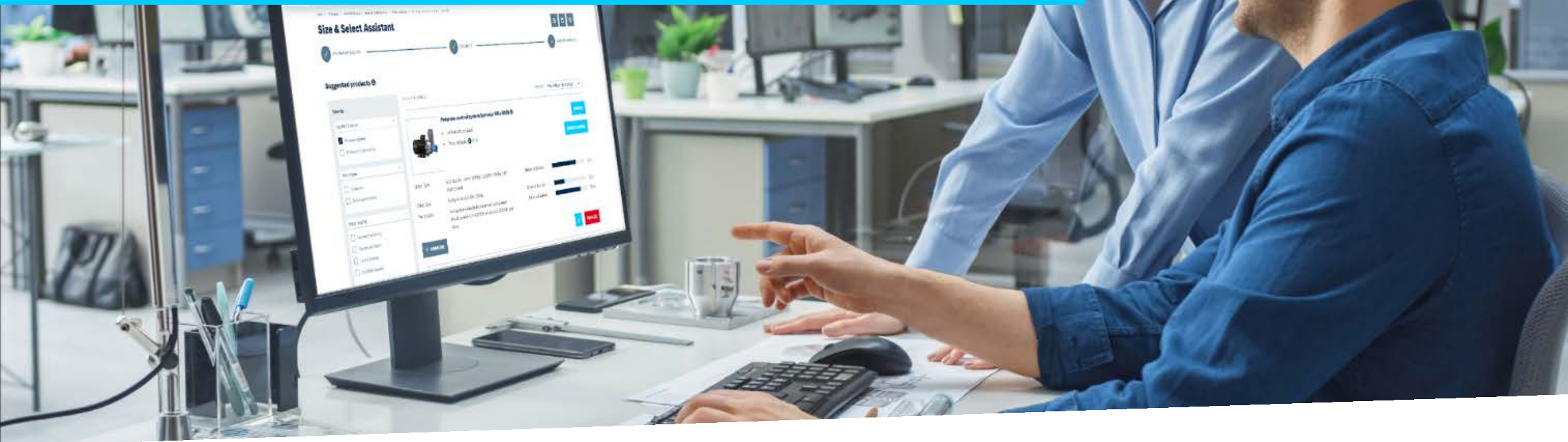


# Bosch Rexroth Web-Seminar

## „Variable-speed pump drives: CO<sub>2</sub> savings in just a few steps!“





# CO<sub>2</sub> Reduction Through Energy Saving

## Possible Countermeasures

- **Decomposition of CO<sub>2</sub>**

Per year, a beech tree binds approx. 12.5 kilograms of CO<sub>2</sub>. So you would have to plant **80 trees to compensate for one ton of CO<sub>2</sub> each year** with trees.

