The Fundamentals of Case CE Tier 4 Solutions

Emissions SITUATION

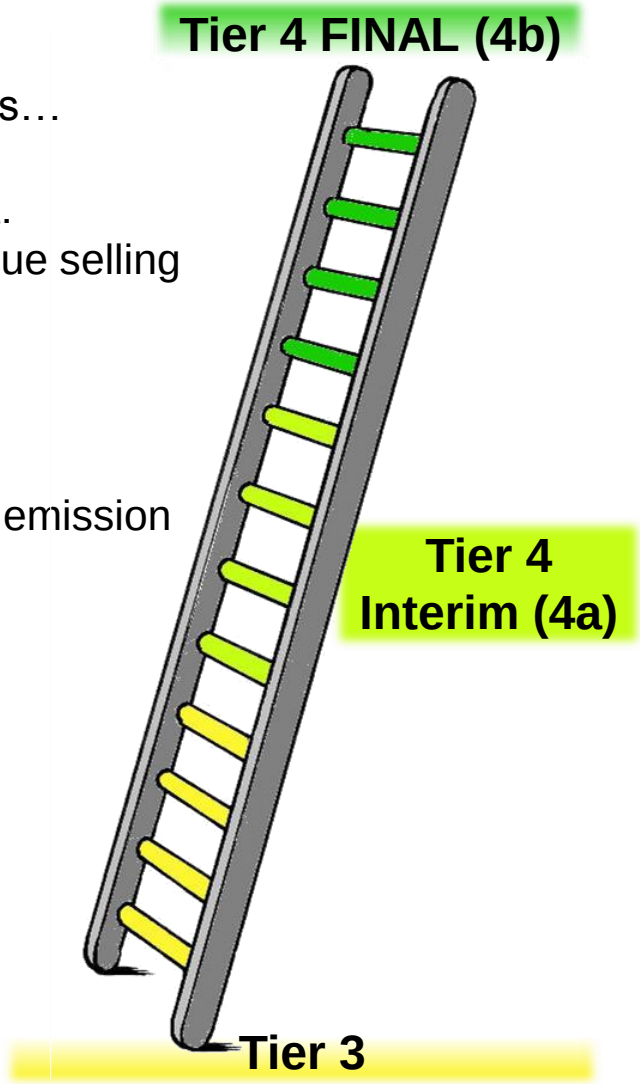
Equipment can meet Tier 4 emissions regulations in two ways…

1.Compliant Machines

a. The engine physically won't pass the emissions test.
b. The manufacturer must use carbon credits to continue selling the product.
c. Compliant machines do not qualify for all jobsites.

2.Certified Machines

a. A certified engine physically passes emission tests.
b. Certified machines (for the current tier) do not have emission restrictions on jobsites at this time.



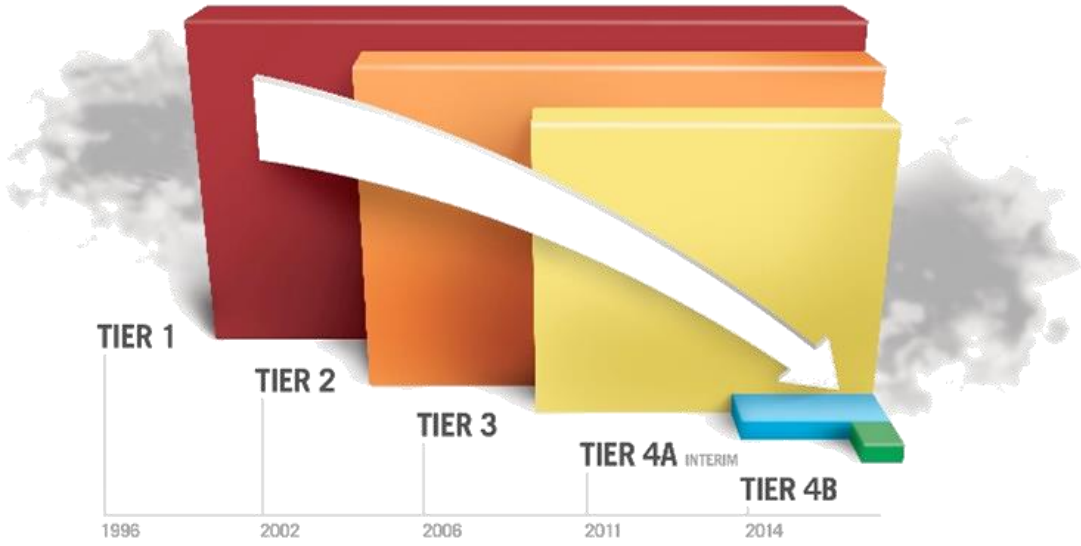
Tier 4a & Tier 4b Timeline

Engine Power	Tier 4a	Tier 4b
49 - 75 HP 37 - 56 kW	2008	2013
75 - 174 HP 56 - 130 kW	2012	2015
174 - 750 HP 130 - 560 kW	2011	2014

