

**08**  
**JUNE**  
**2023**



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**AY**

**ECARBONISATION**  
**USTAINABILITY**

**Bergerat**  
**Monnoyeur**



**Eneria** 

**Decarbonisation & Sustainability Day**

Thursday 8th of June 2023



# Caterpillar REBUILDS

Give your machine a second life

**100% COMMITMENT**

Wim Vermaut

# Be Safe

Every Employee ... Safely Home ... Every Day

**be**present  
SEEK + SHARE + LISTEN + CHAMPION

# Win the Right Way

VALUES + ETHICS + COMPLIANCE

– Our reputation is built not only on what we achieve, but how we achieve it

# Safety procedure



**Re-What??  
“Rebuild”  
What’s it??**



# What is a Rebuild?

**Re-What??**  
**“Rebuild”**  
**What’s it??**

01

In every Cat machine there are sub-systems. These are made up of...

02

Each sub-system or component is designed to have a finite life...

03

...to extend the life...

04

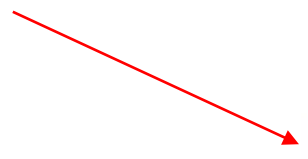
...a rebuild happens at the end of... and resets it.



# 3 technical groups

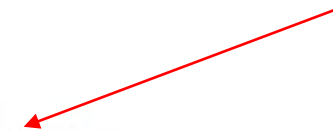
## Engine

Fuel, Oil, Cooling



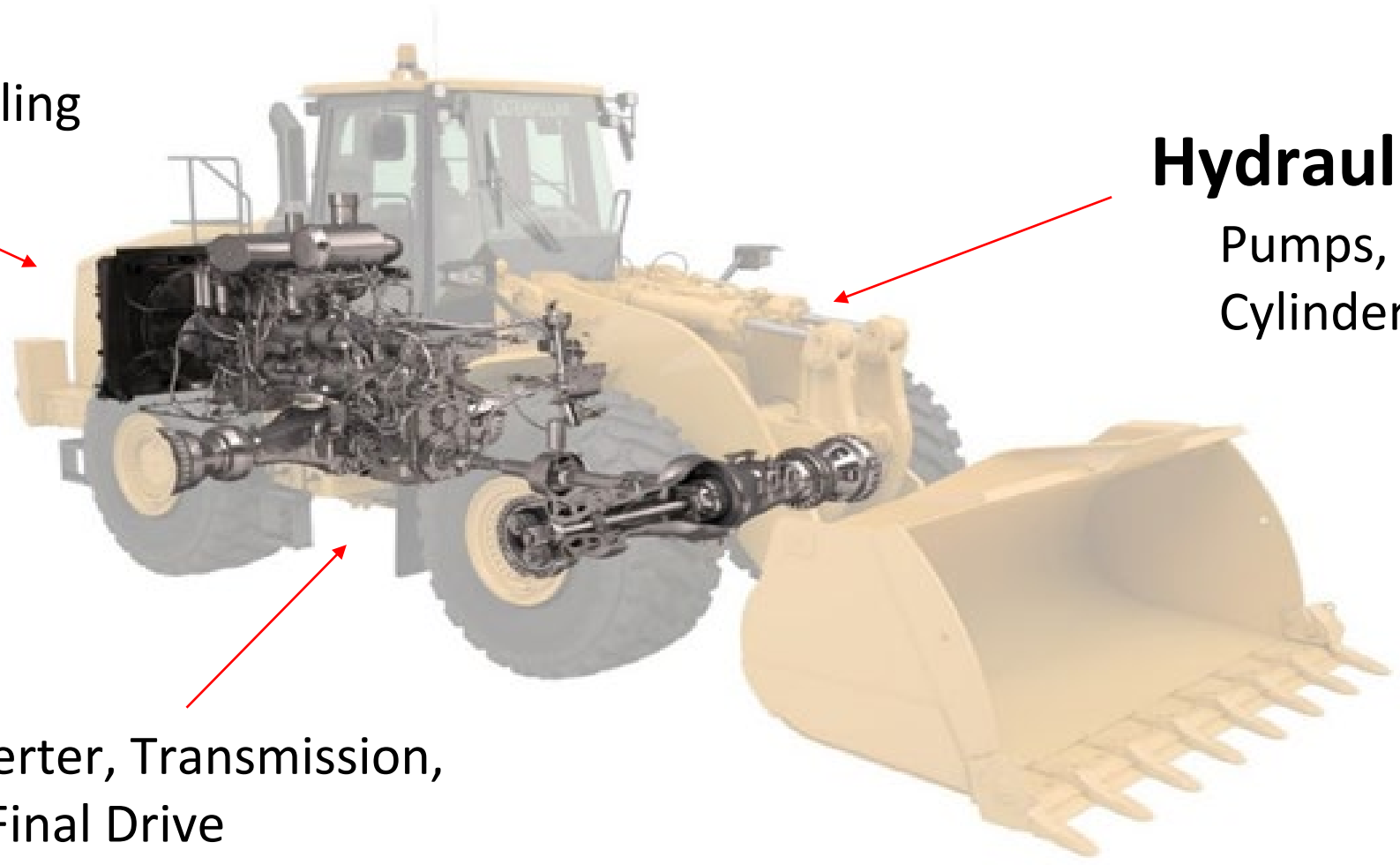
## Hydraulics

Pumps, Motors, Cylinders



## Drivetrain

Torque Converter, Transmission, Differential, Final Drive





# Caterpillar Certified Rebuilds PROGRAMS



## Certified Full Machine Rebuild

- With this program, your machine is completely renovated.
- A complete new paint job is carried out systematically.
- All manufacturer's technical updates and modifications are carried out.
- A new serial number is assigned to the equipment if wanted.



