



**BU Drive**  
the concept company 

**apra**  
automotive parts  
remanufacturers association

**Welcome!**





**BU Drive** 

# **Remanufacturing Turbochargers**

**Clemens Ortgies**

Budapest, 26<sup>th</sup> of April 2010

### BU GROUP

#### BU Drive

- ▶ Concept Solutions on Powertrain Applications for the Aftermarket
- ▶ Remanufacturing, Distribution, Product Support
- ▶ OE-Warranty Management
- ▶ Engines, Transmissions, Turbochargers, Injection Systems

#### BU Power Systems

- ▶ Distributor & Service Provider for PERKINS ENGINES COMPANY Ltd.
- ▶ Engines Sales
- ▶ Product Support Parts
- ▶ Product Support Service
- ▶ PECL Warranty Management

## Products

- **Engines**  
(short blocks, long blocks, complete engines)
  - PC engines
  - LCV engines
  - CV engines
  - Locomotive engines
  - Industrial engines
  - Gas engines
  - Stationary engines up to 5,000 kW power
- **Parts / Components**
  - Turbochargers
  - Injection Systems
  - Cylinderheads
  - PC transmissions

## Services

- Exchange remanufacturing
- Regenerative remanufacturing
- Warranty management
- IBOX added value services
- IMOT customized product portfolios
- Business concepts
- Aftermarket consulting
- Applied engineering

