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Active Regeneration Technology for DPF& NSR

JASIC

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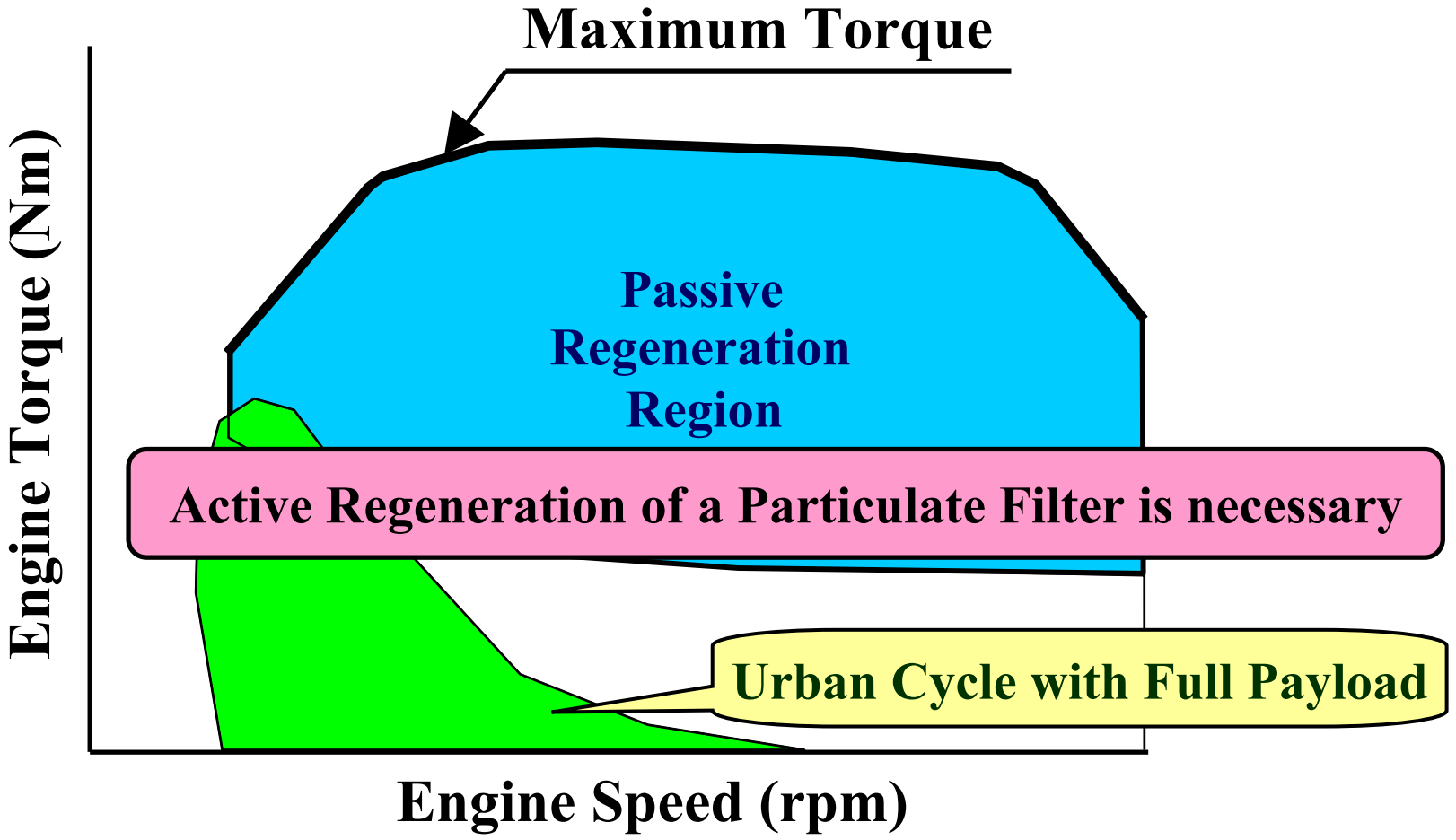
Needs for Active Regeneration

- Regeneration of accumulated soot on DPF is critical for practical application.
- Exh. Temp. in urban driving is not enough for continuous (passive) regeneration of CR-DPF or C-DPF.
- Therefore Japanese DPF installed engines in production mostly apply active regeneration technologies. Those differ for each manufacturers' design philosophy.
- An example already presented in SAE2004-01-0824 by Japanese manufacturer.
- Active regeneration is also necessary for de-sulfurization of NOx Storage Reduction (NSR) catalyst. Because sulfur in fuel is accumulated on NOx adsorbing material on the catalyst and poisons NOx reduction performance.

