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Energy Consumption of Nissan Leaf with different Driving Conditions.

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Master VIE project

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Outline

Introduction and Objectives

GHG of University of Lille in 2020 [https://urlz.fr/oZRB]

GHG of commuting
- Car
- Bus
- Subway/Train
- Other

81% 12% 6% 1%
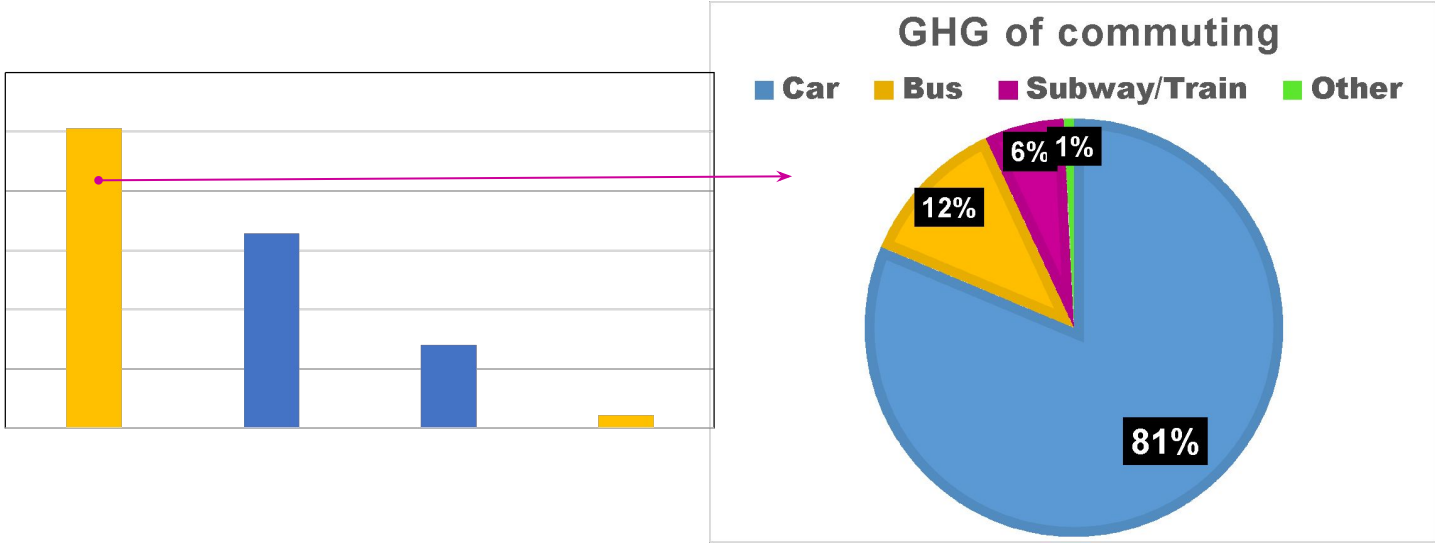
→ **EVE:** estimation of energy consumption of various electrified vehicles
(e-bike, e-cars, e-bus, H2-bus…)

Master Project: energy consumption of Nissan Leaf with different driving conditions

