Quiet cars (EV, HEV) and Pedestrians

It is not a theoretical problem to solve

in 5 or 10 years…

From 2011, the number of these cars is going to increase in cities…

Electric Vehicles in Renault = 4 models from mid 2011

What are the Issues for EV with regard to external sound?

- Keep the safety of all pedestrians
- Reduce noise pollution

  Produce a sound only at low speed , much lower than the current external noise but which stay easy to detect

- Provide the EV with a sound that makes sense (function and emotion)
- Find out technical systems which keep EV **affordable for all, easy and fast to implement**

The Japanese Guideline answers to these issues

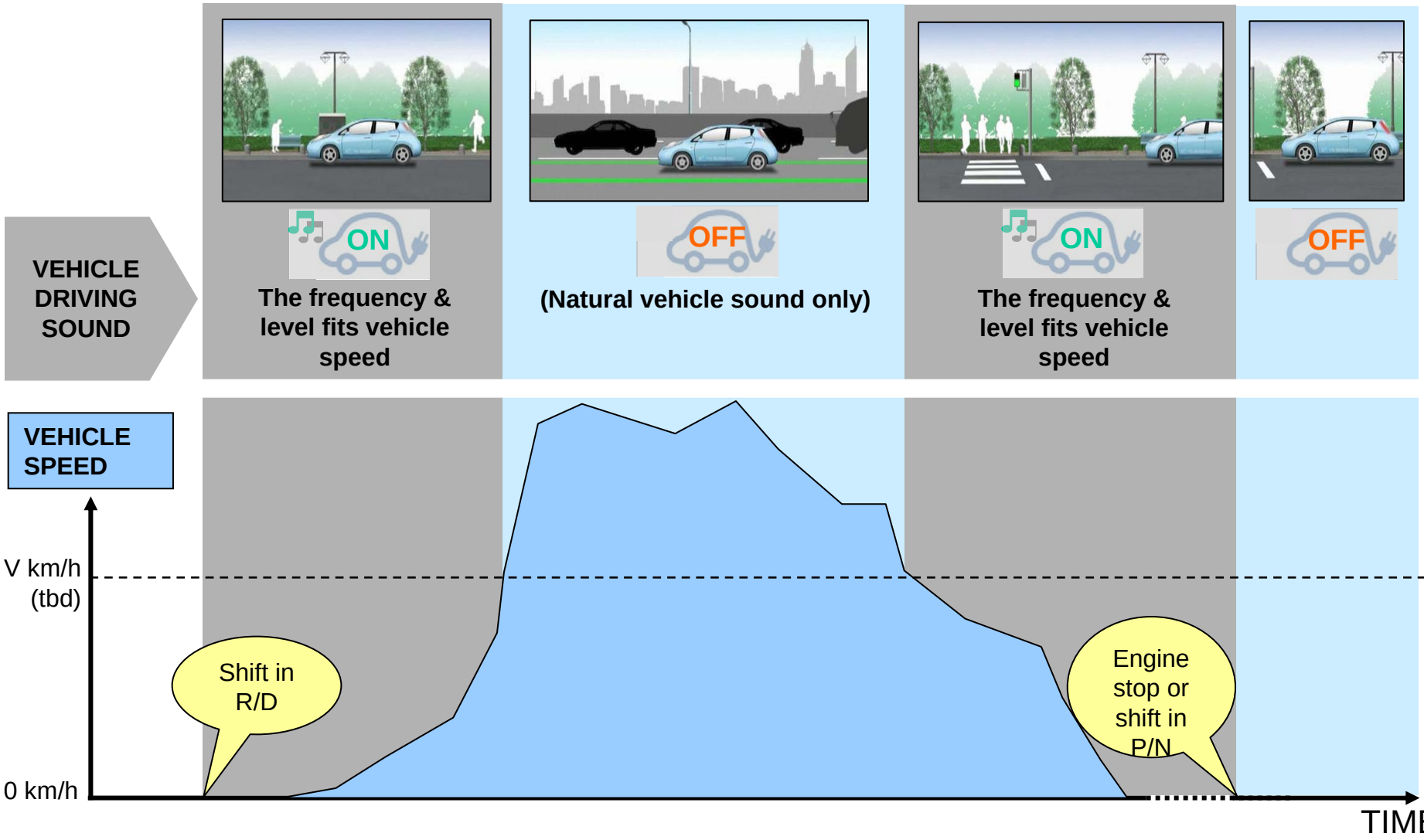
RENAULT Functional specifications

External sound characteristics

- Polyphonic sound generator (not a Buzzer)
- Waterproof 80mm loudspeaker mounted in engine compartment.
- Amplifier
- Sound (level, frequency) = function (speed, acceleration)
- Enable automatic sound: 0 kph <V <20 kph
- Ignition switch on dashboard (OFF) with LED feedback
- Automatic reset (ON)

The pedestrian must be able to estimate :
Speed, proximity & recognize an EV

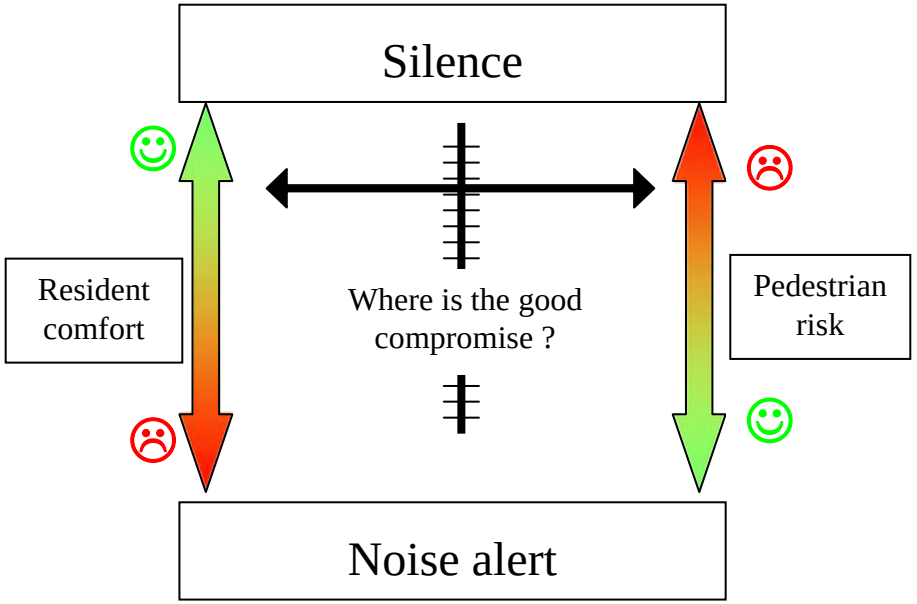
Principle : How does it work?



Ongoing studies in Renault on quiet cars

- **Goal : to have scientific data to manage a difficult compromise**
  - To be sure to have good noise detection in different ambient noises
  - Not to increase the noise pollution

Which scientific Background ?



- **Work on several dangerous “life situation”**
  - Tests and evaluation of noise level for exposed / none exposed people
  - Criteria for audibility and annoyance
  - Comparison between ICE car and electrical / hybrid car

  → Internal proposal for noise specification

Research actions

- **In progress**
  - Detection of approaching vehicle
    - Tests on sound detection in ambient noise
      - Done with ICE and EV vehicle
      - Noise measurement and subjective test
    - Work cognitive aspects (danger interpretation, acoustics clues..)

- **To do : European Project**
  - Call on 7th Framework
    - RENAULT will contribute one European project
      - Deadline for proposal : December 2th 2010
    - Other car manufacturers partner's to find
  - Work packages
    - Detection and annoyance perception
    - Warning signal technologies
    - Strategies for the warning : « smart sound »
    - Vehicle demonstrator

THANK YOU

FOR YOUR ATTENTION!