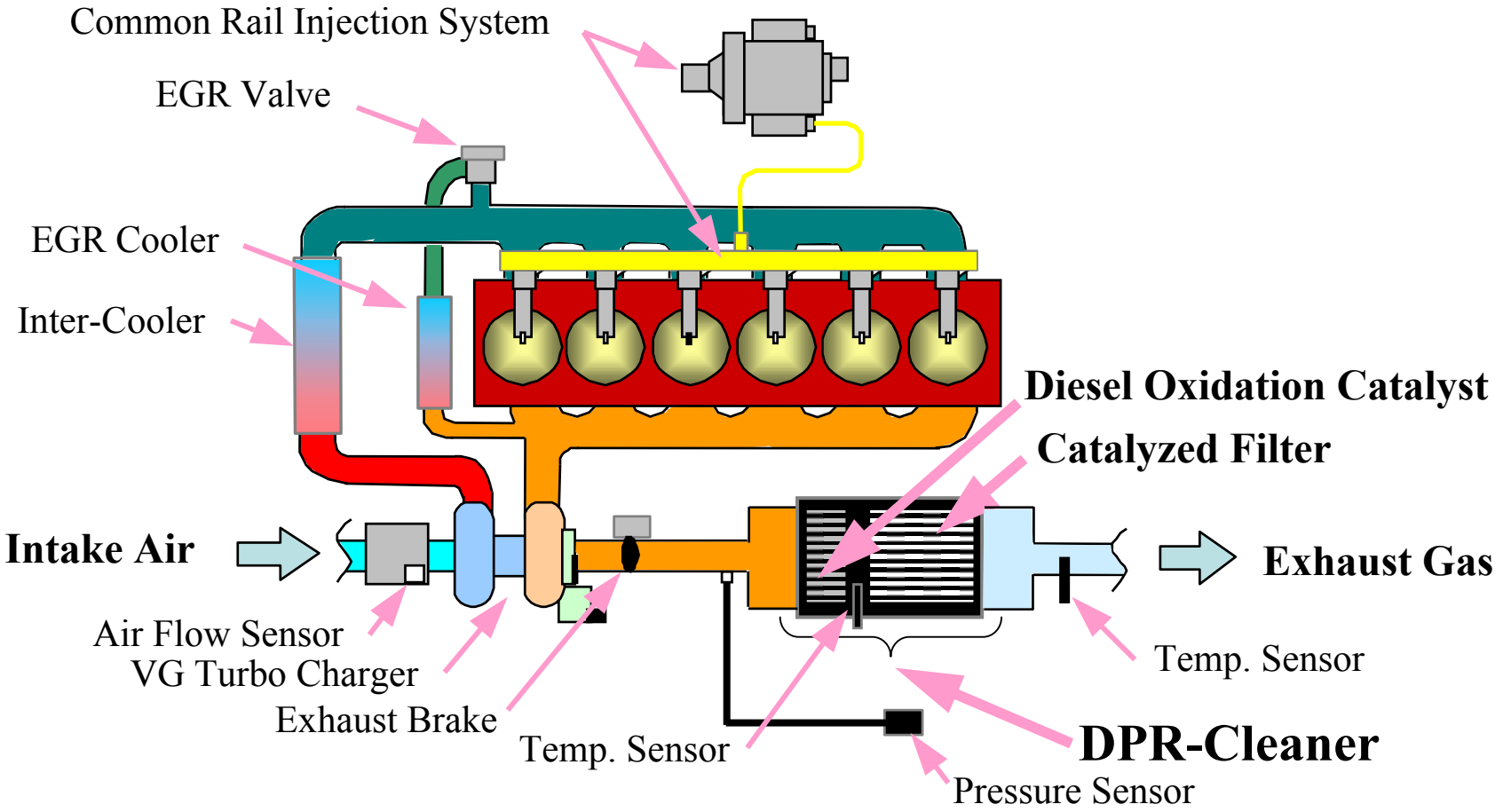
Passive Regeneration Operating Conditions