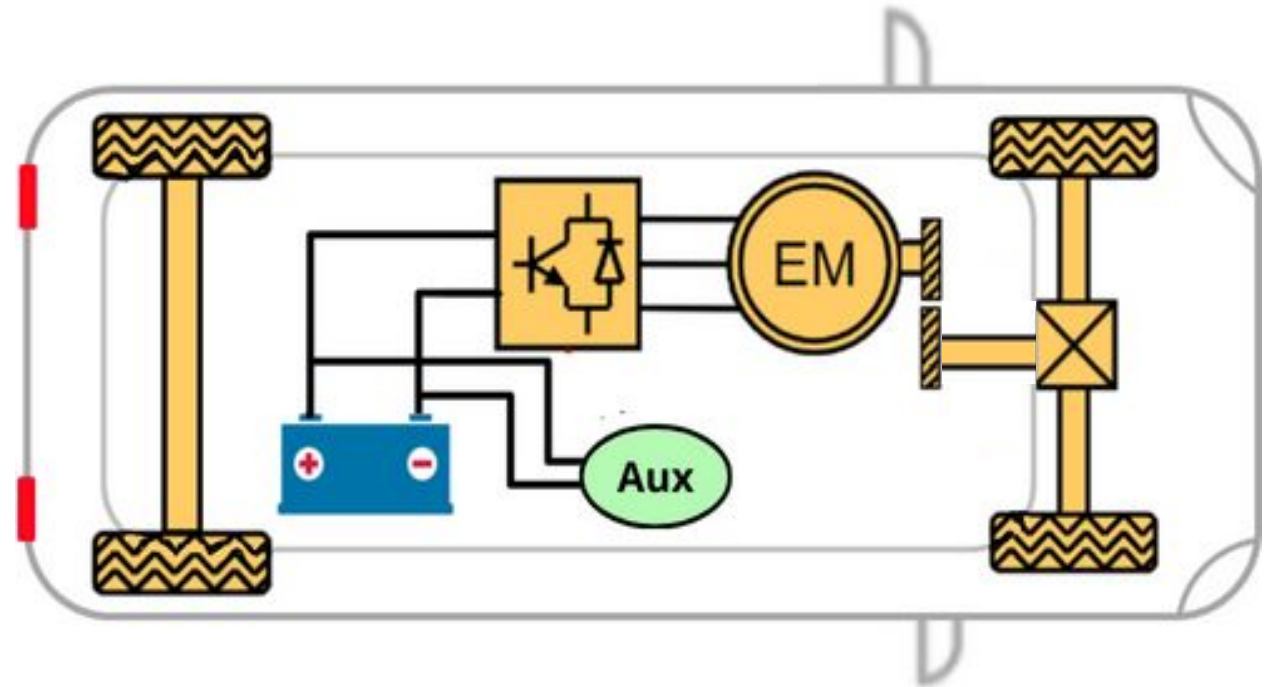# Description of the studied system and its subsystems

Three main Subsystems:
- Traction Subsystem
- Energy Storage Subsystem
- Auxiliary Subsystem