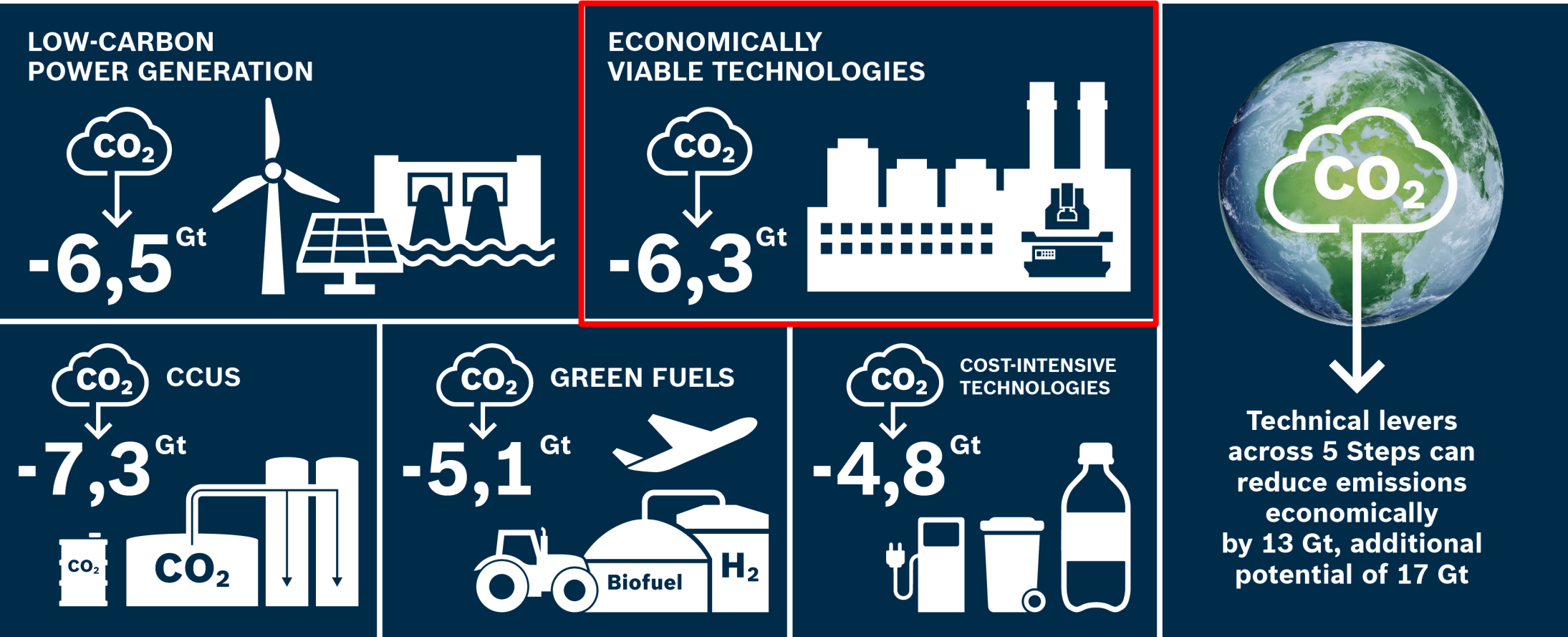


- **Reduction of CO<sub>2</sub>**

- Modernization of existing systems with energy-on-demand drives
- EU: Introduction of CO<sub>2</sub> tax: 2021: € 25/ t CO<sub>2</sub>, increased by € 5 per year
- Fuel, Energy, Gas price increase
- Funding for energy efficiency in the economy

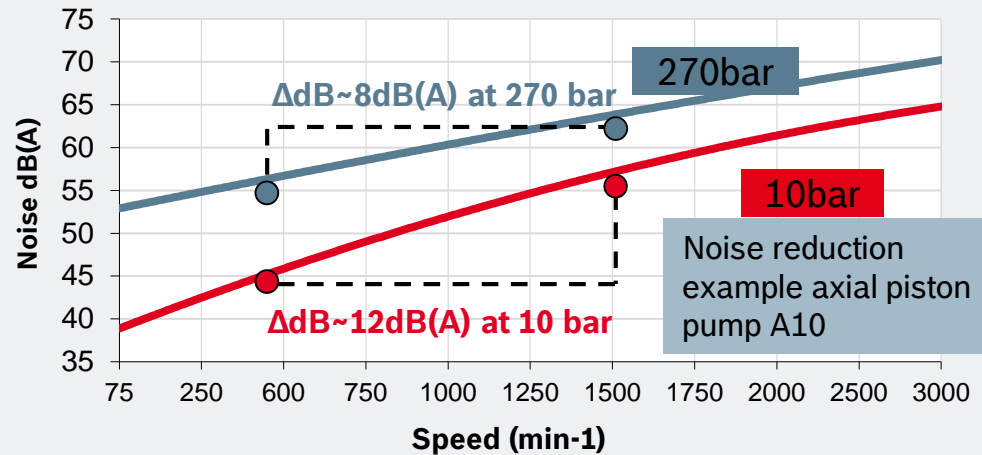
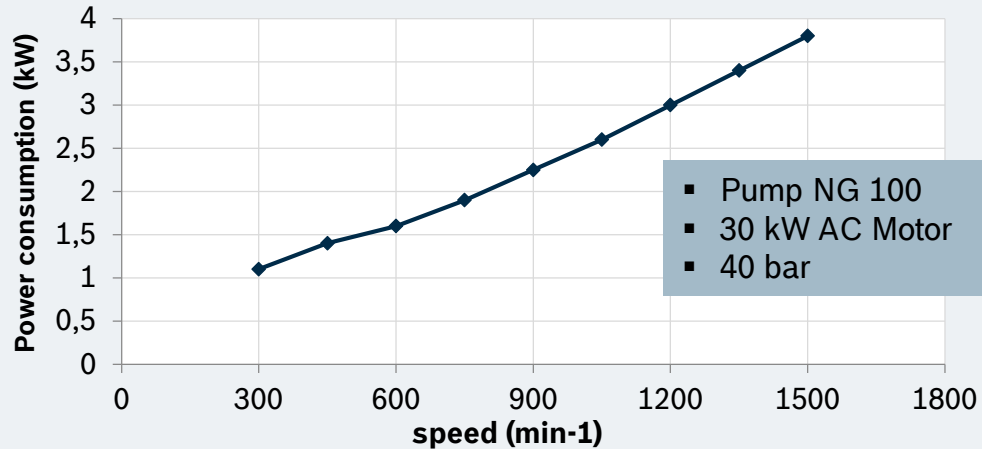
# Connected Hydraulics - Sustainability