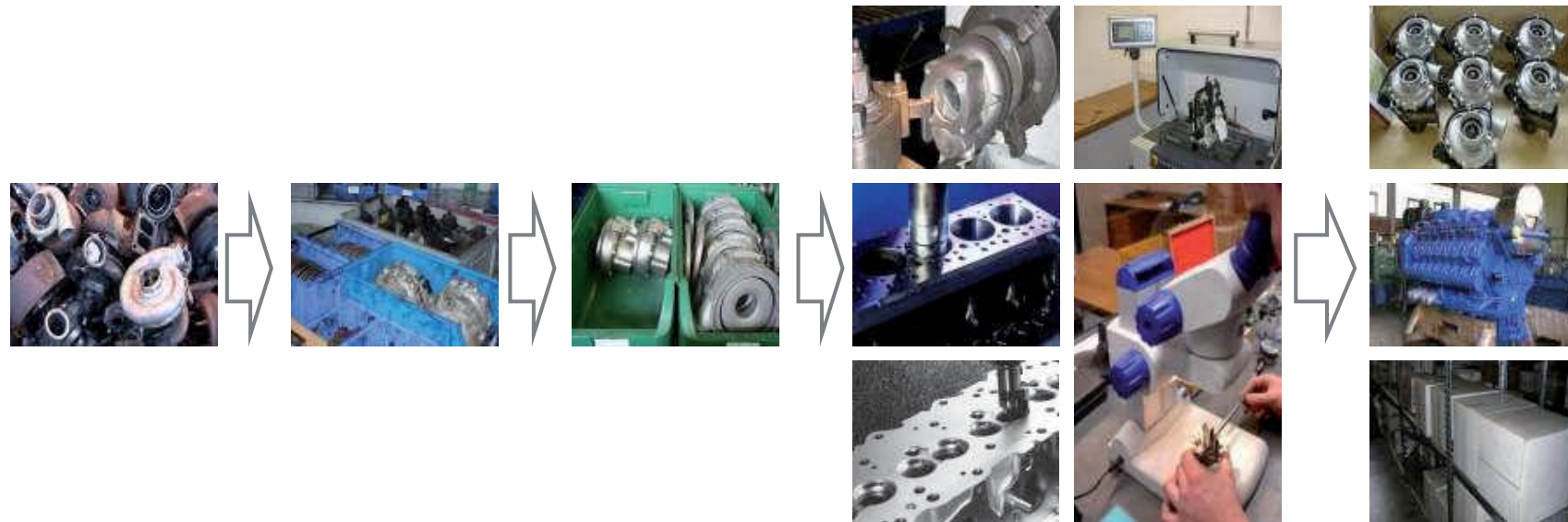
## Brands



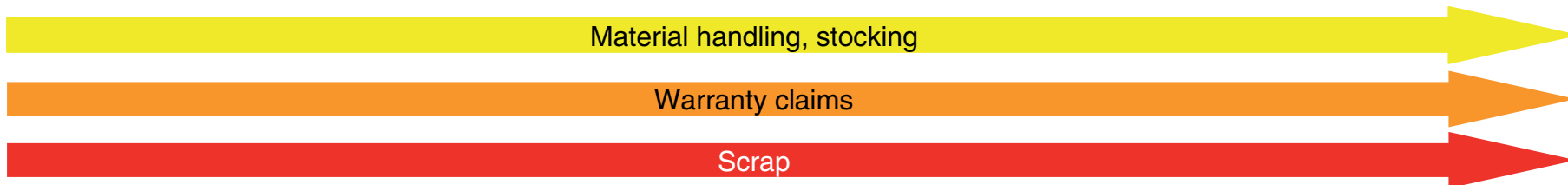


# BU DRIVE Turbo Systems

## Turbocharger Remanufacturing



Cores	Phase blue	Phase green	Phase grey	Phase white
<ul style="list-style-type: none"> <li>• Visual check</li> </ul>	<ul style="list-style-type: none"> <li>• Disassembly</li> <li>• Check</li> <li>• Status: not cleaned</li> </ul>	<ul style="list-style-type: none"> <li>• Cleaning</li> <li>• Check</li> <li>• Status: not machined</li> </ul>	<ul style="list-style-type: none"> <li>• Remanufacturing</li> <li>• 100% check</li> <li>• Status: still disassembled</li> </ul>	<ul style="list-style-type: none"> <li>• Assembly</li> <li>• 100% check</li> <li>• Logistic to the customer</li> </ul>



### Return of old cores



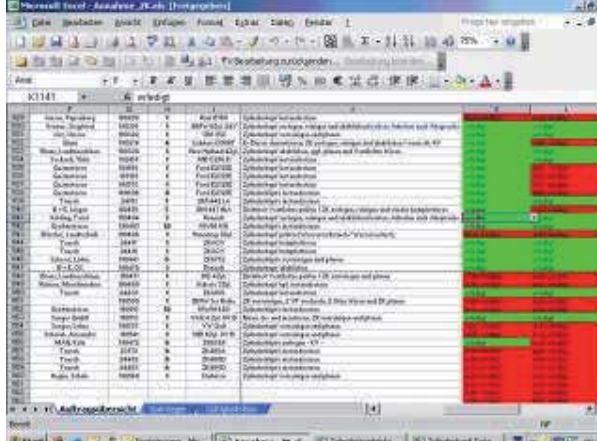
- Returned from the market
- Sorted by Partnumber
- First check for useability
- Approx. 30% will go to stock