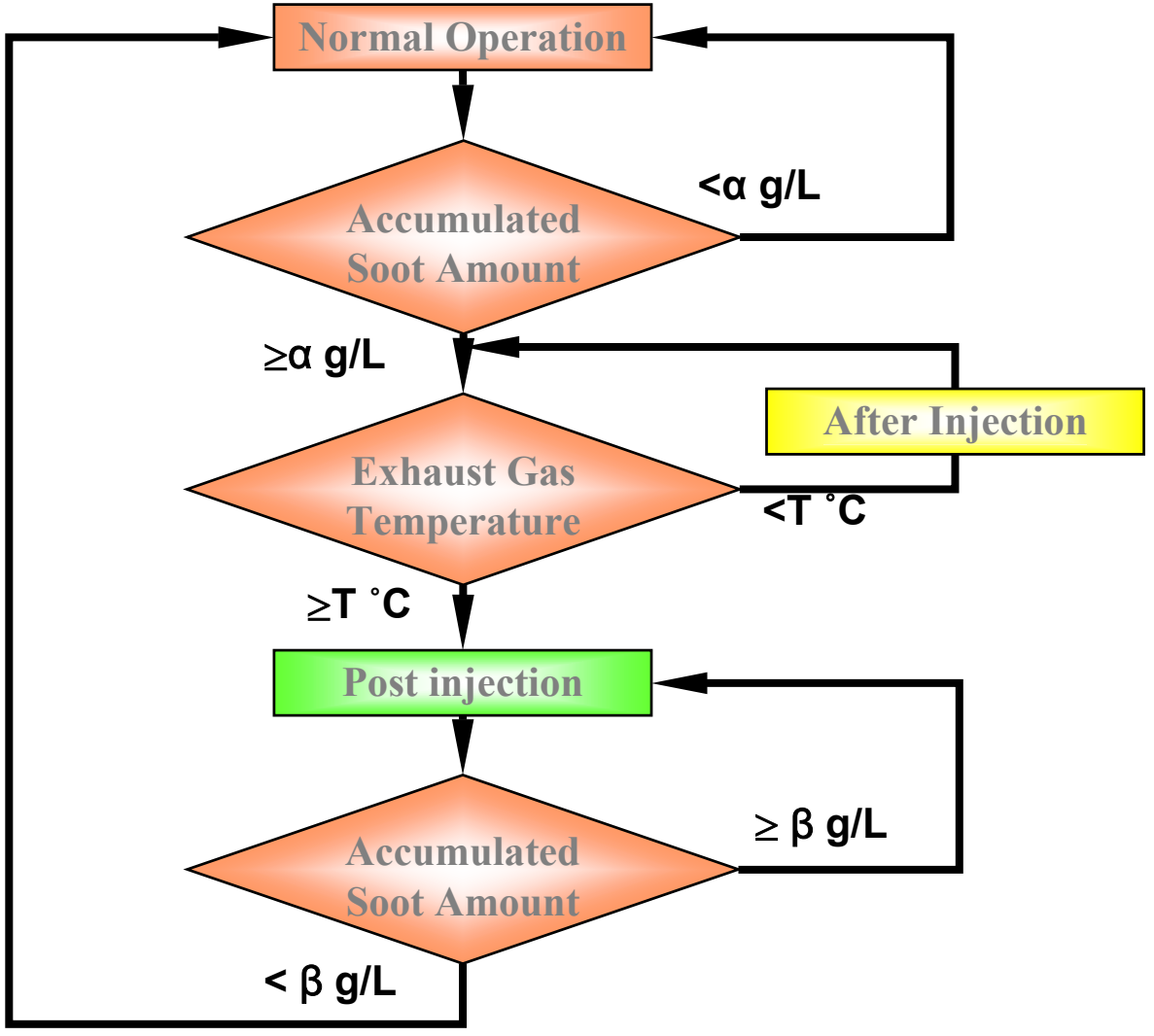
Technology Outline for DPF (SAE2004-01-0824)

- Accumulated soot amount on DPF is estimated by ECU. When the amount exceed the threshold, active regeneration start to increase catalyst bed temp..
- In the active regeneration process, different injection events (after inj. or post inj.) and different air management occur using electronic control of fuel inj. equipment, turbo-charger and EGR devices.
- The process continues several minutes, and during the process, different level of exhaust gases are emitted from tail-pipe.