Emissions SITUATION

The **TIER 4 EMISSIONS REGULATIONS** established by the US Environmental Protection Agency (EPA) and Canadian Environmental Protection Agency (CEPA) are getting tougher. Case has spent years preparing for this shift. You see, we believe it's possible for customers to **INCREASE PERFORMANCE & PRODUCTIVITY** while also preserving and improving the global environment.

A DRAMATIC REDUCTION IN AIR POLLUTANTS WAS REQUIRED BY 2011.



EPA allowable levels of emissions (PM/NOx).

Emissions DILEMMA

Design an engine for power, efficiency and performance **WHILE AT THE SAME TIME** meeting the stringent emission standards for Particulate Matter (PM) and Nitrogen Oxides (NOx).

WHAT IS (PM)?

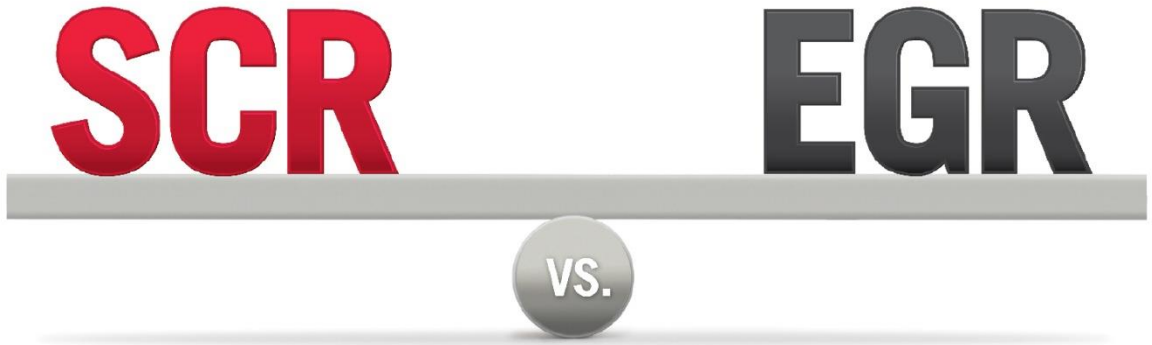
PARTICULATE MATTER is composed of minute particles and pollutants which pose **SERIOUS HEALTH RISKS** for people and animals.

WHAT IS (NOX)?

NITROGEN OXIDES contribute to the cause of acid rain and ground level ozone.

What are THE OPTIONS?

TWO TECHNOLOGIES MEET TIER 4A REGULATIONS.



SCR (Selective Catalytic Reduction) is a simple system that maximizes engine power and treats exhaust gases with a second fluid to eliminate pollutants.

EGR (Exhaust Gas Recirculation) recirculates exhaust back into the engine and uses a particulate filter to capture pollutants.

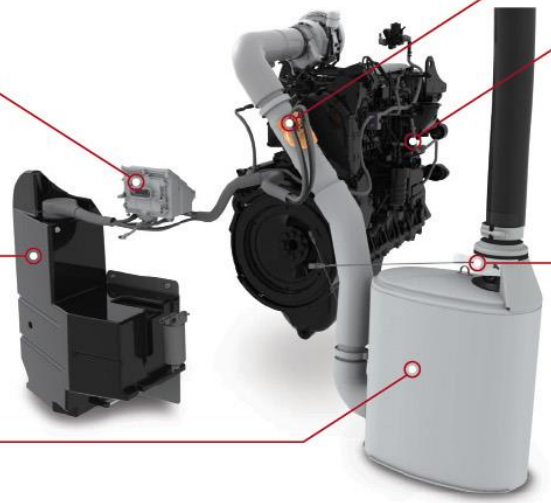
SCR

How SCR works

DEF SUPPLY MODULE
Supplies DEF to the SCR injector at varying flow rates depending on fuel consumption, humidity and NOx levels.