## Potential in industry



# System Overview

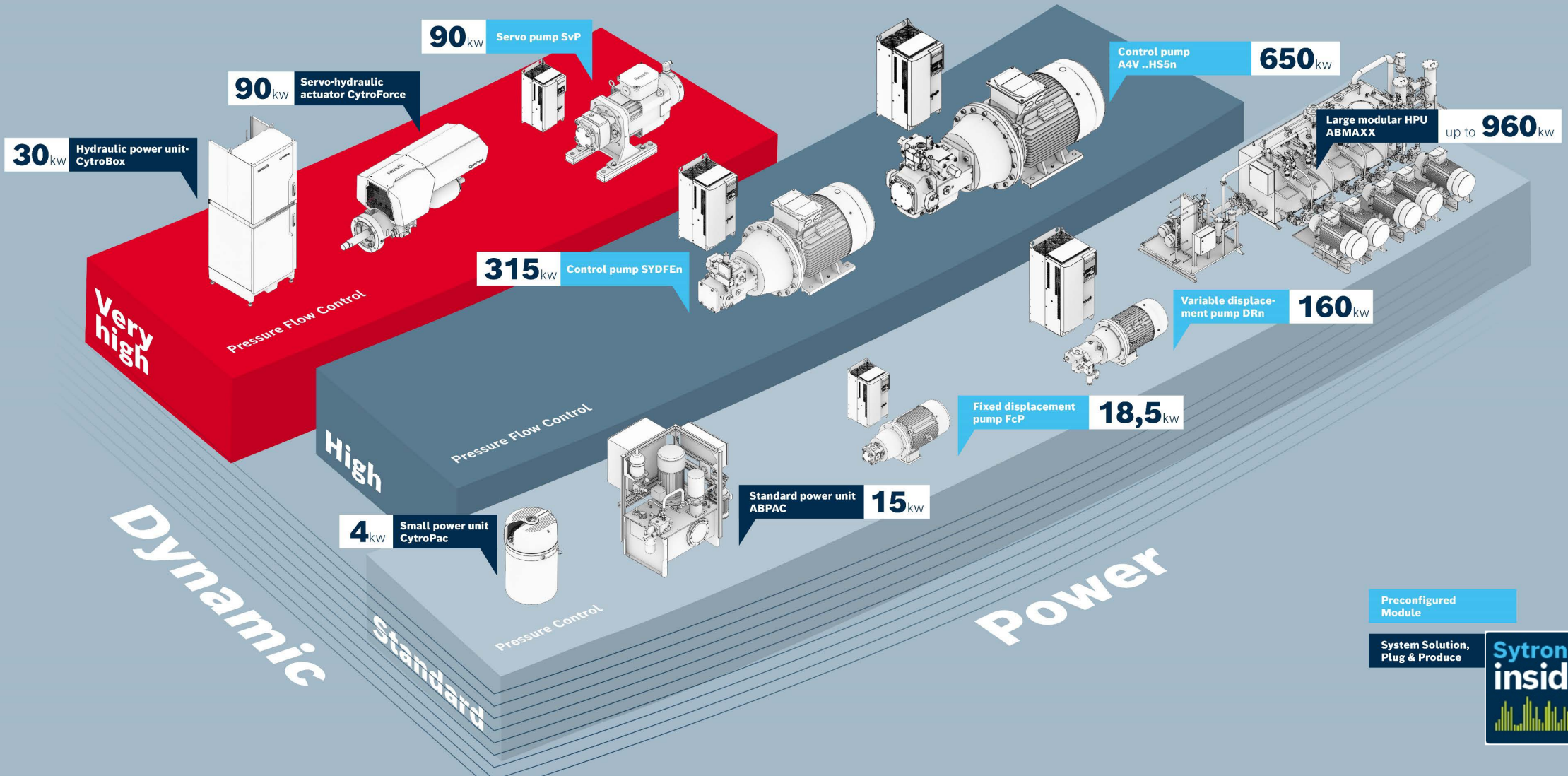
## Advantage of Variable-Speed Pump Drives