# Caterpillar Certified Rebuilds PROGRAMS

## Certified Power Train Rebuild

- Renovation of the powertrain.
- This program covers the renovation of the engine, radiators, transmission, converter, axles and gearboxes.
- Also on-board electronics, electrical wiring harnesses, hydraulic circuit hoses and cooling hoses.



# Caterpillar Certified Rebuilds PROGRAMS

## Certified Power Train Rebuild PLUS



- Not only is the drivetrain rebuilt, you can also customize the reconditioning or replacement of other components to suit your needs.
- This “à la carte” rebuild can therefore meet your exact requirements.
- Mostly PowerTrain+ Hydraulics

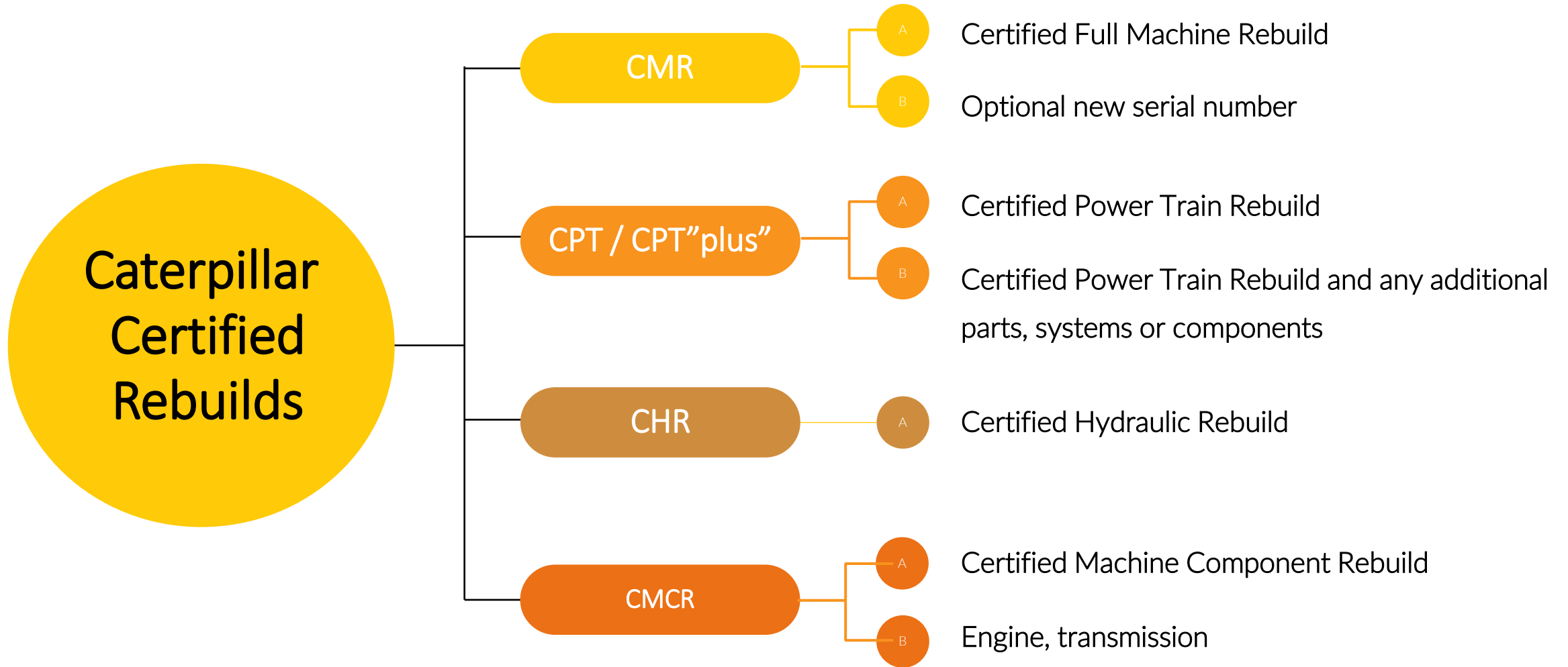
# Caterpillar Certified Rebuilds PROGRAMS



## Certified Hydraulic Rebuild

- This program is dedicated to excavators
- The entire hydraulic circuit is renovated
- Great choice when the rest of the machine is running strong
- Restores pumps, motors, valves, accumulators, hoses, tubes, tanks, coolers and cylinders.

