



THE USE OF BATTERY POWERED CHAINSAW IN COPPICE FOREST

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Coppice Forests in Europe: a traditional natural resource with great potential

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INTRODUCTION

- Utilization of coppice forests and their development is in close connection with use of hand tools
- Mechanized harvesting limited to suitable work conditions
- Globally most of coppice harvesting is cut by chain saw – low investment, private property, resilient to terrain conditions



INTRODUCTION

- In the last five years, a big push has started in the battery powered outdoor applications
- The last tools to be tackled were blowers and chainsaws
 - Difficult working environment
 - High power requirements
- Battery capacity is constantly growing



INTRODUCTION

- The aim of the study was to demonstrate the feasibility of battery powered chainsaw use in coppice forest
- Why coppice?
 - Small diameter of trees
 - Thinner branches
- Consequently
 - The rated power can be lower and the characteristics of trees do not demand a long bar



METHODS



Location: SW-part of Slovenia

Forest type: Coppice

Tree species: *Ostrya carpinifolia*
and *Sorbus aria*

Tree dimensions (DBH): 7-24 cm

Number of trees cut : 16

Sum of cut volume: 2.2 m³

Trail duration: 3h



METHODS



Chain saw

- type: Husqvarna 536 Li XP
- bar length: 14' (35 cm)
- weight: 2.6 kg
- chain speed: 20 m/s

Battery

- type: Husqvarna BLi940X Battery Backpack
- capacity: 26.1 Ah
- voltage: 36 V



METHODS

Exposure to HA vibration

- vibration meter: Bruel&Kjaer 4447
- accelerometer: Bruel&Kjaer 4524B
- position: rear handle



Exposure to noise

- sound meter: Bruel&Kjaer 2250
- microphone: Bruel&Kjaer 4189
- position: right ear