DEF TANK
Contains heating element which is used to thaw the DEF in cold weather applications below 12°F.

SCR CHAMBER
Where DEF mixes with exhaust gas, causing a chemical reaction transforming the NOx into harmless nitrogen gas vapor and water.



DEF INJECTOR
Injects a variable rate mist of DEF into exhaust stream.

HUMIDITY SENSOR
Determines how much DEF to inject based on humidity. It predicts the NOx level leaving the engine before it enters the SCR chamber.

NOx SENSOR
Senses the amount of NOx exiting the SCR chamber.

Case IH 8.7L engine with SCR Exhaust System utilized on a Magnum 235–340 Series tractor.

Diesel Exhaust Fluid (DEF)

Is Diesel Exhaust Fluid Safe?

DEF Characteristics:

- Non-Toxic
- Non-polluting
- Non-flammable
- Non-hazardous
- Stable
- Colorless

DEF has about the same alkalinity as Baking Soda.

CEGR

EGR with a DPF

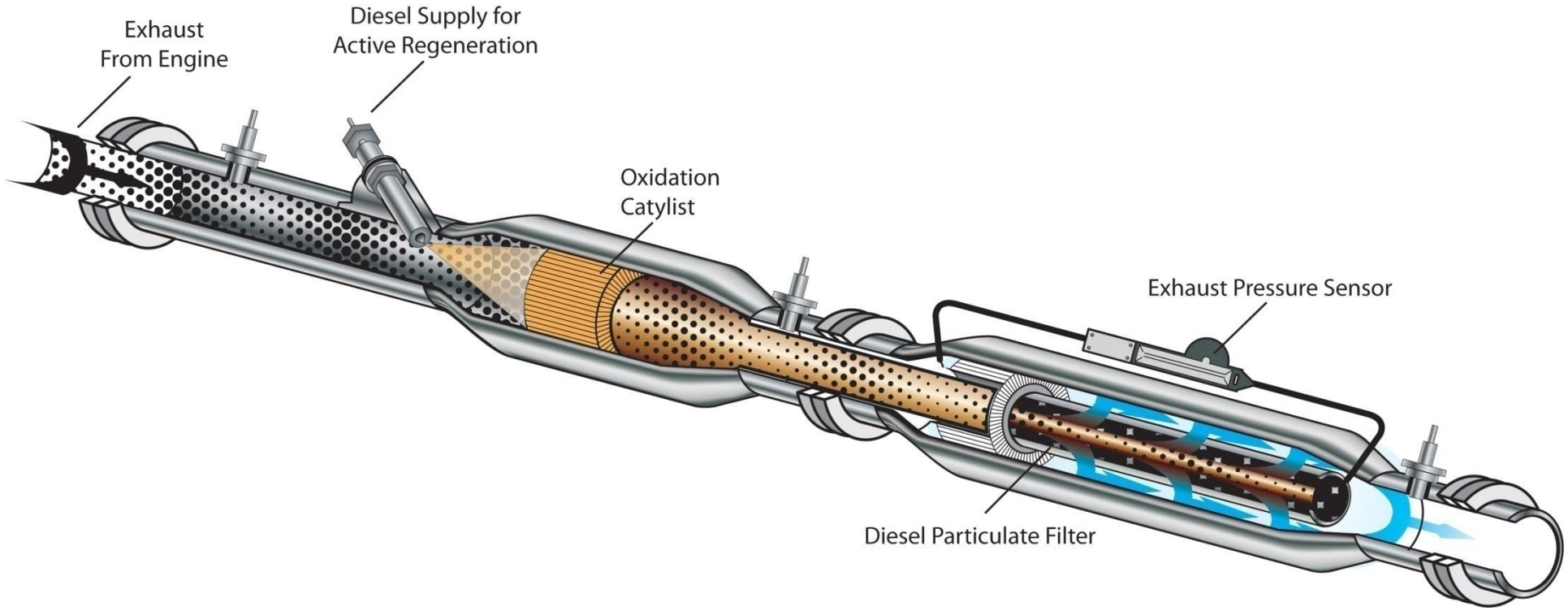
CEGR OPERATION:

- Exhaust gases are injected into the cylinder where operating temperatures lower
- NOx levels decrease due to the cooler running temperatures

DIESEL PARTICULATE FILTER:

- Exhaust after-treatment process
- Regeneration occurs when PM accumulates and exhaust flow is restricted
- Diesel fuel is used to create heat for regeneration

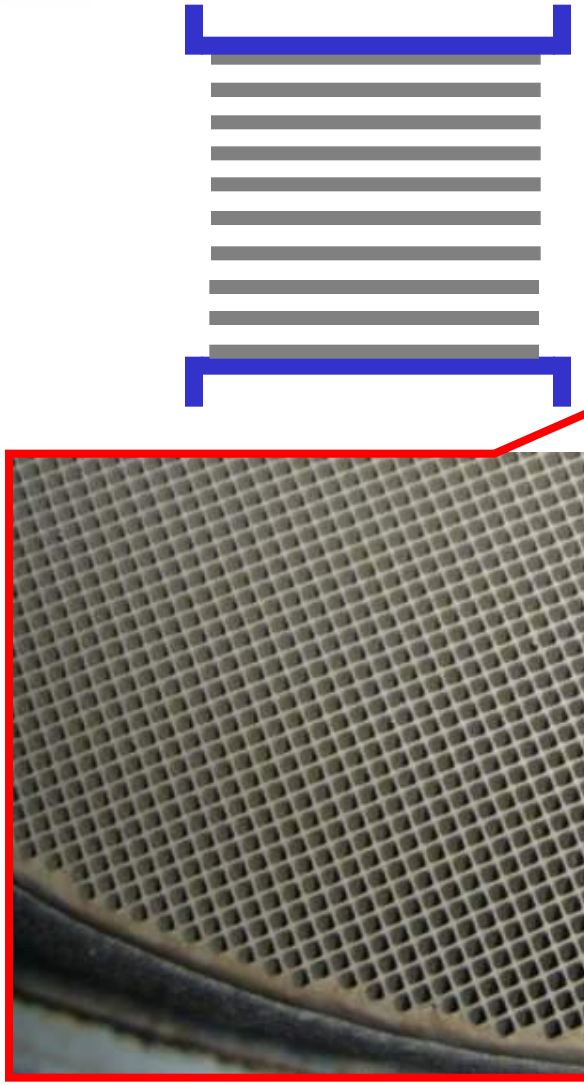
How DPF works

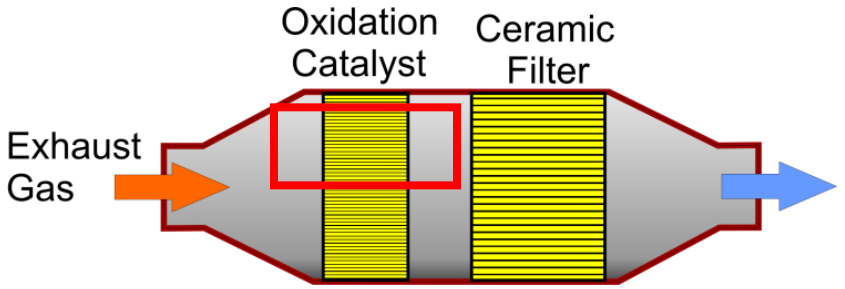


PM Accumulation Animation

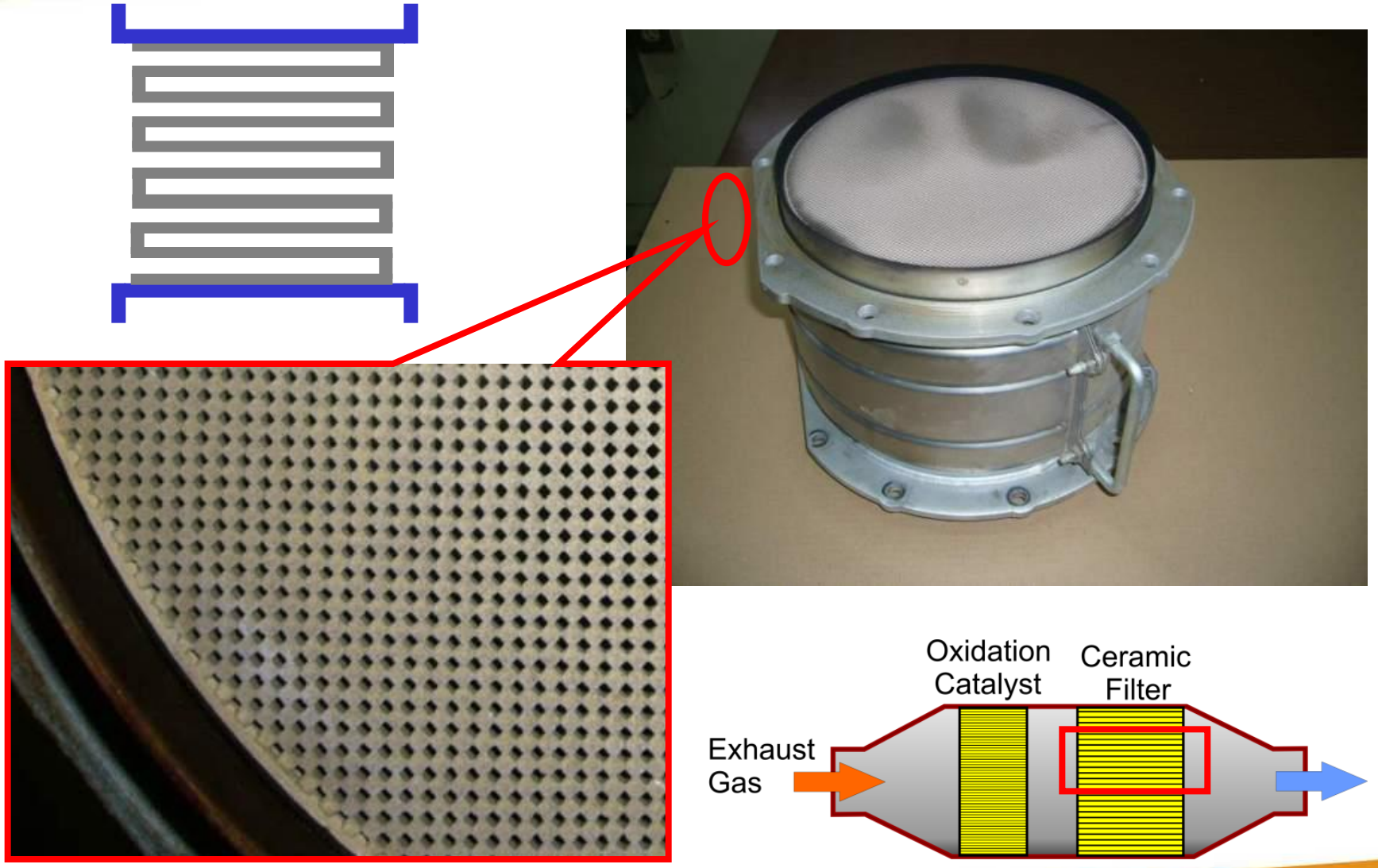
DPF Regeneration Animation