# Caterpillar Certified Rebuilds PROGRAMS





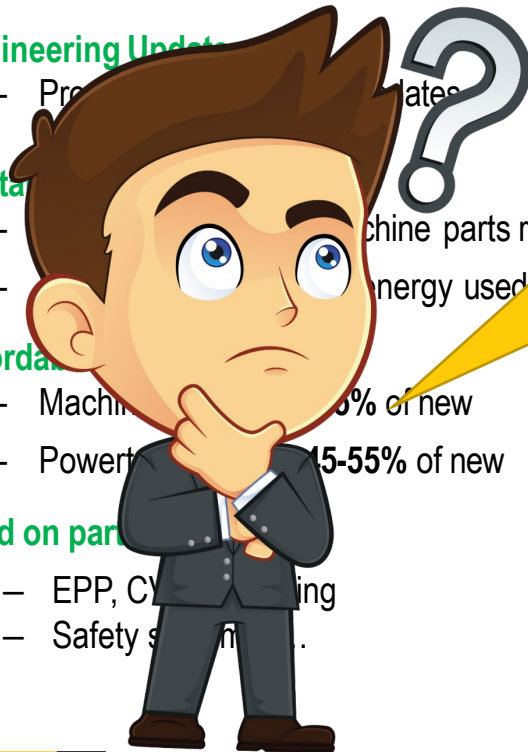
**“Rebuild”  
OK, but  
Why??**



# Caterpillar Certified / Dealer Rebuild Programs

## Why Rebuilds?

- **Built in value**
  - Cat Machines are built to be rebuilt
  - Restores like-new performance, reliability and durability
  - Avoids the cost and downtime associated with chaotic system one repair at a time
- **Engineering Updates**
  - Provides latest
- **Sustainability**
  - Machine parts reuse
  - Energy used
- **Affordability**
  - Machine 30% of new
  - Powertrain 15-55% of new
- **Add on parts**
  - EPP, Cylinders
  - Safety systems



“Rebuild”  
OK, but  
Why??