### Start: Production Planning



- Initiative: Sales demand
- Start of production planning via Navision PPS tool

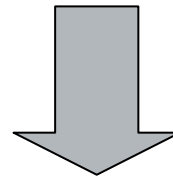


Line	Part	QTY	Unit	Description	Status
101	101000	1	PC	101000	Green
102	102000	1	PC	102000	Green
103	103000	1	PC	103000	Green
104	104000	1	PC	104000	Green
105	105000	1	PC	105000	Green
106	106000	1	PC	106000	Green
107	107000	1	PC	107000	Green
108	108000	1	PC	108000	Green
109	109000	1	PC	109000	Green
110	110000	1	PC	110000	Green
111	111000	1	PC	111000	Green
112	112000	1	PC	112000	Green
113	113000	1	PC	113000	Green
114	114000	1	PC	114000	Green
115	115000	1	PC	115000	Green
116	116000	1	PC	116000	Green
117	117000	1	PC	117000	Green
118	118000	1	PC	118000	Green
119	119000	1	PC	119000	Green
120	120000	1	PC	120000	Green
121	121000	1	PC	121000	Green
122	122000	1	PC	122000	Green
123	123000	1	PC	123000	Green
124	124000	1	PC	124000	Green
125	125000	1	PC	125000	Green
126	126000	1	PC	126000	Green
127	127000	1	PC	127000	Green
128	128000	1	PC	128000	Green
129	129000	1	PC	129000	Green
130	130000	1	PC	130000	Green
131	131000	1	PC	131000	Green
132	132000	1	PC	132000	Green
133	133000	1	PC	133000	Green
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137	137000	1	PC	137000	Green
138	138000	1	PC	138000	Green
139	139000	1	PC	139000	Green
140	140000	1	PC	140000	Green
141	141000	1	PC	141000	Green
142	142000	1	PC	142000	Green
143	143000	1	PC	143000	Green
144	144000	1	PC	144000	Green
145	145000	1	PC	145000	Green
146	146000	1	PC	146000	Green
147	147000	1	PC	147000	Green
148	148000	1	PC	148000	Green
149	149000	1	PC	149000	Green
150	150000	1	PC	150000	Green
151	151000	1	PC	151000	Green
152	152000	1	PC	152000	Green
153	153000	1	PC	153000	Green
154	154000	1	PC	154000	Green
155	155000	1	PC	155000	Green
156	156000	1	PC	156000	Green
157	157000	1	PC	157000	Green
158	158000	1	PC	158000	Green
159	159000	1	PC	159000	Green
160	160000	1	PC	160000	Green
161	161000	1	PC	161000	Green
162	162000	1	PC	162000	Green
163	163000	1	PC	163000	Green
164	164000	1	PC	164000	Green
165	165000	1	PC	165000	Green
166	166000	1	PC	166000	Green
167	167000	1	PC	167000	Green
168	168000	1	PC	168000	Green
169	169000	1	PC	169000	Green
170	170000	1	PC	170000	Green
171	171000	1	PC	171000	Green
172	172000	1	PC	172000	Green
173	173000	1	PC	173000	Green
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179	179000	1	PC	179000	Green
180	180000	1	PC	180000	Green
181	181000	1	PC	181000	Green
182	182000	1	PC	182000	Green
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194	194000	1	PC	194000	Green
195	195000	1	PC	195000	Green
196	196000	1	PC	196000	Green
197	197000	1	PC	197000	Green
198	198000	1	PC	198000	Green
199	199000	1	PC	199000	Green
200	200000	1	PC	200000	Green

### Phase Blue: Dismantling



- Initial check for useability of the single components
- Confirmation to the PPS system upon completion of phase blue



- One partnumber per charge
- Charges of 10-20 units



**confirmation**

### Phase Green: Cleaning



- Standard mechanical cleaning
- Smooth material saving chemical cleaning

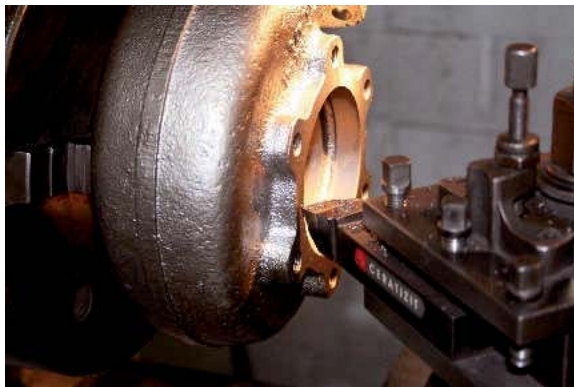


- Further check of useability
- Not accepted parts will be replaced by new parts
- Confirmation to the PPS system upon completion of phase blue



