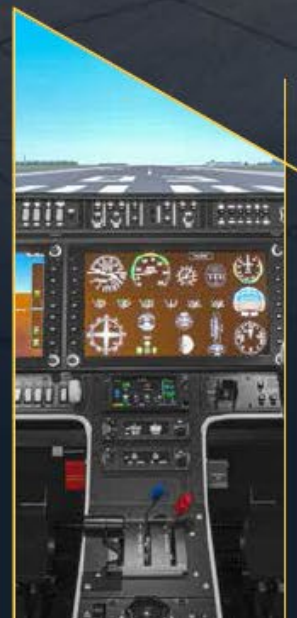
WISA DESIGN COMPETITION

DESIGNING THE FLIGHT SCHOOL OF THE FUTURE



WISA DESIGN COMPETITION

How can a flight school become a beacon of sustainable innovation in aviation?

- International student design competition
- Call for inspirational ideas, exciting designs, and new directions towards a more sustainable future for the air transport sector
- Start from the ground up
- Open-source material to support broader aeronautical sustainability in flight training schools
- Sustainable + Net-Zero Energy + Carbon Neutral = An international paradigm

Deliverables

- A 2-storey high institutional building to support current and future operations of WWFC
- A hangar for aircraft maintenance

WISA DESIGN COMPETITION

Awards

Prizes:	Sponsored by:
1st Prize: $5,000	Waterloo Wellington Flight Centre & Waterloo Institute for Sustainable Aeronautics
2nd Prize: $2,500	ALSIM Flight Training Solutions
3rd Prize: $1,000	Region of Waterloo International Airport

Publication Partner:

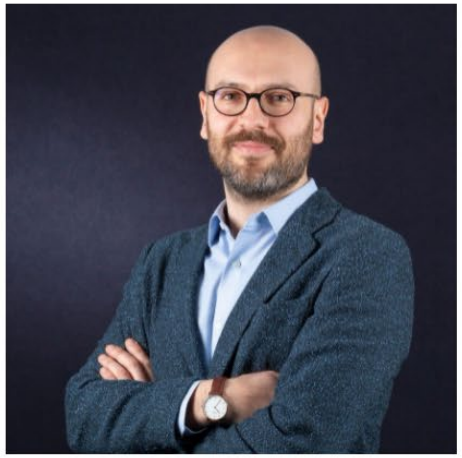
SKIES

Schedule

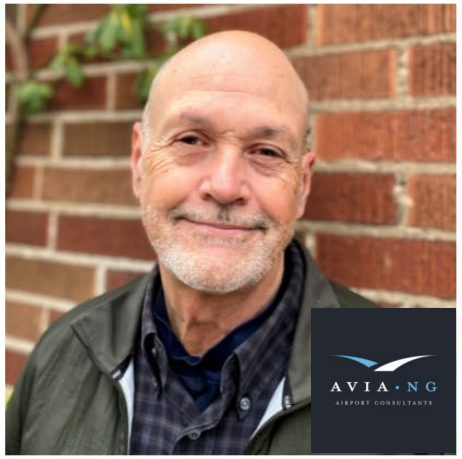
January 17, 2022	Competition Launch
May 9, 2022	Submission Deadline
May 27, 2022	Top 3 Designs Announced
June 24, 2022	Top 3 Presentations & Winners Announced

A JURY OF EXPERTS

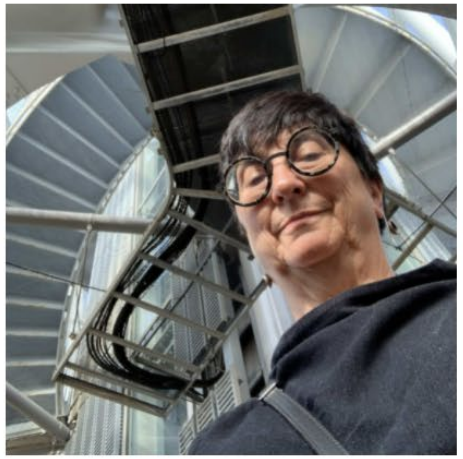
Costa Kapsis



Greg Ballentine



Terri Boake



Robert Connors

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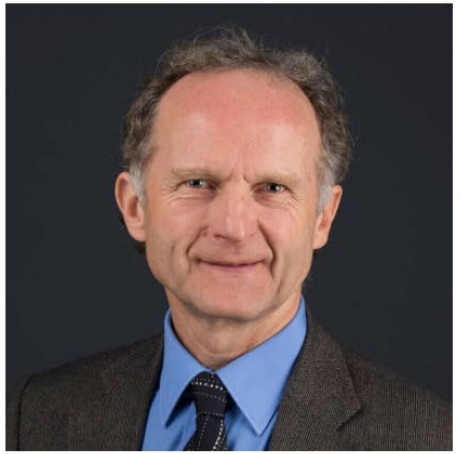
FLIGHT TRAINING SOLUTIONS

Ben Crooks

Suzanne Kearns

Liam O'Brien

Paul Parker



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ONTARIO, CANADA

Electricity System Notes

Technology will change over time. The last 70 years have been relatively stable with gradual improvements to piston type planes (Cessna equivalents) for training.
In 2020 the first electric trainer was certified in Europe and many more are expected. The first ones are small two-seaters, but they will grow as battery energy density improves.
This has implications for the flight school in terms of technology, infrastructure, electricity generation and storage.

1. Technology: The fleet is likely to change to include the introduction of electric trainers.
2. Infrastructure: Charging infrastructure will be required, so refueling is no longer just some fuel tanks and a pump.
3. Electricity generation: The large roof area of hangars enables solar panels to be installed to provide onsite electricity rather than rely solely on the grid. (local and low carbon option)
4. Storage: The used e-plane batteries could have a second life being used to store the solar electricity until charging takes place.

Let's dive a little deeper into a sample calculation:

- Pipistrel Velis Electro has a battery capacity of 25kWh
- If 20kWh is used in a one hour training flight, recharging in the next hour would require 20kWh.
- If the plane is flown 4 hours/day, the daily requirement would be 80kWh/day.
- If training is the equivalent of 180 days/yr, the annual electricity requirement would be 14,400 kWh/yr.
- Allowing for system losses (inverters, chargers, etc.) 1,000 kWh/yr might be supplied from each kW of pv capacity so you would need approximately 15 kW of pv per 2 seat trainer. (Larger, heavier e-planes would require more electricity, so you might look at the total generating capacity of the roof area in order to meet future needs.)
- Hint: PV Watts is a good online tool to calculate electricity production for different pv array configurations. You might want to increase your early morning and late afternoon production by having the pv array on east and west facing slopes instead of the conventional south orientation. With this configuration, you would have a larger pv capacity than inverter capacity. This system benefits from the low price of pv panels compared to inverters.

Other thoughts:

- What about hydrogen as another propulsion technology option? Will it be available in the small trainer market, or in the larger jet airliner market?
- You can decide what to include or exclude in your plans.
- Making the buildings zero carbon will require low carbon energy for space and water heating as well.

Useful Links:

- PVWatts Calculator
- Region of Waterloo International Airport Master Plan Implementation
- evolv1: A Zero Carbon Building Case Study

For more information visit:

https://uwaterloo.ca/sustainable-aeronautics/wisa-comp