- **Reduced cost of noise isolation**  
→ Easier integration into machine without secondary noise reduction measures
- **Higher system availability**
  - through reduced wear of components and oil
  - through condition monitoring and diagnostic functionality.
- **Cost savings for cooling**  
Significantly less heating by lowering the average pump drive speed according to the reduced energy consumption → Reduced effort to cool down the HPU
- **Reduced total cost of ownership**  
Reduced energy consumption in part-load operation  
→ **Reduced energy costs, lower carbon footprint**

# Variable-Speed Pump Drives

Preconfigured modules and complete system solutions



# Variable-Speed Pump Drives - Sytronix

## Product overview



FcP5020



SvP7020



SvP5020



DRn5020



SY(H)DFEDn

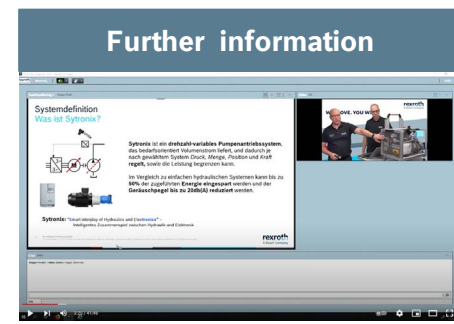


HS5n



HS5En  
(Prototyp)

The **Size&Select Assistant** considers **all products** of the **Sytronix** family and determines the **best matches** according to the filtering



# Variable-Speed Pump Drives - Sytronix Size & Select Assistant (SSA)



**Product overview - Industrial Hydraulics**

Pumps, Motors, Cylinders, On/off valves, Proportional, high-pressure and servo valves, Manifolds and plates, Electronics, Pump systems

**Tools and Configurators**

**Shorter time to market**

Our engineering tools and configurators assist you in the selection, engineering and ordering of standard products, customized variants and systems.

**Engineering Tools**

Schematic editor, hydraulic circuit editor, 3D CAD, 2D CAD, Simulation

**Configurators and selection guides (19)**

CybroBox, CybroPac, HSR, Size&Select

**Size & Select Assistant**

Application selection: Machine tools, Plastic machinery, Presses, Metallurgy, Free input

Data editor - Machine tools

Profile Data: Total line of useful oil, Maximum pressure (bar), Average pressure (bar), Maximum flow rate (l/min), Average flow rate (l/min), Maximum hydraulic power (kW), Average hydraulic power (kW)

No.	Phase name	Pressure [bar]	Flow rate [l/min]	Duration [s]
1	Acceleration	0.0 - 100.0	0.0 - 0.0	0.0
2	Open clamping unit rapidly	100.0	0.0 - 1.0	0.0
3	Acceleration	0.0 - 1.0	0.0 - 1.0	0.0
4	Open clamping unit rapidly	100.0	0.0 - 1.0	0.0
5	Acceleration	0.0 - 1.0	0.0 - 1.0	0.0
6	Hold	100.0	0.0 - 1.0	0.0
7	Acceleration	0.0 - 1.0	0.0 - 1.0	0.0
8	Turn motor	100.0	0.0 - 1.0	0.0
9	Acceleration	0.0 - 1.0	0.0 - 1.0	0.0
10	Hold	100.0	0.0 - 1.0	0.0
11	Hold	100.0	0.0 - 1.0	0.0

**Pressure control system Sytronix DRn 5020**

- Without accumulator
- Price indicator € €

Motor utilization: 52%  
Drive utilization: 20%  
Pump utilization: 37%

Buttons: COMPARE, ENERGY SAVINGS, FINALIZE

**rexroth**  
A Bosch Company

Sytronix

Configuration: Configuration selected, Material selection

System Properties: System configuration, Accessories, Pump type, Pressure control, Motor type, Motor power

Component: Accumulator Storage Full on, Hydraulic Storage Full on, Hydraulic Storage

ID Erweiterung: 1031 ✓  
Antriebszubehör: Öltemperatursensoren ✓  
Druckmessumformer: HMDD 250 ✓

Sie haben Ihre Konfiguration erfolgreich abgeschlossen.  
Bruttopreis: [ ]

Buttons: Dokumentation, In den Warenkorb, Produktbeschreibung, CAD anfordern, Komponentenliste