- Battery : 350.4 V / 40 kWh
- Maximum Speed : 144 km/h
- Autonomy: 270 km
- energy consumed (WLTC) : 171 Wh/km
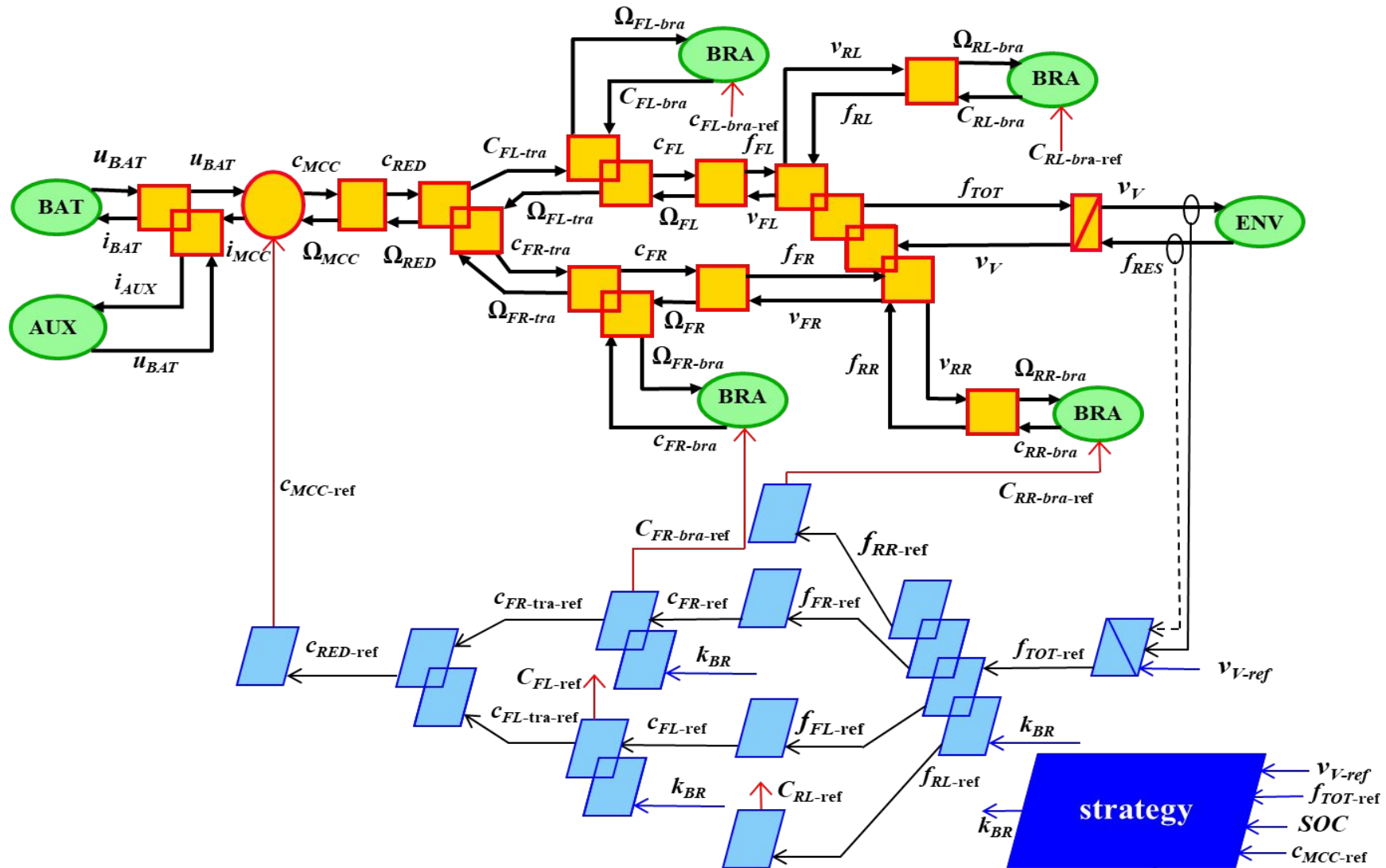- Mass: 1505 kg

[Nissan LEAF ZE1 Technical Documentation]

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Model and control organization

Complex model organisation using the "EMR" formalism.

Simulation and validation

WLTC Cycle class 3		
	Consumption (Wh/km)	*consumption error (%)*	*Autonomy (km)*
Real Vehicle	171*	ref	270*
Simulation	177.3	1.9	250

*[Nissan LEAF ZE1 Technical Documentation]

Velocity (km/h)

time (s)

the simulation model has 2% of error on energy consumption compared to the Nissan data