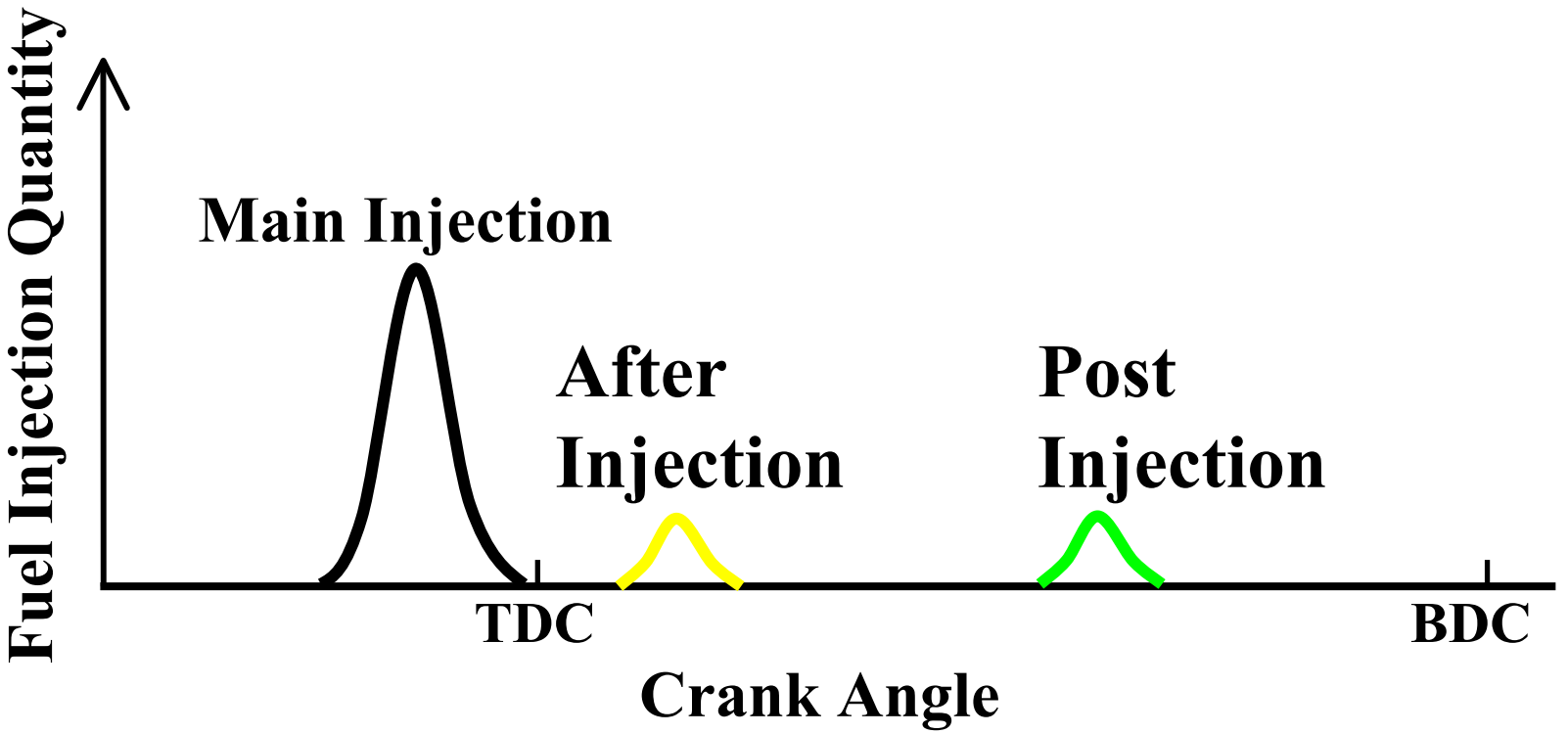
Diesel Engine System to Achieve PM Reduction