**“Rebuild”  
How??**

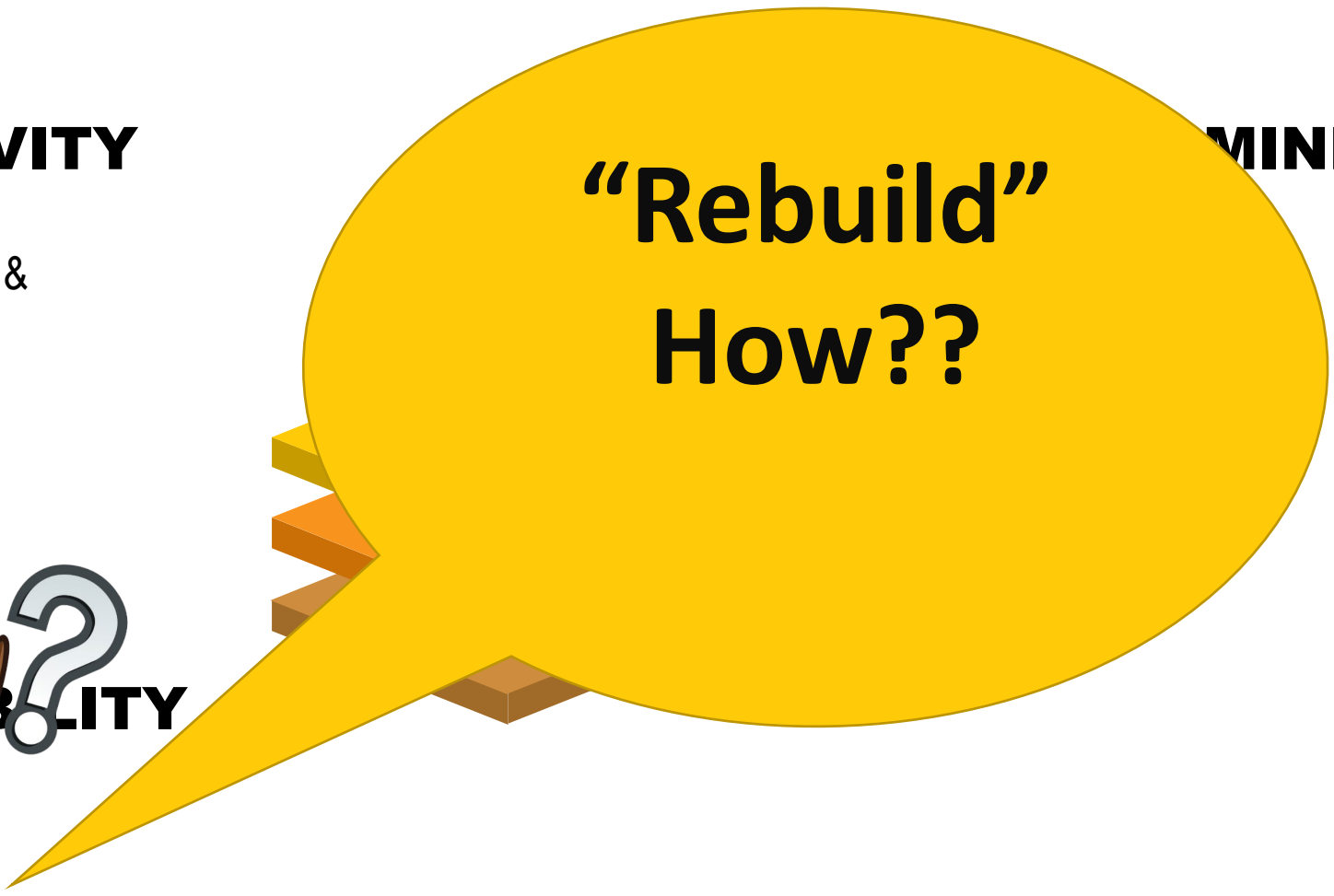






# 1 | PRODUCTIVITY

- Up to 200 inspections & Critical engineering updates
- Bench & performance testing
- Fraction of new machine price



# 2 | SUSTAINABILITY

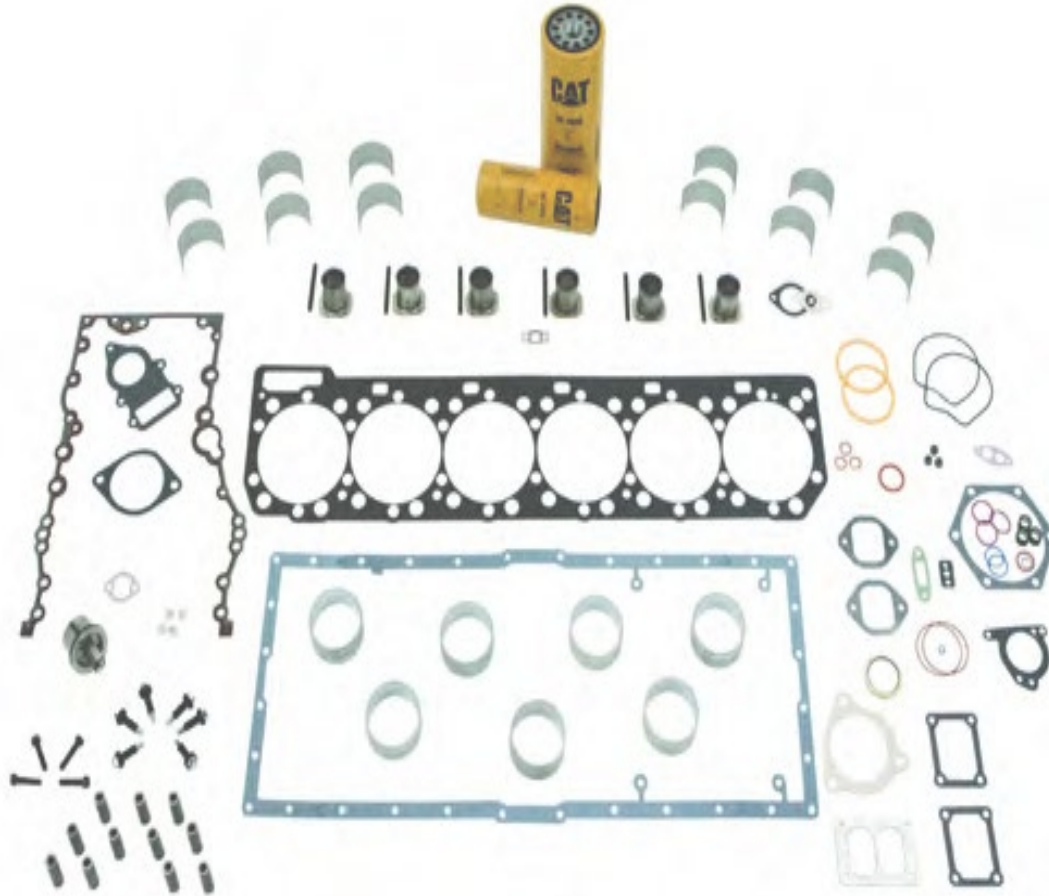
- On machine
- 500,000 material returned to production since start of program



# Example of options for the Engine



## Service Kit **BRONZE**



- ✓ Camshaft bearings
- ✓ Connecting rod bearings
- ✓ Valve-gear bearings
- ✓ Various gasket kits
- ✓ Cylinder head gasket
- ✓ Oil pan gasket
- ✓ Injector gaskets
- ✓ Exhaust collector seals
- ✓ Various filters (oil, diesel)
- ✓ labor

# Example of options for the Engine



## Service Kit **GOLD**

- ✓ Includes bronze kit
- ✓ Piston rings
- ✓ Pistons
- ✓ Connecting rod
- ✓ Axes of pistons
- ✓ Labor