confirmation

### Phase Grey: Machining and Final Cleaning



- **Housings:  
remanufacturing of threads  
and flanges**



- **Additional ultrasonic  
cleaning after machining**



**confirmation**

### Phase Grey: Machining → 100% Inspection

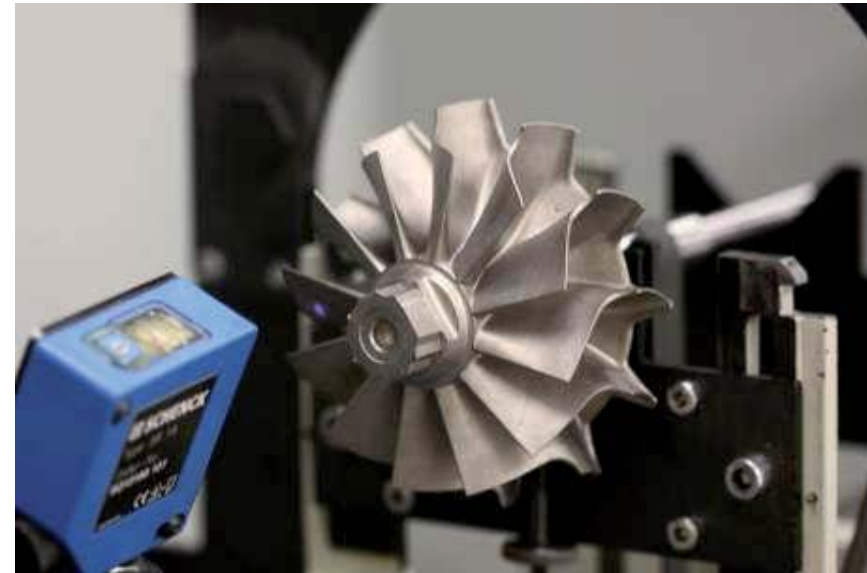


- Based on data supplied by OE manufacturers
- Inspection results stored in our data base



**confirmation**

### Phase Grey: Machining → Balancing Step 1 (Rotor System)

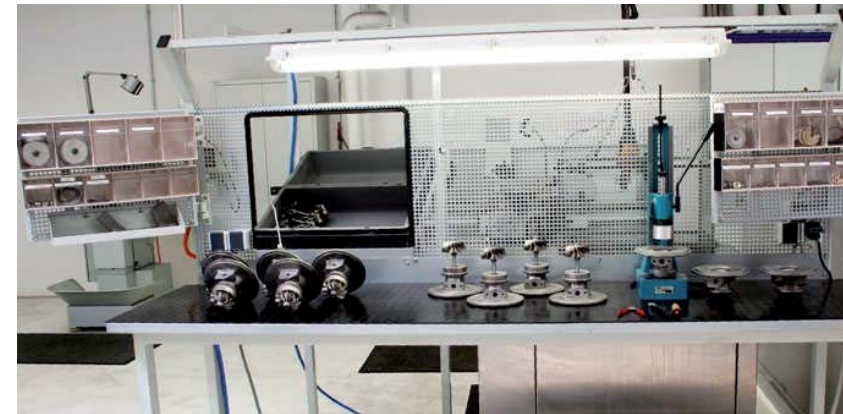


- **Latest balancing technology**
- **Based on OE data**
- **100% testing**
- **Results filed in PPS data base**



**confirmation**

Phase White: Assembly → Step 1: Cartridge



- OE spare parts only (repair kits)
- Following OE manufacturing data



confirmation





### Phase White: Assembly → Step 2: Completion



- **Following OE data**
- **Torques etc. filed in PPS data base**



**confirmation**

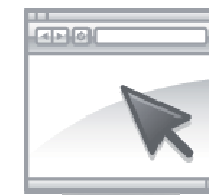


### Phase White: Assembly



- ✓ Standard warranty
- ✓ No remanufacturing of Garrett VNT turbochargers
- ✓ Nameplate:

Turbo Systems Böcker & Esling	
<input type="text"/>	<input type="text"/>
Ausf.-Nr.:	
Ser.-Nr.:	
BU-Nr.:	