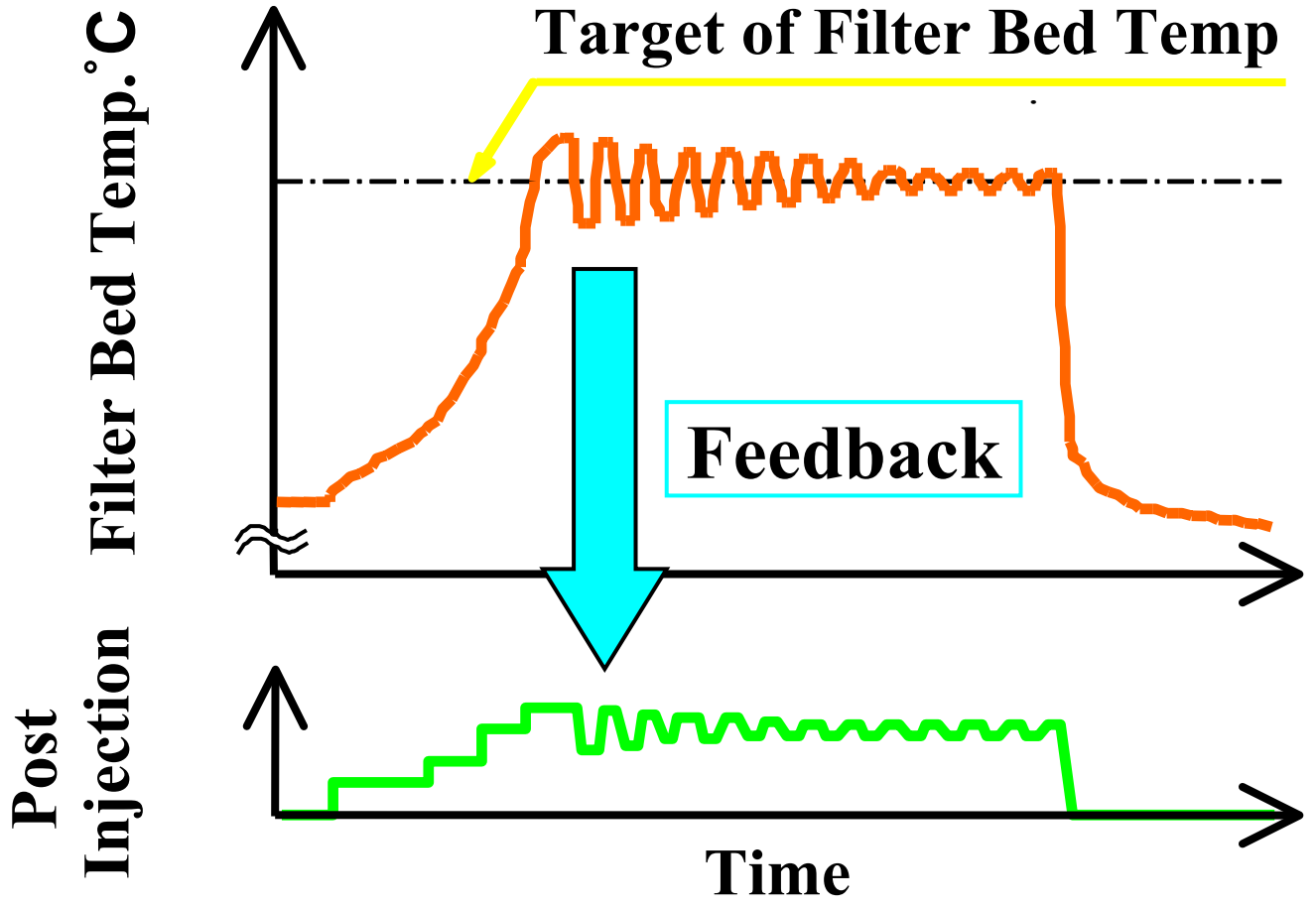
Example of Regeneration Process of the DPR