# Example of options for the Engine



## Service Kit **PLATINUM**

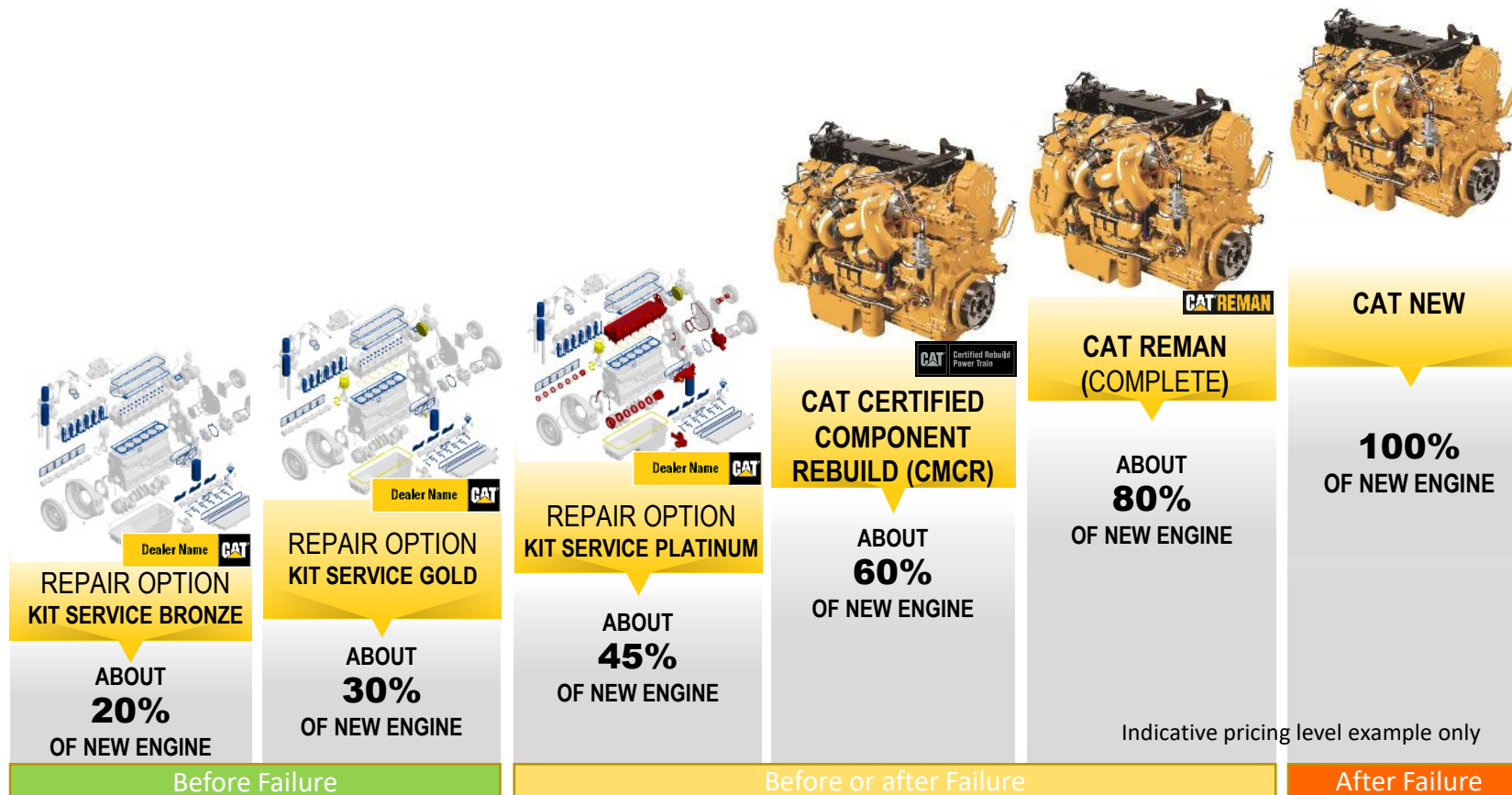


- ✓ Includes bronze kit
- ✓ Piston rings
- ✓ Pistons
- ✓ Connecting rod
- ✓ Axes of pistons
- ✓ revised cylinder head
- ✓ revised injectors
- ✓ revised water pump
- ✓ revised oil pump
- ✓ Labor





# Example of options for the Engine.





# REBUILD TYPES and LEVELS

OPTION  
**01**

## Component rebuild

- LEVEL 1 – REBEARING & RESEAL
- LEVEL 2– REBEARING & RESEAL PLUS
- LEVEL 3 – DEALER REBUILD/EXCHANGE/CMCR
- LEVEL 4 – CAT REMAN
- LEVEL 5 – CAT NEW

