings



Autonomous pushback

Average 2 minutes saved per operation – less risk of perturbations

# Airport Operational Benefits

## Ground operation

- Healthier & safer access to the aircraft (no engine blast)
- Increased aircraft autonomy, maneuverability & on-time performance
- Improved gate utilisation performance
- Lower environmental footprint

## Strong collaboration with airports

- Current & near future traffic growth consideration
- Ground operations rules & constraints/necessary improvement
- Simulation of e-Taxi impact on airport daily traffic flow
- Noise & emissions reduction

## Airport feedback

- Highly interested by e-Taxi for operational & green benefits
- Strong expectations in term of gate turn around time & airport daily traffic flow



***Aviation industry is encouraging this innovation to improve operations at the gate and to improve environmental/noise footprint***



# Environmental Benefits

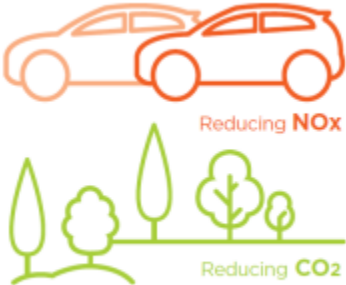


When compared with Dual Engine Taxi Operations, **Electric Taxiing by Safran** provides the opportunity to reduce by...



**Electric Taxiing  
by Safran**

**=** **-932 cars**  
and  
**+948 trees**



*Example for 17 min taxi out - 2000FC/year*

Electric taxiing system drastically reduces emissions and noise on ground





## Electric Taxiing by Safran



### Up to 4% lower fuel burn

*Don't use main engines when you do not have to*



### Autonomous and free pushback

*Up to two minutes saved per rotation*



### Lower emissions & noise

*Enhance air transport and airport image to local communities*



Electric Taxi will improve operational performance, increase aircraft autonomy and reduce costs and environmental footprint