Fuel Injection Pattern

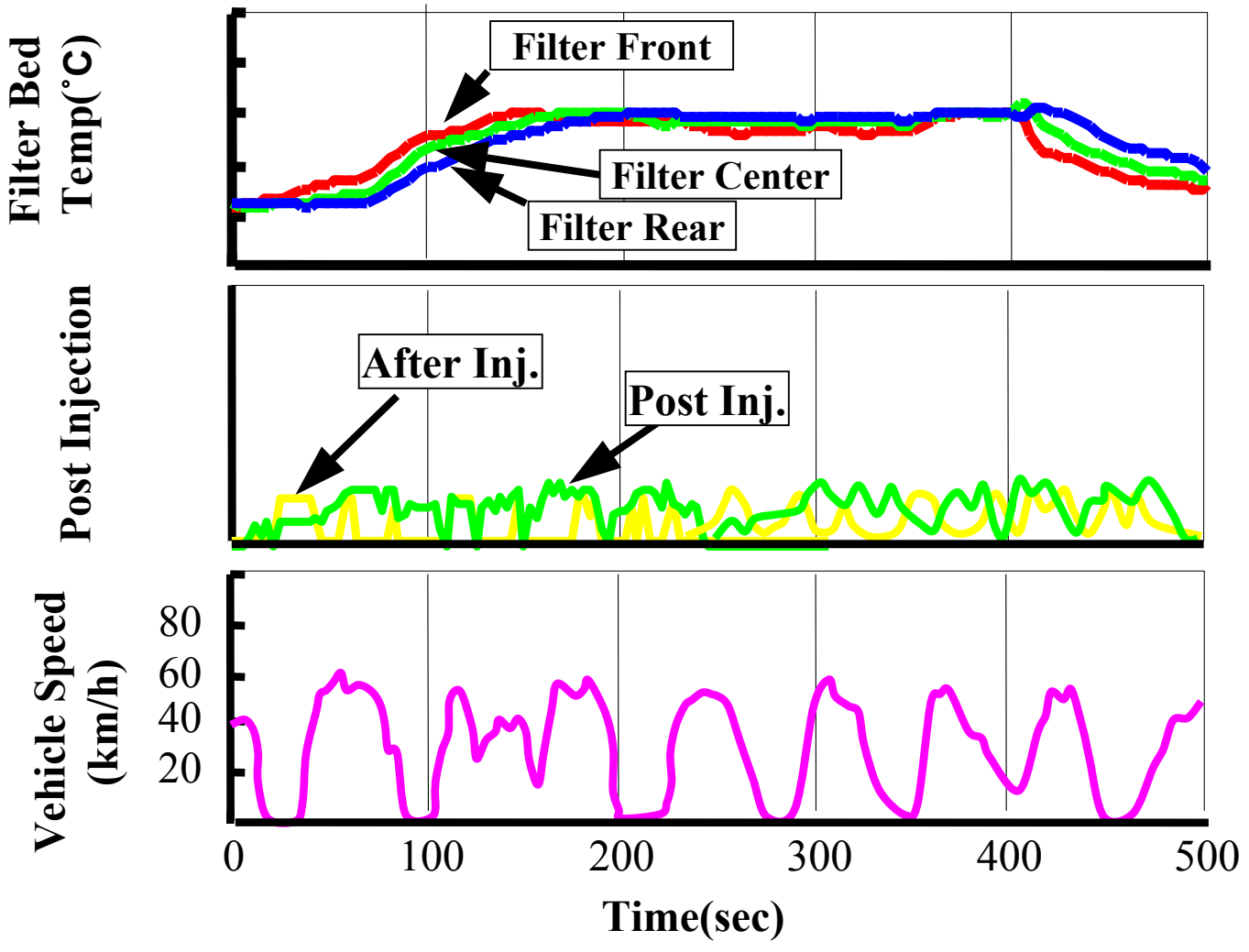


Fuel Injection Control



Filter Temperatures during