[https://urlz.fr/pvSe]
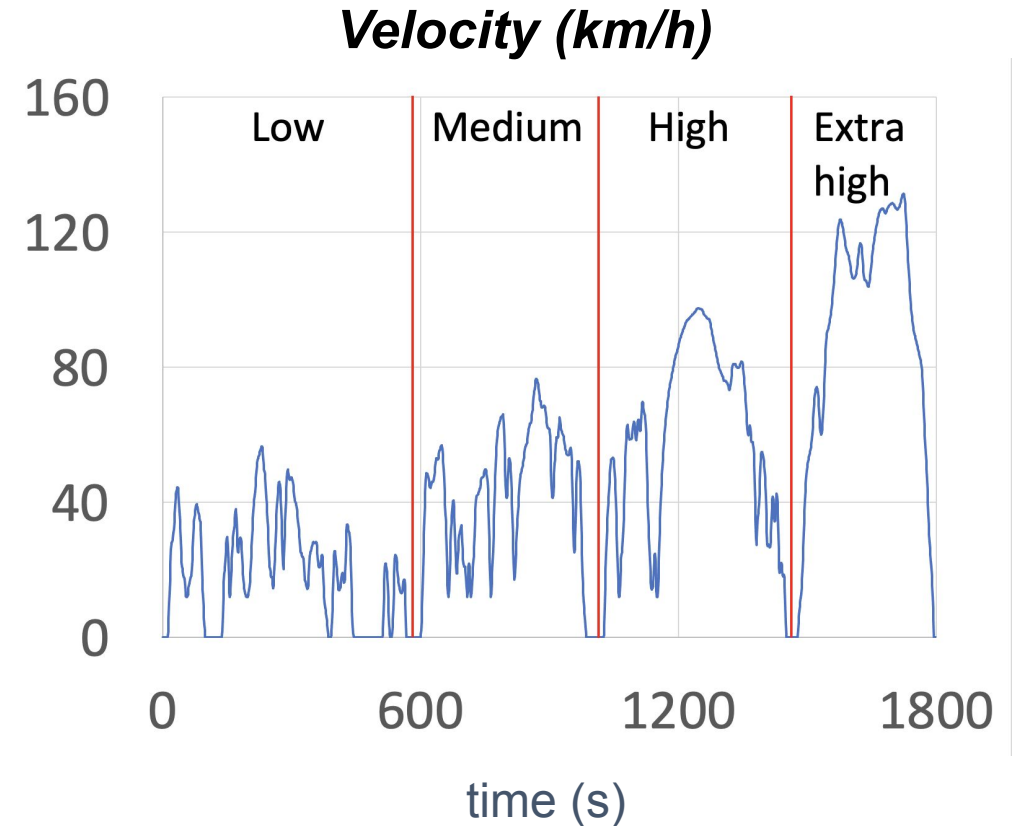
Validation using a real driving cycle
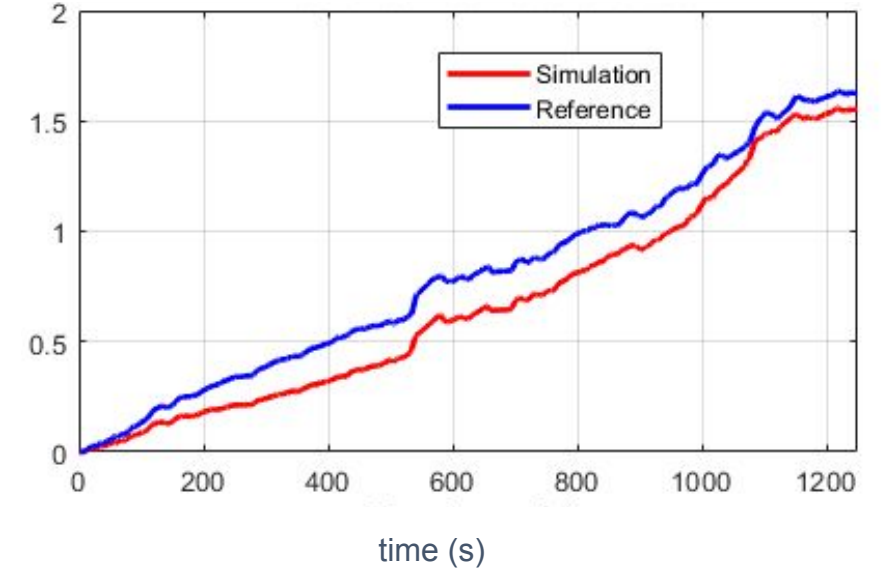
Battery Current (A)