1 Search:  
Start on website

2 Size&Select:  
based on p/Q load cycle

3 Configure:  
Final generation of variant

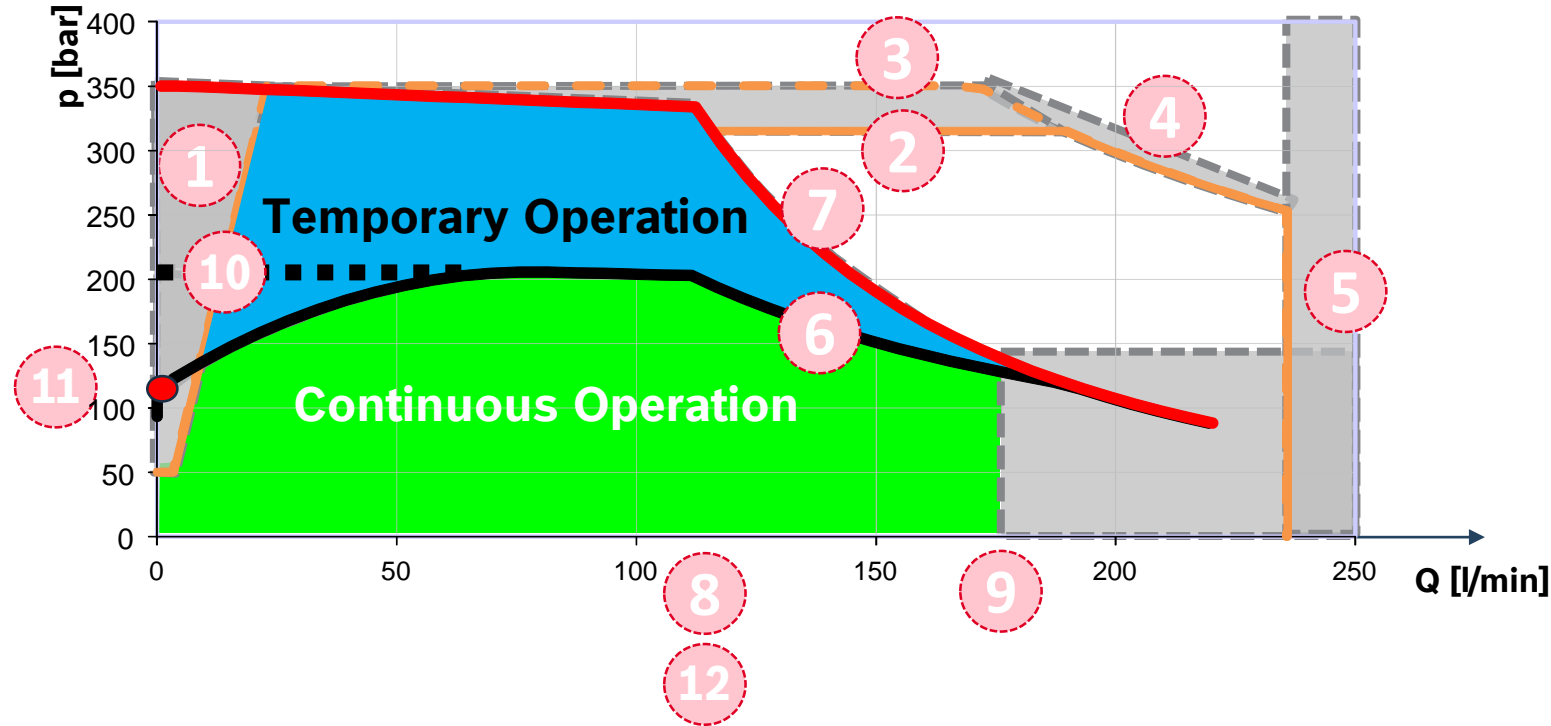


# Size & Select Assistant

## Check of system limits

**Example:**  
 80 cc pump  
 45 kW motor  
 45 kW EFC

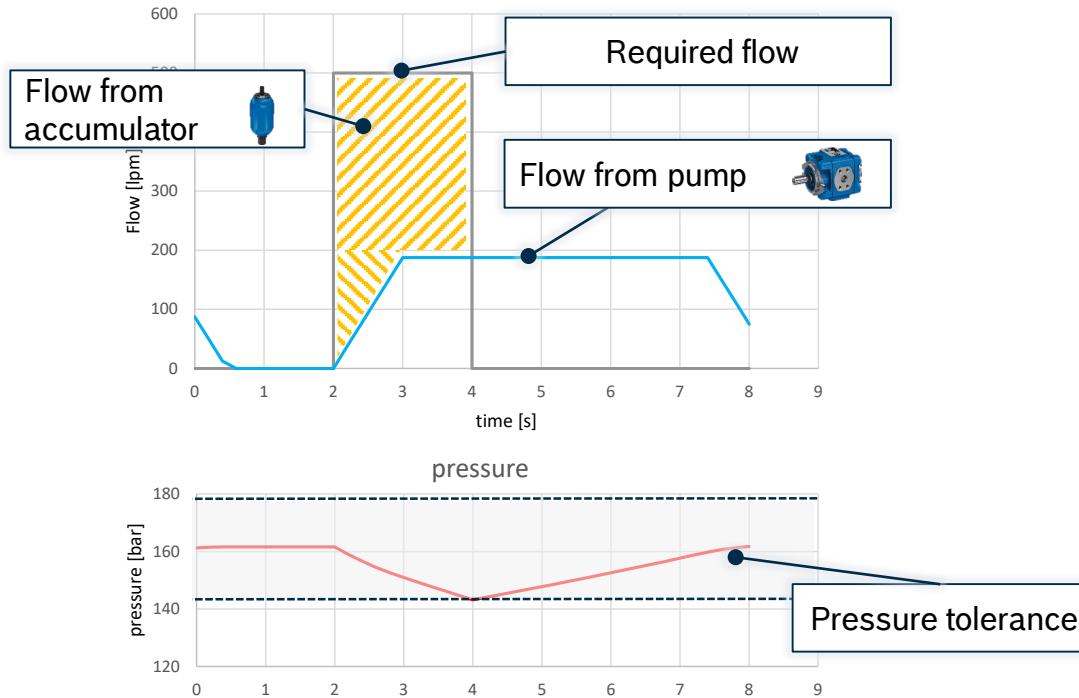
- ✓ 1 Minimum Speed
- ✓ 2 Continuous pump pressure
- ✓ 3 Pump Pressure – short term operation
- ✓ 4 Power limitation pump
- ✓ 5 Maximum pump flow rate / speed
- ✓ 6 Continuous torque
- ✓ 7 Max. Torque
- ✓ 8 Field weakening area
- ✓ 9 Dynamics
- ✓ 10 Motor
- ✓ 11 Continuous stand still torque
- ✓ 12 Corner frequency