Active Regeneration

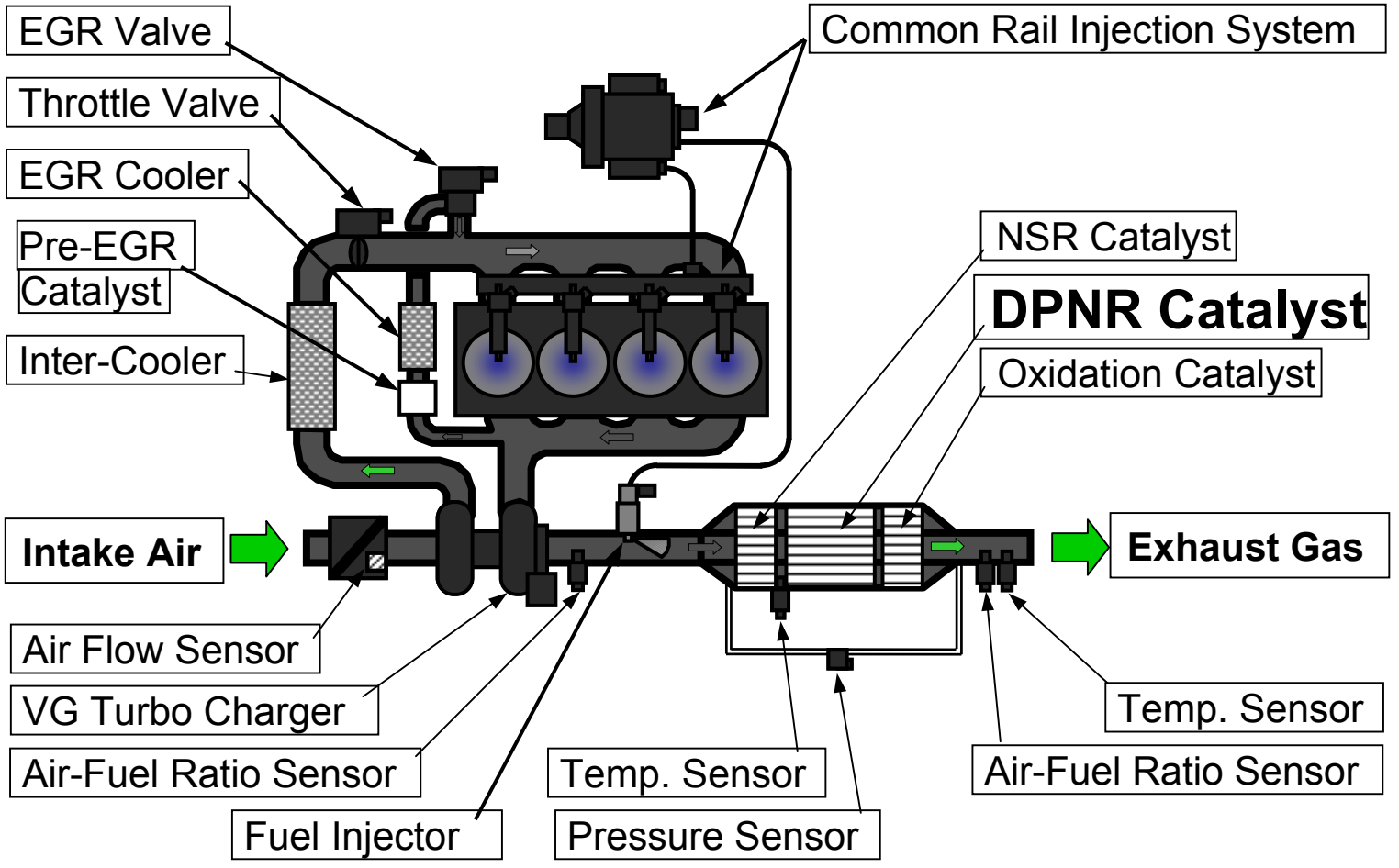
(Under City Driving Condition with the Ave Speed of 24km/h)



