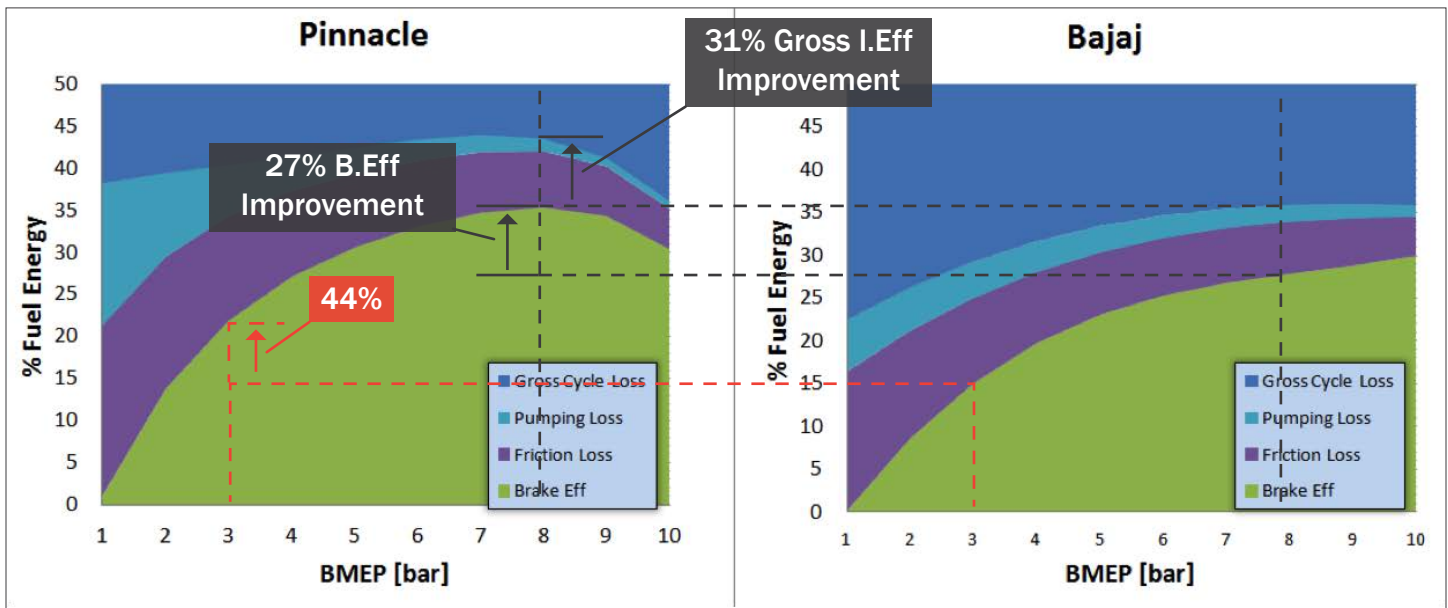


EFFICIENCY

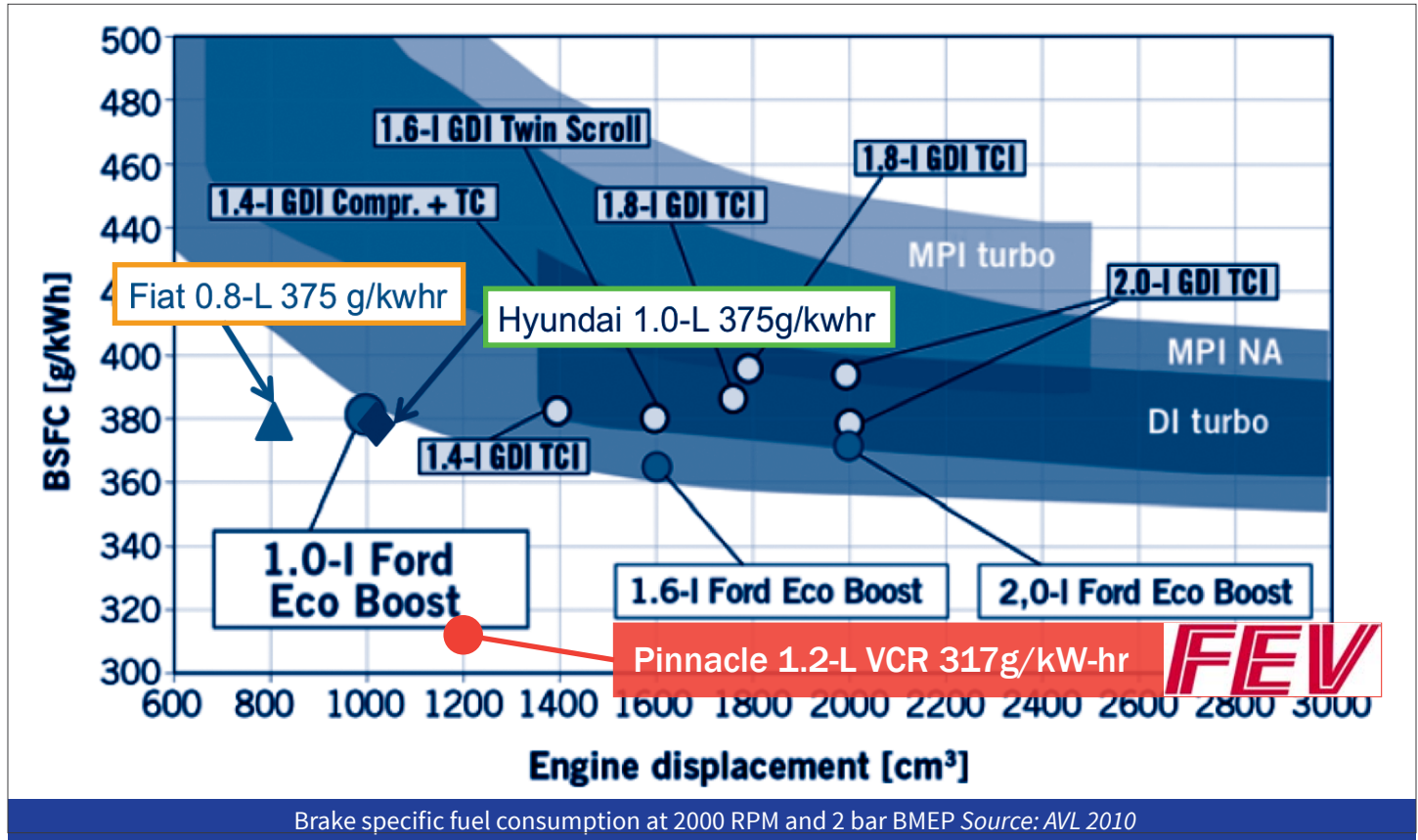
TEST CELL DATA



Energy Balance – 250cc (15:1, test data)

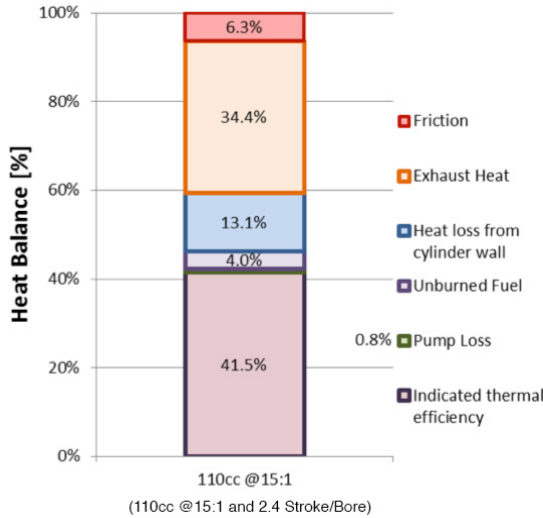
% Fuel	Pinnacle	Bajaj	% Improvement
To Gross Ind Work	43.6%	34.6%	31%
To PMEP	2.6%	2.7%	4%
To Friction	7.8%	6.8%	-16%
To Brake Work	35.4%	27.8%	27%

SIGNIFICANT LIGHT LOAD PINNACLE ADVANTAGE



2k RPM, 2 bar BMEP	BSFC [g/ kW-hr]
Fiat 0.8L T	375
Hyundai 1.0L T	375
Ford 1.0L T	380
Pinnacle 1.2L	317

LOWER HEAT LOSSES THAN 26:1 HCCI



Note: Long effective stroke (2.4:1 stroke/bore), low surface area, and high dilution result in low heat loss and improved thermal efficiency.