**confirmation**

# BU DRIVE Turbo Systems

## *Turbocharger Remanufacturing*

 **Modules in stock**



 **Complete turbochargers  
in stock**



**confirmation**

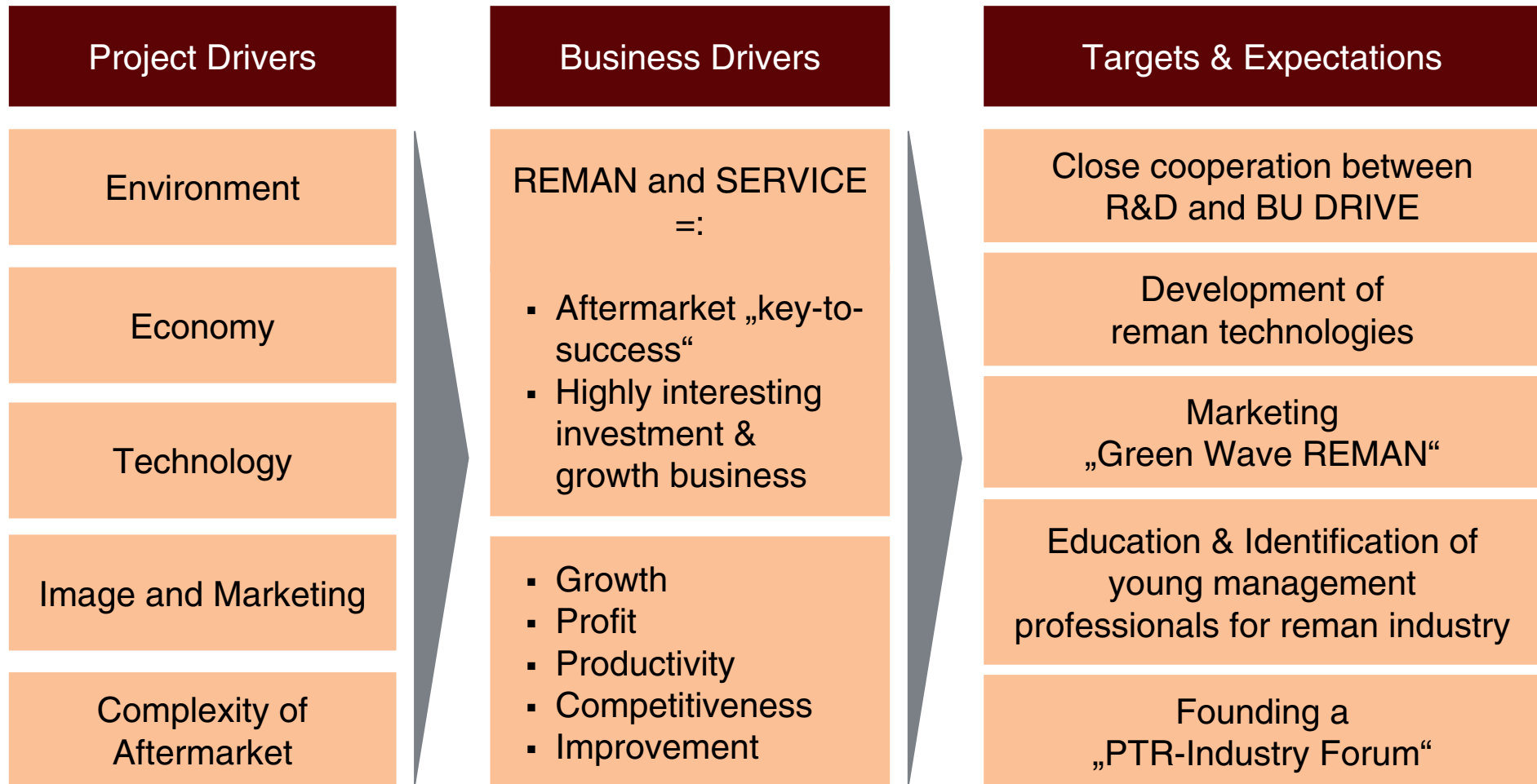
## Cooperation BU Drive & Fraunhofer-Projektgruppe Prozessinnovation an der Universität Bayreuth