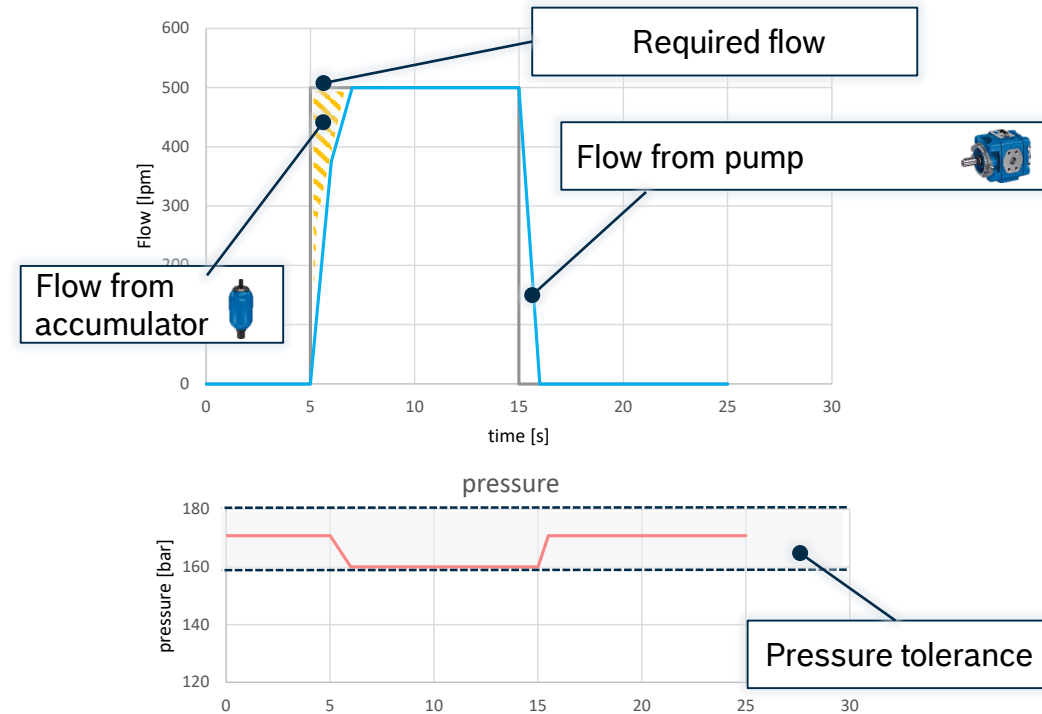
# Size & Select Assistant

## Accumulator sizing

**Use Case #1:** Down-sizing motor/pump by reducing the max. required volume flow of the pump



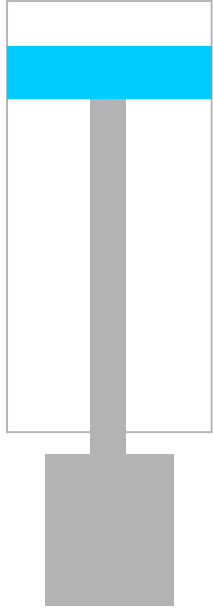
**Use Case #2:** Reduction of pressure drops during acceleration phases



The Size & Select Assistant optimizes the accumulator size depending on the lowest component costs

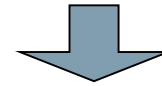
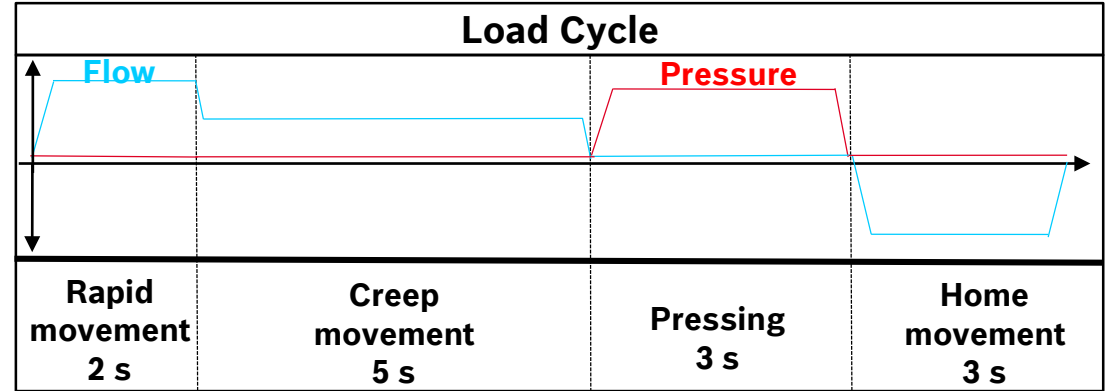
# Size & Select Assistant

## Application example (Simplified press cycle)



p/Q demand

Phase name



Phase name	Pressure [bar]	Flow [l/min]	Duration [s]
Rapid movement	30	200	2
Creep movement	30	80	5
Pressing	250	5	3
Home movement	30	230	3



# Industrial Hydraulics & CO2 Emissionen

## Automotive blow molding machine

### Original drive solution

Hydraulics: 3 fixed displacement pumps, pressure regulating valve, 2 control manifolds

Operating process: 57.600 kWh/a  
Ancillary process (cooling): 136.800 kWh/a  
Energy consumption: 194.400 kWh/a



### Rexroth 4EE automation solution

- 2 variable speed motors with 3 pumps
- Optimized operational process with cycle time reduction
- High-efficiency synchronous motors and optimized internal gear pump

Operating process: 72.000 kWh/a  
Ancillary process (cooling): 14.400 kWh/a  
Energy consumption: 86.400 kWh/a



# -56%



**Return On Investment:** 2 years



**Energy Savings:** 108.000 kWh/a



**Monetary Savings:** 15.120 €/a \*\*



**CO<sub>2</sub> elimination\*:** 66,2 t/a

\* Energy mix, Germany pursuant to GEMIS Version 4.2 in reference year 2004: 0.613 kg CO<sub>2</sub>/kWh


\*\* Electricity rate: EUR 0.14/kWh incl. 3.592 ct./kWh Renewable Energy Law contribution, 24 hours/day, 250 days/year