OPTION  
**02**

## Powertrain Rebuild

- CAT CERTIFIED REBUILD

OPTION  
**03**

## PWT + Hyd Rebuild

- CAT CERTIFIED REBUILD

OPTION  
**04**

## Hydraulic Rebuild

- CAT CERTIFIED REBUILD

OPTION  
**05**

## Machine Rebuild

- CAT CERTIFIED REBUILD

**IDENTIFY REBUILD  
TYPE AND LEVEL  
THAT MEETS THE  
CUSTOMER'S NEED**

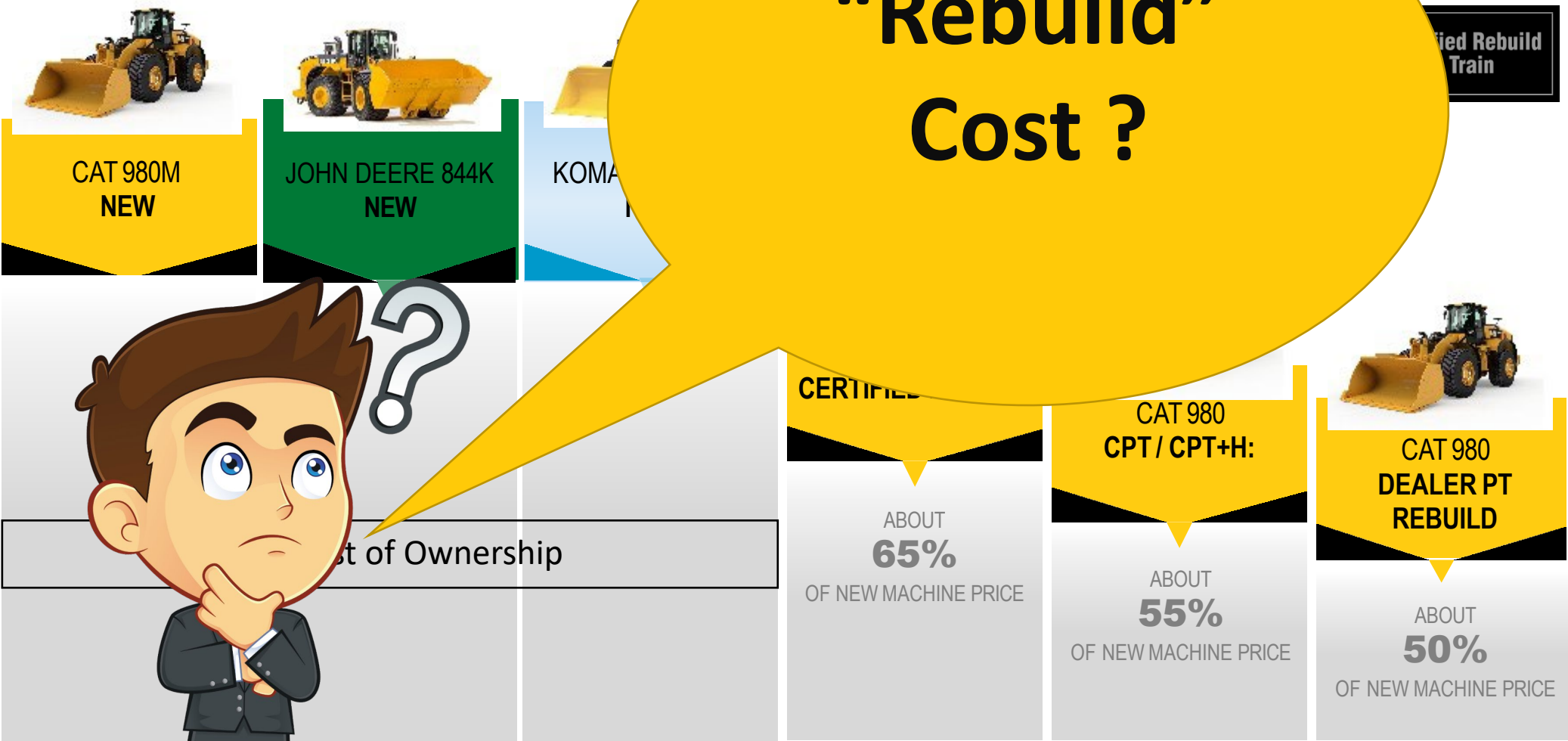
**“Rebuild”  
COST ?**





# Price Positioning / Customer Experience

Pricing Ladder Example



**“Rebuild”  
Cost ?**



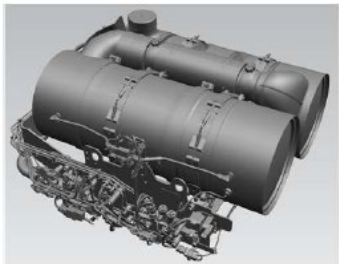
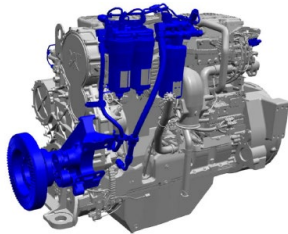


# REPOWER : WHAT TO CONSIDER ?

Bringing down machine emissions

For the customer:

- Bringing your machine up to the latest emissions standards
- Cat designed and certified solution
- Competitively priced in combination with rebuilt
- Enables work in areas with site requirements for strict emissions levels
- Most cost effective technology to comply with state and federal emissions requirements