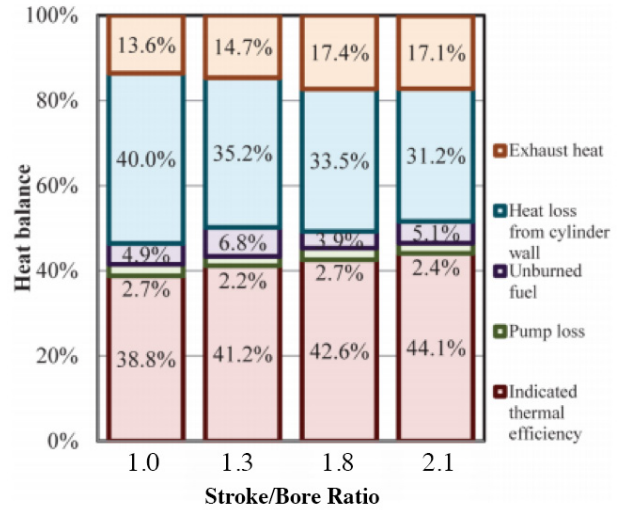
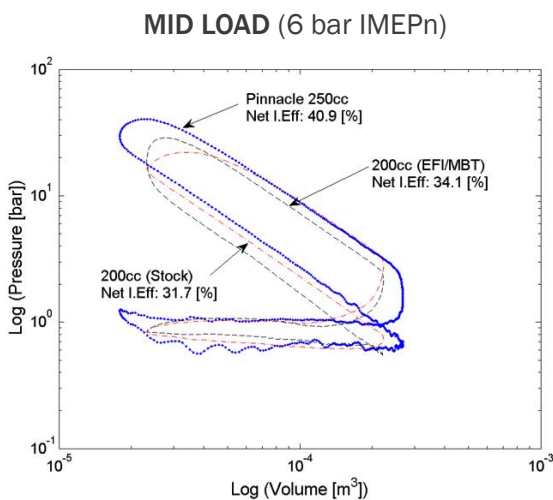


Fig.11. Heat release analysis

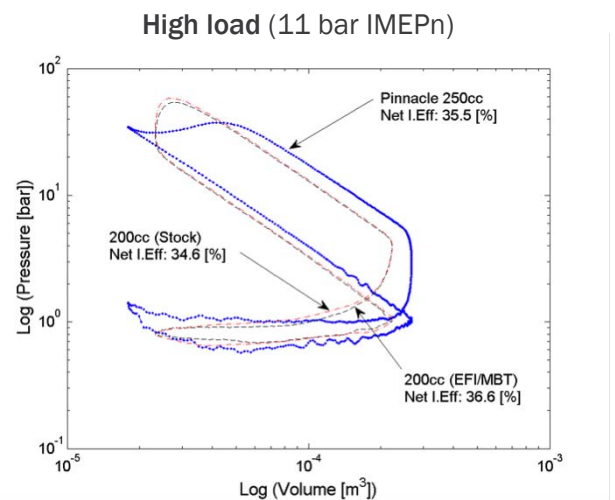
26:1 CR, CNG HCCI 247cc
Koga and Kiura, 2013

A 2.4 stroke/bore ratio 110cc Pinnacle Engine at 15:1 can produce the same efficiency as a 247cc CNG HCCI engine at 26:1 (at ~1.4 stroke/bore)

FIXED COMPRESSION RATIO



Low heat loss
Longer expansion



- Without VCR: delayed combustion still produces similar full load efficiency
- With VCR: compression ratio would be reduced vs load to maintain threshold knock
- Lowest bar logPV comparison to conventional poppet valve engine

logPV comparison (250cc, 15:1, 4000 RPM)