# Industrial Hydraulics & CO2 Emissionen

## Plastics press optimization


### Original drive solution

Hydraulics – fixed displacement pump,  
pressure regulating valve, 2 control manifolds

	<b>Operating process</b>	<b>67.000 kWh/a</b>
	<b>Ancillary process (cooling):</b>	<b>45.000 kWh/a</b>
	<b>Energy consumption:</b>	<b>112.000 kWh/a</b>

### Rexroth 4EE automation solution

- Variable-speed pump
- Energy recovery via drive amplifier
- High-efficiency synchronous motors

	<b>Operating process:</b>	<b>17.700 kWh/a</b>
	<b>Ancillary process (cooling):</b>	<b>7.300 kWh/a</b>
	<b>Energy consumption:</b>	<b>25.000 kWh/a</b>

**78%**



**Energy Savings: 87.000 kWh/a**



**Monetary Savings: 12.180 €/a \*\***

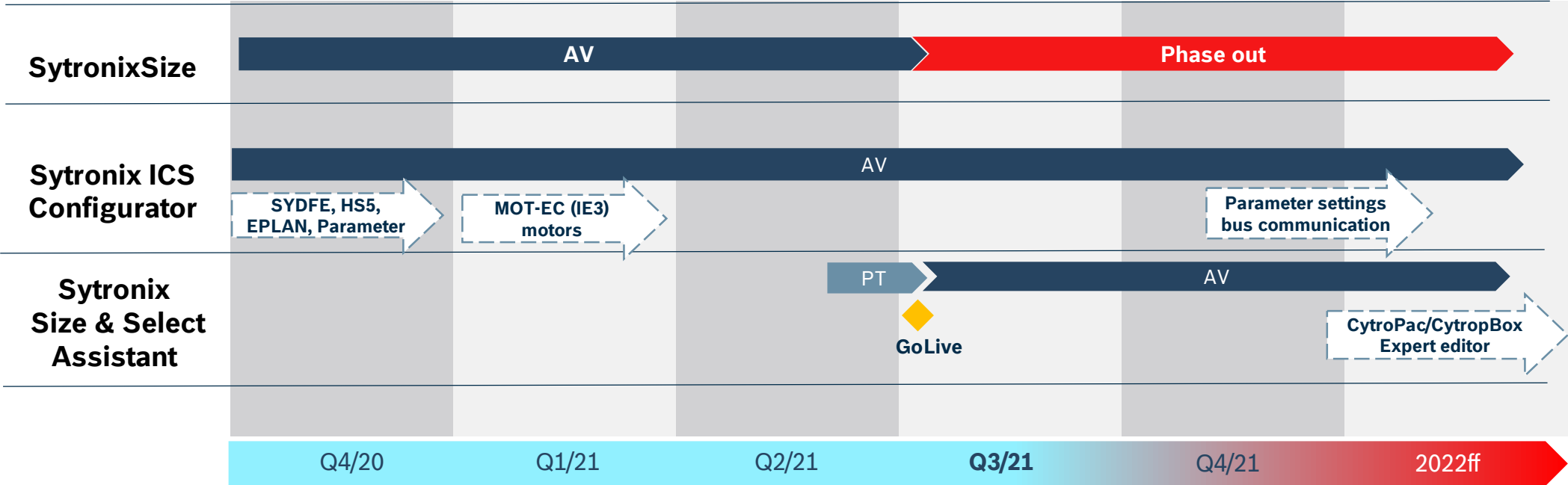


**CO<sub>2</sub> elimination\*: 53,3 t/a**

\* Energy mix, Germany pursuant to GEMIS Version 4.2 in reference year 2004: 0.613 kg CO<sub>2</sub>/kWh

\*\* Electricity rate: EUR 0.14/kWh incl. 3.592 ct./kWh Renewable Energy Law contribution, 24 hours/day, 250 days/year

# Size & Select Assistant Roadmap Sytronix Tools



# Sytronix

## Further Informationen

[www.boschrexroth.com/Sytronix](http://www.boschrexroth.com/Sytronix)

**Sytronix**  
THE **ECO-BOOSTER**  
How variable-speed drives protect the environment and increase productivity.  
[TECHNICAL DETAILS](#)



[sytronix.support@boschrexroth.de](mailto:sytronix.support@boschrexroth.de)

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- Sytronix DRn 5020**  
[TECHNICAL DETAILS](#)
- Sytronix SvP 5020**  
[TECHNICAL DETAILS](#)
- Sytronix SvP 7020**  
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