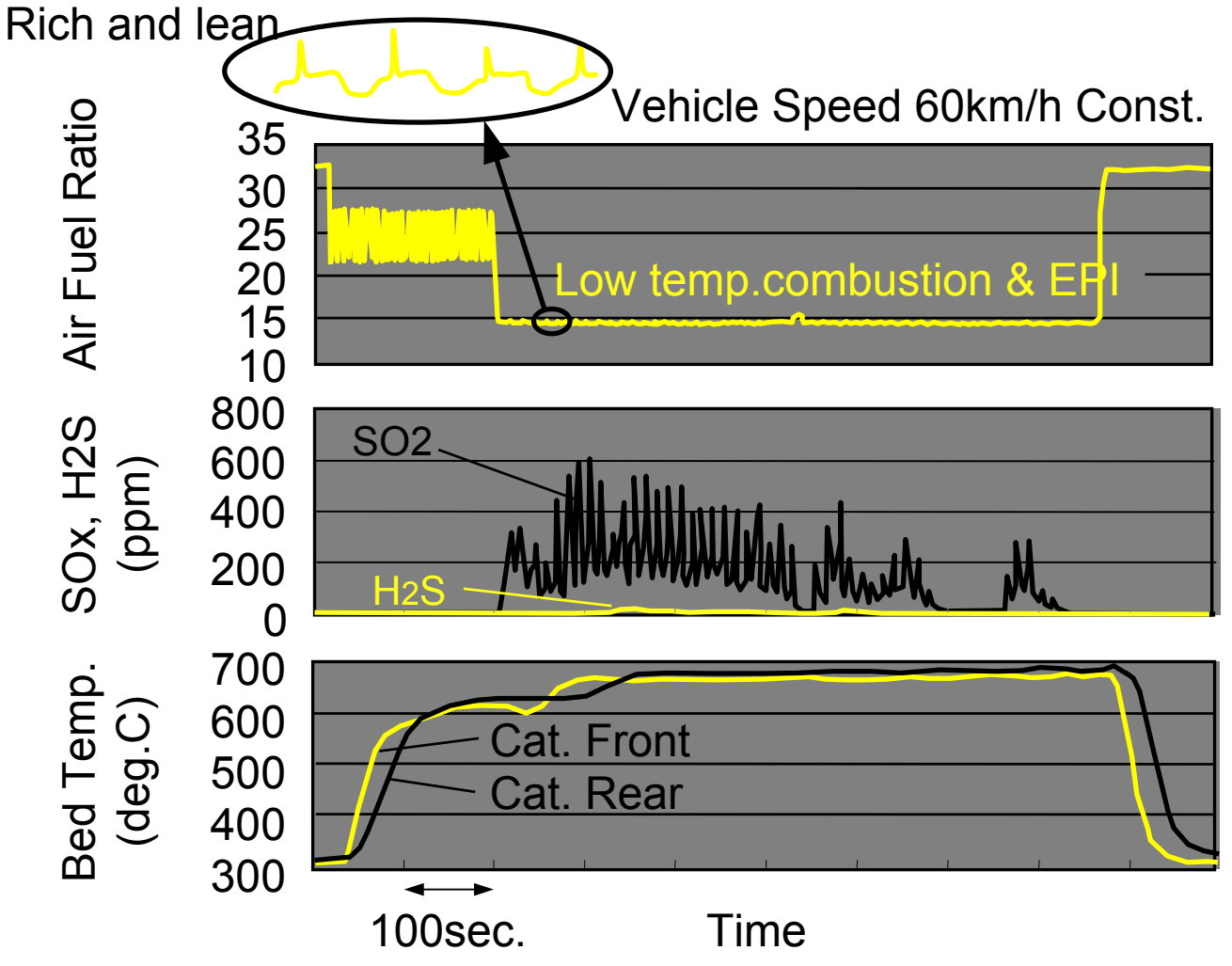
Technology Outline for NSR

- Fuel rich circumstances for catalyst bed necessary for NSR regeneration to remove sulfur.
- In the active regeneration process, much sophisticated injection events (fuel injection to catalyst bed) and air management is necessary for fuel rich circumstances.
- The process continues several minutes, and during the process, different level of exhaust gases are emitted from tail-pipe.

System Configuration for NSR+DPF



An Example of Active Regeneration (De-Sulfurization) for NSR Catalyst



Summary

- Active regeneration is necessary for both DPF and NSR technology.
- The regeneration process continues several minutes, and in the process different emission characteristics should be observed. The duration and emission level depend on design.
- We propose the different emission characteristics during active regeneration should be considered in OCE-GTR.