Velocity (km/h)
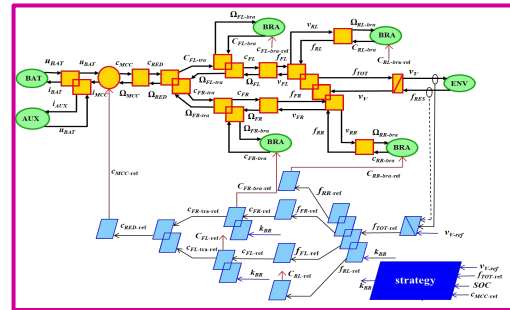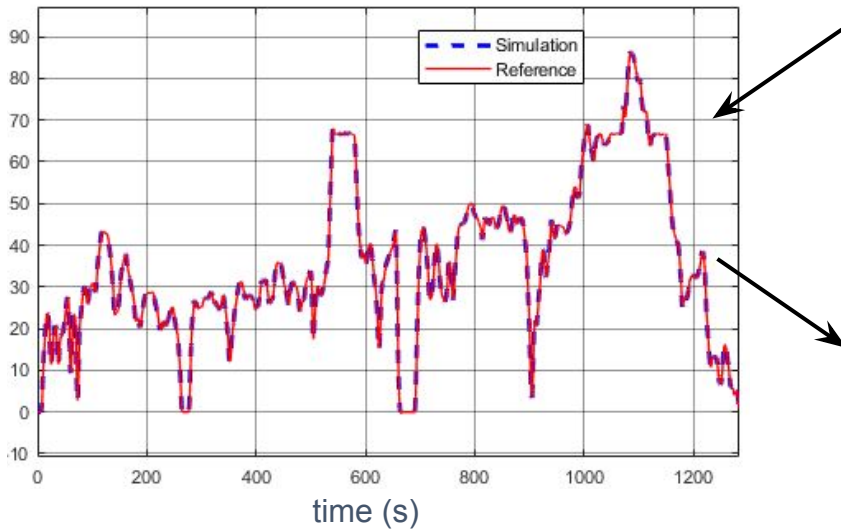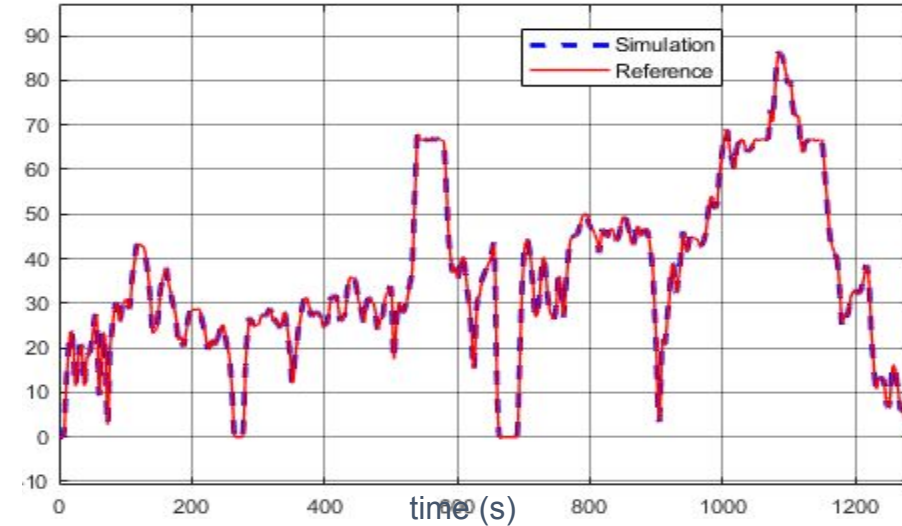

simulation
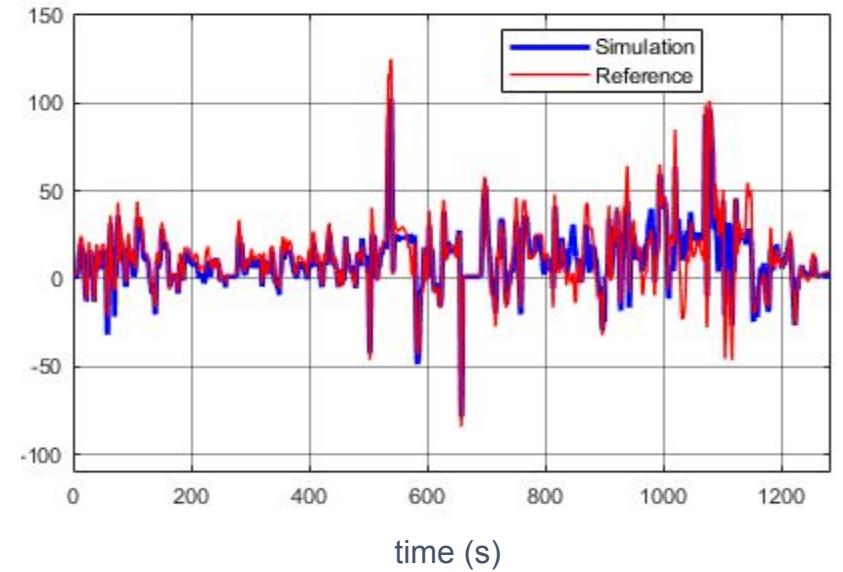
Energy Consumption (kWh)

