

NORR  
HYDRO

# NORRDIGI<sup>®</sup> MCC

ENERGY RECOVERY TEST IN  
MATERIAL HANDLING  
APPLICATION



UP TO  
**-70% ENERGY  
SAVED**



# PROJECT SCOPE

- Energy efficiency comparison between two systems was conducted by measuring hydraulic power input from pressure and flow
- Volume flow was calculated from displacement and rotational speed of the pumps in both systems
- Pressure sensors were installed close to pumps in both systems
- In NorrDigi MCC system, start and end pressure were verified to ensure the start energy in the accumulators is equal to the end energy

## TEST MACHINE

- 16tn forklift truck

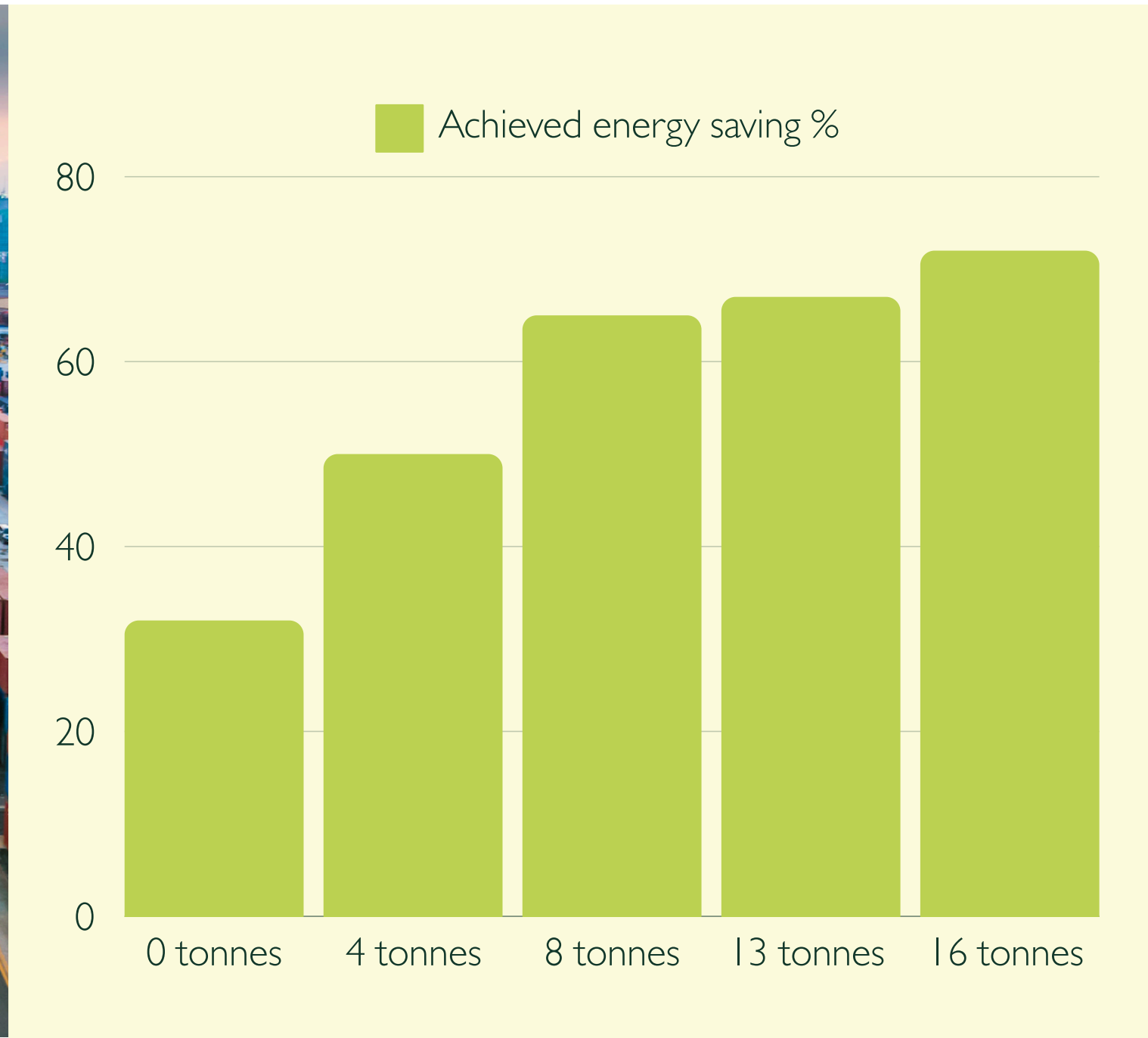
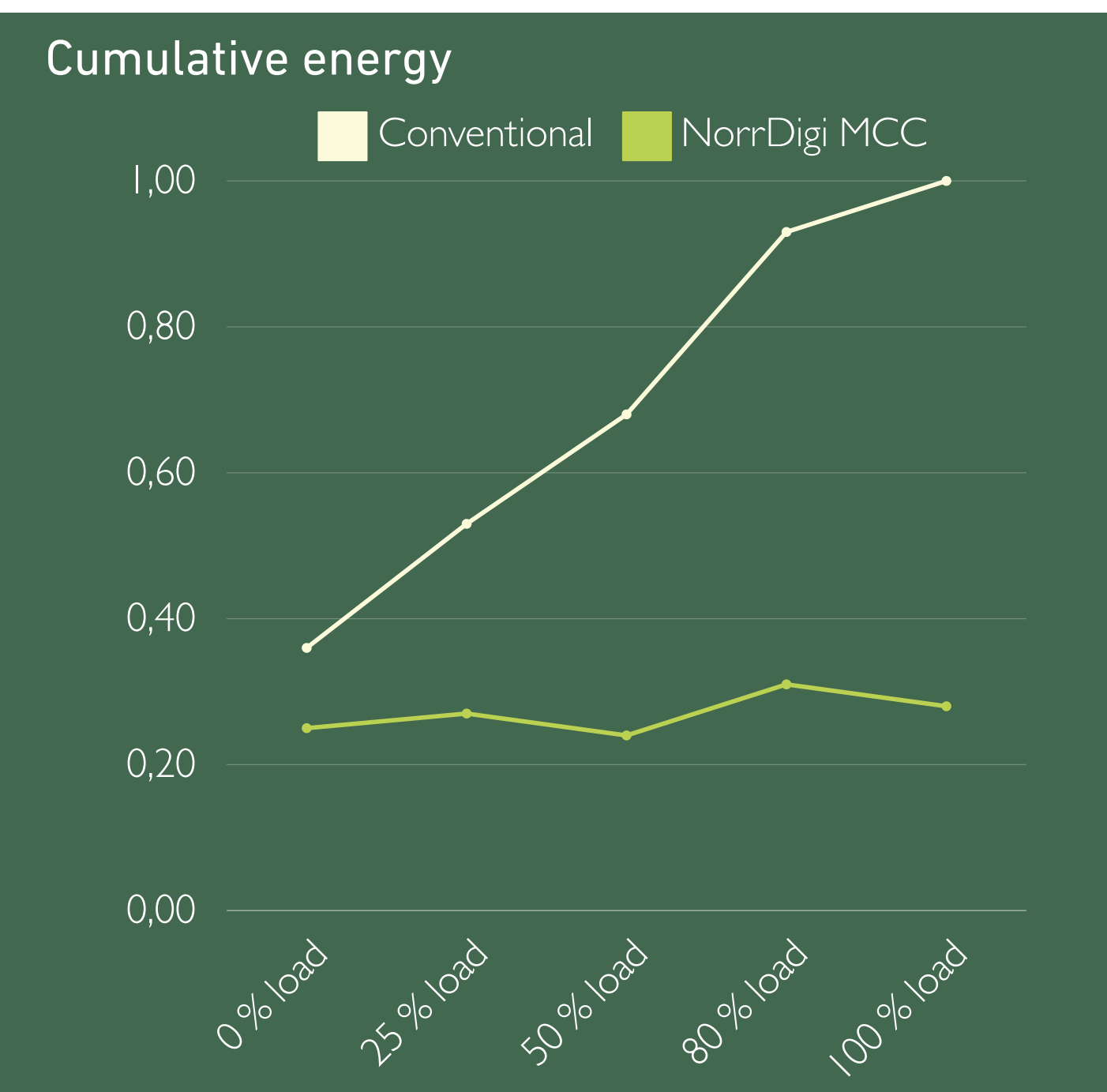
## TEST CYCLES

- 5 cycles up and down movement
- Lifting height 4 meters (2 meter cylinder extension)
- Weights measured: 0,4,8,13 and 16tn



UP TO  
**-70 % ENERGY SAVED**

**SAVED ENERGY AT DIFFERENT CONTAINER WEIGHTS IN LIFT CYCLE**





# MOVEMENT CONTROL

- Speed targets were reached with all test weights
- Response times were constantly better in NorrDigi MCC system (i.e. start movement time)

\*From joystick command to start of the movement

WEIGHT	CONVENTIONAL	NORRDIGI MCC
0 tn	500ms	250ms
8 tn	800ms	210ms
16 tn	820ms	500ms

# CONCLUSION

- Energy efficiency results are good even at low weights
- All speed conditions were met
- Smooth end damping helps with less oscillation and protects the structure from operator damage
- Lifting motions were widely very good