DOC – Diesel Oxidation Catalyst





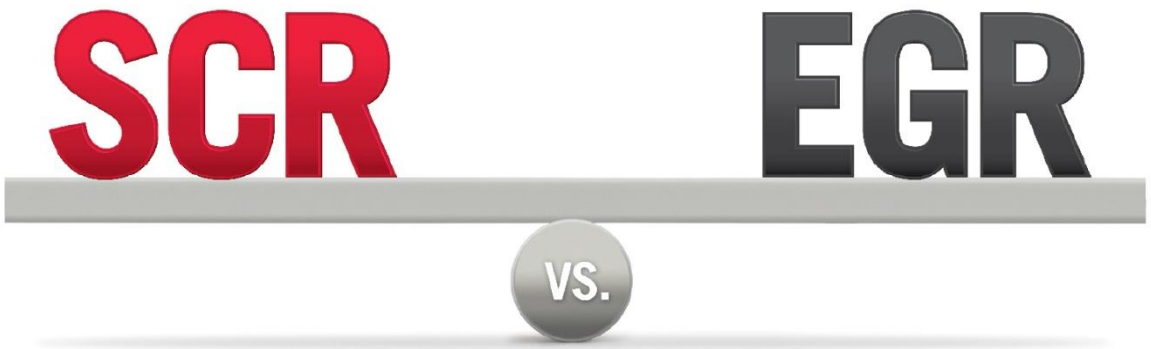
DPF – Diesel Particulate Filter



Tier 4 going forward…

BENEFITS TO CUSTOMERS TODAY:

Both systems provide inherent benefits within certain applications.



TOMORROW:

Case Construction believes SCR is the long term solution for Tier 4 Final.

Thank you