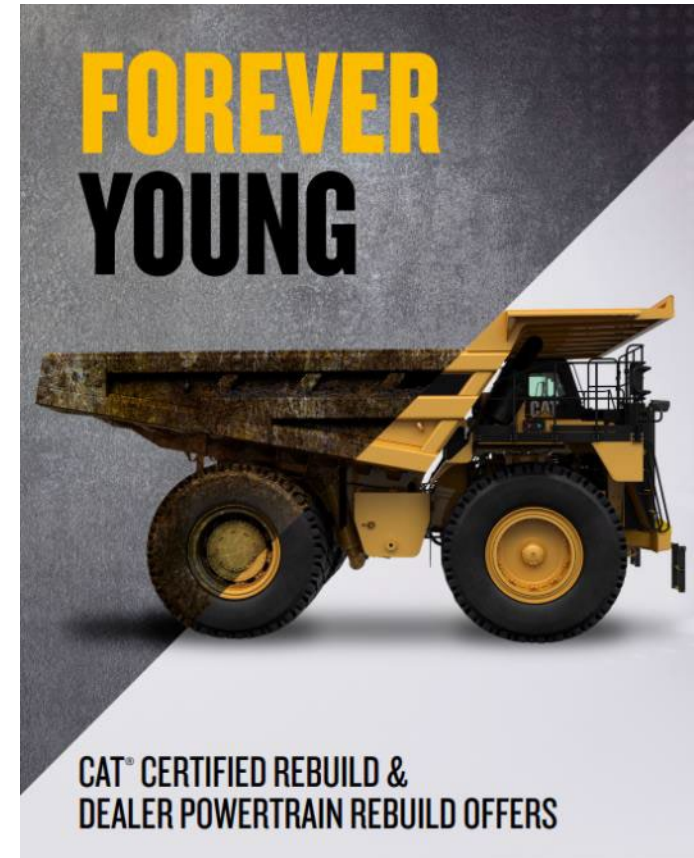
**What does  
this mean to  
me??**



# Caterpillar Certified Rebuild Solutions Summary



- Take advantage of your equipment's built-in Second Life
- Like-New Warranty on Parts
- Enhance your machine's efficiency
- Certified and warranted machine
- Subscription Level 3 contract included
- Mandatory updates
- Availability after 3 months
- Optional Engineering & Safety upgrades
- Extended Coverage Options
  - 3 Year 5,000 hours
  - 1 Year 6,000 hours
  - 2 Year 10,000 hours
  - Other terms available – up to 5 years
- Budget Flexibility
  - Capital Budget up to 65% new price
  - Repair & Maintenance Expense goes down
- Financing through Cat Finance






# Sustainability

Good for Business – Good for the Planet!

Less is more!

Through our Rebuild solutions we:

-  Recycled and returned more than 500,000 tons of end-of-life material to productive use
-  Re-use on average 65% of parts when rebuilding your machine
-  Minimize the need for raw materials and reduce energy consumption



## REBUILD FOR A SUSTAINABLE TOMORROW

With Caterpillar, you don't have to give up on your current equipment to stay productive. We design our machines for not just one – but for multiple lives.

We focus on developing solutions to optimize our use of resources, maximize the total life cycle value of our products, and minimize the cost of ownership for you.

IT'S GOOD FOR YOUR BUSINESS...	...AND GOOD FOR THE PLANET
With our Rebuild solutions, you will:	Through our Rebuild solutions, we:
 Enhance your machine's efficiency	 Recycled and returned more than 500,000 tons of end-of-life materials to productive use
 Upgrade the features of your machine to increase productivity	 Re-use on average 65% of the parts when rebuilding your machine(s) thus reducing CO <sub>2</sub> emissions* <small>*CO<sub>2</sub> emissions associated with manufacturing processes of rebuilt vs. new machine</small>
 Benefit from a lower cost compared to buying a new machine	 Minimize the need for raw materials and reduce energy consumption

 **THINK LONG TERM. THINK REBUILD.**

Give your machine a second life – Cat® Rebuilds will keep your machine productive while contributing to sustainable development.

Do something good for your machine – and for the planet. Choose Rebuild now!

 We will help you find the right Rebuild solution for you. Call your Cat local dealer at +XXXXXXXXXX to know more! Learn more on (insert dealer website)	<name of local parts counter advisor> <local website> <local phone number> <local email>
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# Renewable Fuels

- HVO (Hydrotreated Vegetable Oil)

- Are made from various vegetable oils, animal fats or used cooking oils.
- Can be used as a direct replacement in Cat engines. Comply with EN15940
- Can power diesel engines while reducing the carbon intensity of the engine.
- At 100%, HVO reduces Greenhouse Gas Emissions (GHG) by 45 to 85% on a well to tank basis
- Lowers particulate matter emissions by over 30%
- Reduces emissions of carbon monoxide by over 10%
- HVO may reduce nitrogen oxide emissions.
- Emissions reductions effects vary per engine .