the simulation model has **2%** of error on energy consumption compared to a **real driving cycle**
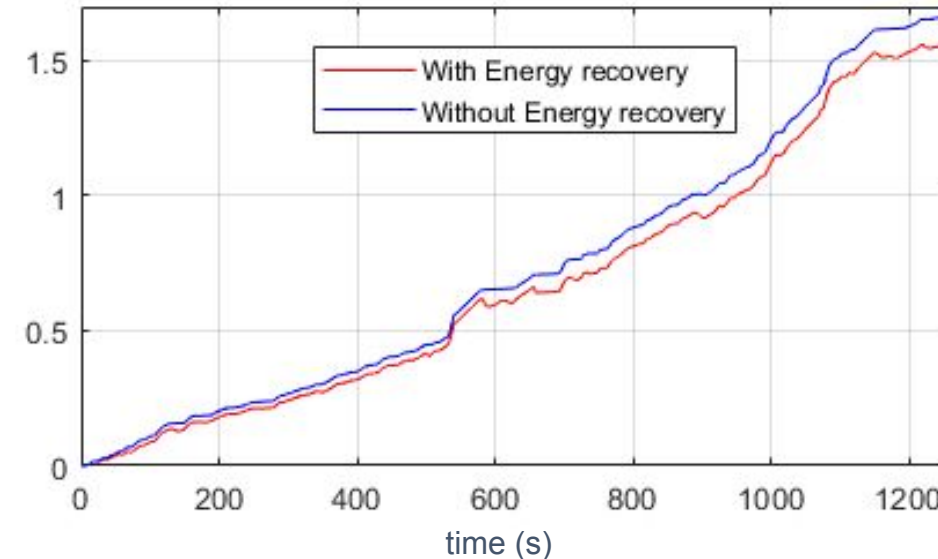
Evaluation of the gain of energy recovery

Real driving cycle		
Braking type	*Pure mechanical*	*Pure Electrical*
Consumption (Wh/km)	**123.3**	**117.2**

5% of energy saving using regenerative braking

Velocity (km/h)
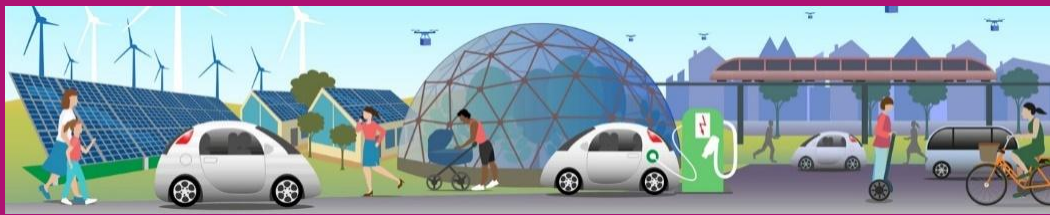

Energy Consumption (kWh)

Conclusion

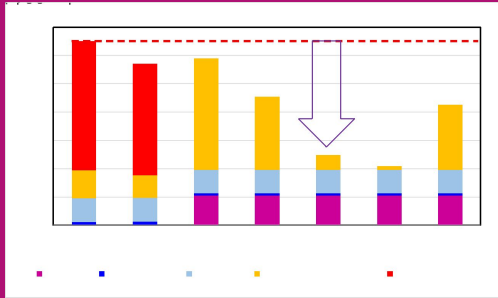○ **Simulation model of the Nissan Leaf**

- validation with 2% of error with a real driving cycle
- energy saving of 5% using regenerative braking
- energy consumption negligeable for turns

○ **Perspectives**

- impact of mass transfer during braking
- impact of different drivers (CUMIN-SARA)

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