# PTR – Powertrain Remanufacturing

# PTR – Powertrain Reman Projekt

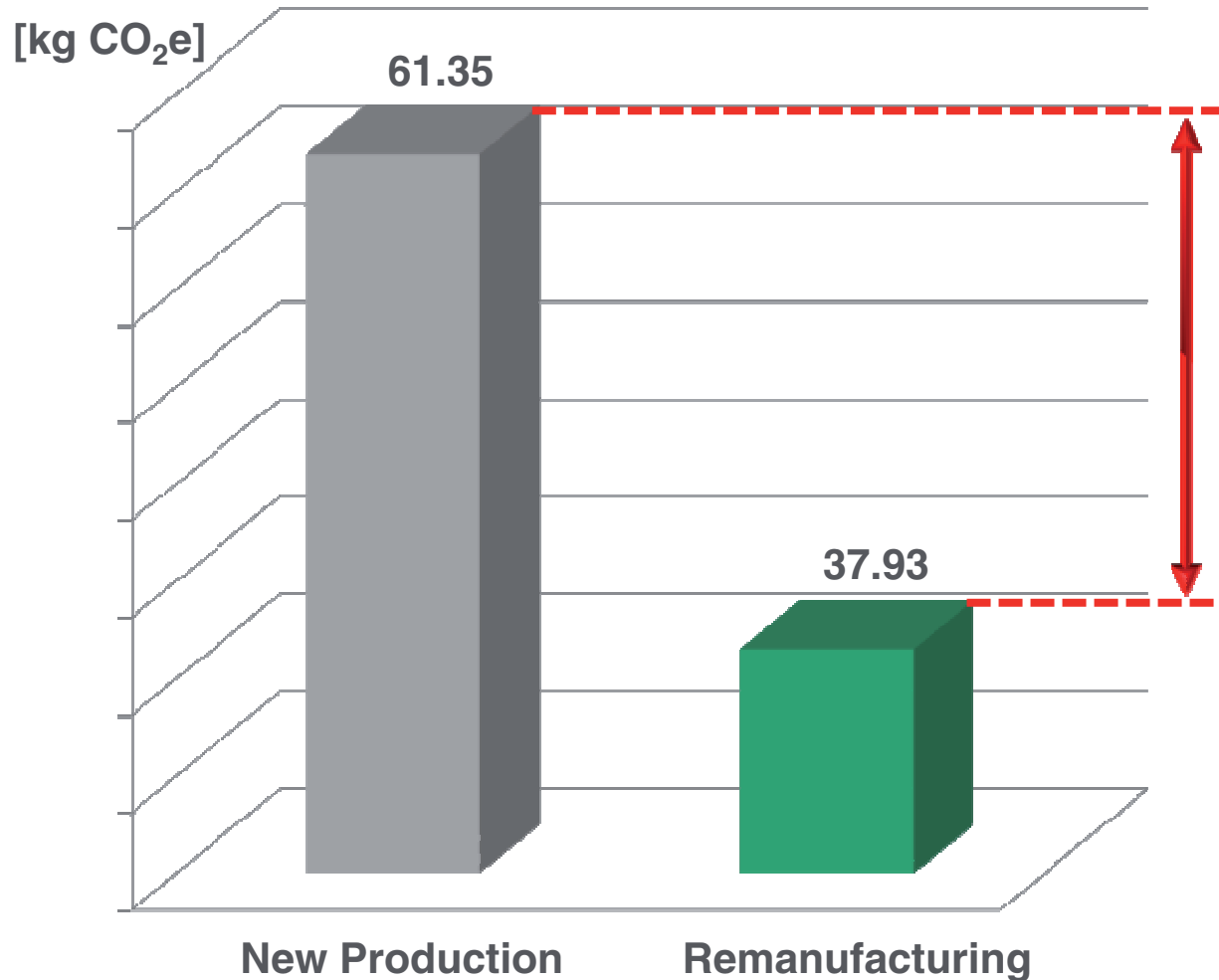
## Project - Drivers & Targets



# PTR – Powertrain Reman Projekt

## Green Wave Reman – Eco Balance Turbocharger

© BU Drive 2009  
 Source: Project PTR  
 BU Drive  
 Dr. Bucker  
 Prof. Steinhilper  
 Mr. Köhler



Turbocharger BorgWarner Turbosystems  
 316699 (Application Daimler Actros)

**Savings per  
 Exchange Turbo =  
 23.42 kg CO<sub>2</sub>e**

Software / Program: SimaPro V.7  
 Methode: IPCC 2001 GWP 100a  
 Methode version: V 1.04  
 Date: 12.10.2009  
 Systeme: compare total systeme



BU Drive 

**Thank you!**