## BIODIESEL AND RENEWABLE DIESEL USED IN CAT® MACHINES

**DID YOU KNOW THAT YOUR CAT® MACHINE CAN RUN ON BIO-FUELS?**  
Biodiesel can be used in Cat® engines at various blend levels and has been used for over twenty years. Successful use is based on understanding the fuel quality and managing storage and handling appropriately. Biodiesel fuels must comply with industry and/or Caterpillar specifications, as minimum requirements to ensure successful use.

**What is Biodiesel and Renewable Diesel?**

Biodiesel and Renewable Diesel or Hydrotreated Vegetable Oil (HVO) are renewable fuels that can power diesel engines while reducing the carbon intensity of the engine. Both fuels can be used in engines with no or minimal conversion process.

Biodiesel and Renewable Diesel (HVO) are made from various vegetable oils, animal fats or used cooking oils. Processing of these feedstocks is different for biodiesel than for HVO resulting for fuels that are readily combustible in diesel engines but of different chemistries. Either fuel can be used at 100 percent (with some limitations for biodiesel) or blended with diesel at various blend levels.

Biodiesel environmental impacts:	Renewable Diesel HVO environmental impacts:
<ul style="list-style-type: none"><li>• At B100, biodiesel reduce Greenhouse Gas Emissions (GHG) by 45 to 85% on a well to tank basis</li><li>• Lowers particulate matter emissions by over 40%. Reduces emissions of hydrocarbon by over 60%</li><li>• Reduces CO, Polycyclic aromatic hydrocarbons and other emission. Emissions Reduction effects vary per engine duty cycle.</li></ul>	<ul style="list-style-type: none"><li>• At 100%, HVO reduces GHG by 45 to 85% on a well to tank basis</li><li>• Lowers particulate matter emissions by over 30%</li><li>• Reduces emissions of carbon monoxide by over 10%</li><li>• HVO may reduce nitrogen oxide emissions. Emissions reductions effects vary per engine duty cycle.</li></ul>

**⚠️**

- **HVO:** Can be used as replacement for Diesel. Fuel must comply with specification EN 15940.
- **B100:** Can be used as replacement for Diesel under certain conditions. Fuel must comply with ASTM D6751; EN 14214 and Cat specifications and managed appropriately.

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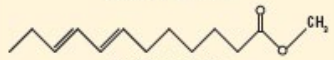
Bergerat Monnoyeur

# Renewable Fuels

## • B100 Bio diesel

- Can be used in the majority of Stage III engines
- B5 – B20 –B100 ( mixing levels)
- 7% to 10% Reduction in power
- Fuel lines may need to be changed
- Not available for DPF engines
- Possible issues: elastomers used in older engines (early 1990) (Can be updated during a CMCR, if not already done)
- Rebuild + Specific CVA available


**B100 Biodiesel & HVO Renewable Diesel use:**

	Biodiesel (FAME)	Hydrotreated Vegetable Oil (HVO) (Renewable Diesel)
<b>Source</b>	Vegetable oils and fats	Vegetable oils and fats
<b>Process</b>	Transesterification	Hydrotreating
<b>Chemistry</b>	Oxygenated, ester  Fatty Acid Methyl Ester	Non-oxygenated, paraffin <b>n - Paraffin</b> $\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$ <i>n - Decane</i> $\text{C}_{10}\text{H}_{22}$
<b>Replacement for diesel?</b>	Yes, with some cautions	Yes
<b>Specifications</b>	ASTM D6751, EN 14214, Cat Spec	EN 15940*


\*: HVO is per diesel specifications except for density.

Biodiesel has lower energy content than diesel fuel due to its oxygen content. Typically, the loss of power output is measurable and can reach 8% at B100.


**Lessons from successful usage of biodiesel including high blend levels**




Quality control of the fuel – Per spec fuels




Tank/storage management – temperature control, water ingress prevention and age control




Filter plugging and Cloud point management



Management of oil drain intervals – implement an oil testing program for blends higher than B20




Understanding impact on power output: higher blends result in reduced engine power output




Materials compatibility – use appropriate hoses and elastomers materials

Guidance and details of operational recommendations are provided in Caterpillar publications.


**Biodiesel**  
Most common blends:




**B5** 5% biodiesel + 95% diesel fuel (by volume). Any diesel fuel and in Europe can be B5. This is considered drop-in replacement for diesel in any Cat engine. B5 is per typical diesel fuel specifications.




**B20** 20% biodiesel + 80% diesel fuel. This is a common blend level and majority of Caterpillar engines can run successfully on per-spec B20 that is managed appropriately.



**B100** 100% Biodiesel. This is applicable in some Cat engines that are Tier III or prior. B100 has to be per specifications and has to be managed for aging and other aspects to ensure successful application in engines.



**HVO fuels can be used at 100% or as blend levels.**



**Biodiesel and HVO can be mixed, together and with diesel.**





THANK YOU



Do something good for your machine - and for the planet

CHOOSE REBUILD NOW