RESULTS

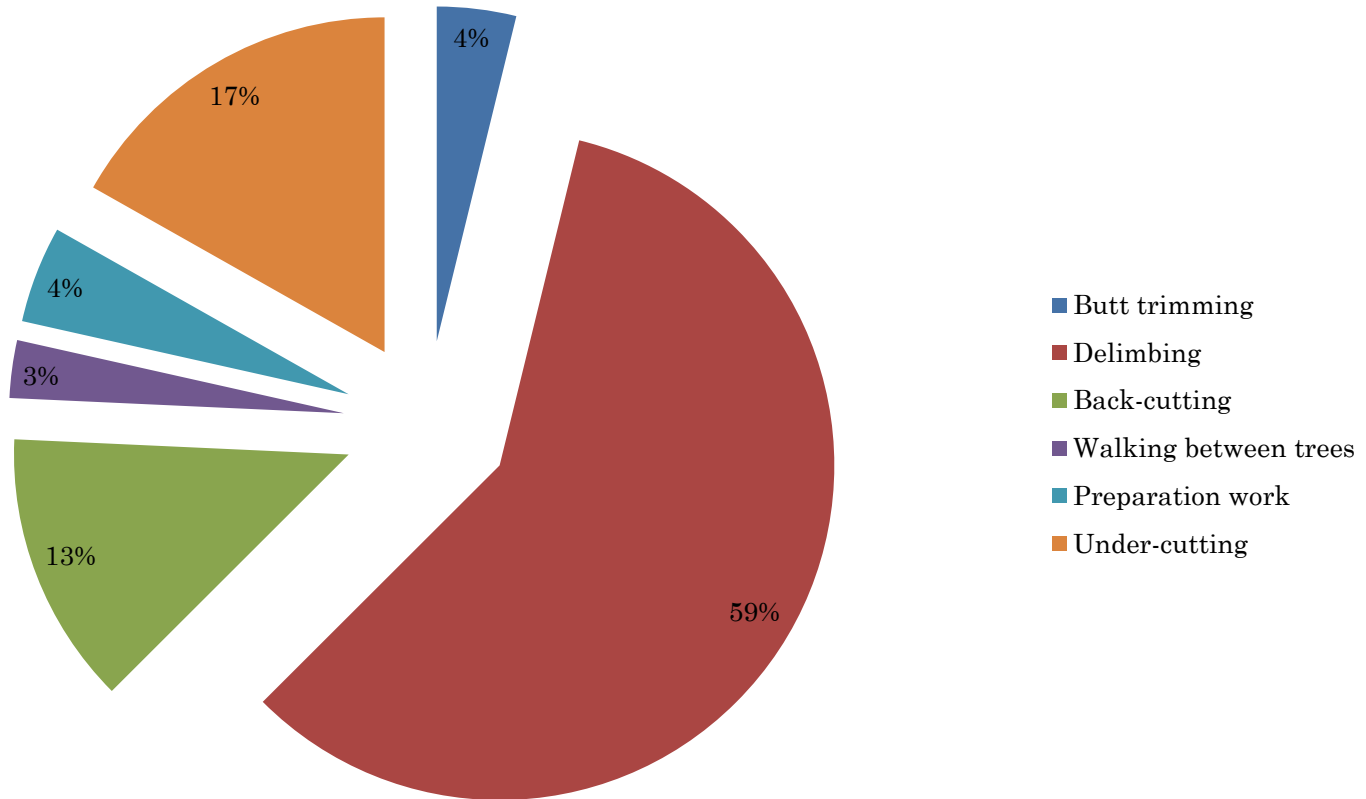


Figure 1: Breakdown of productive time for battery powered chainsaw in coppice forest



RESULTS

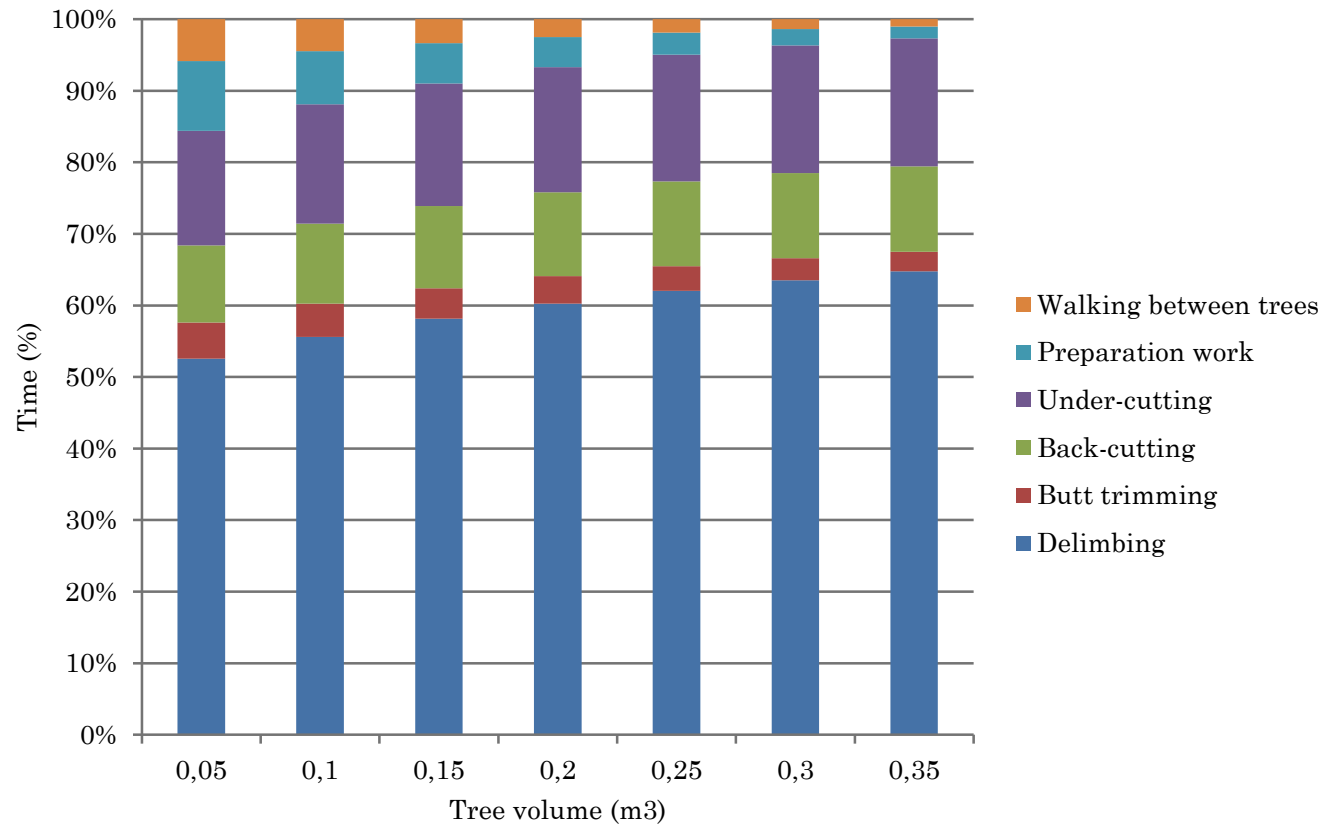


Figure 2: Breakdown of productive time per tree volume for battery powered chainsaw in coppice forest



RESULTS

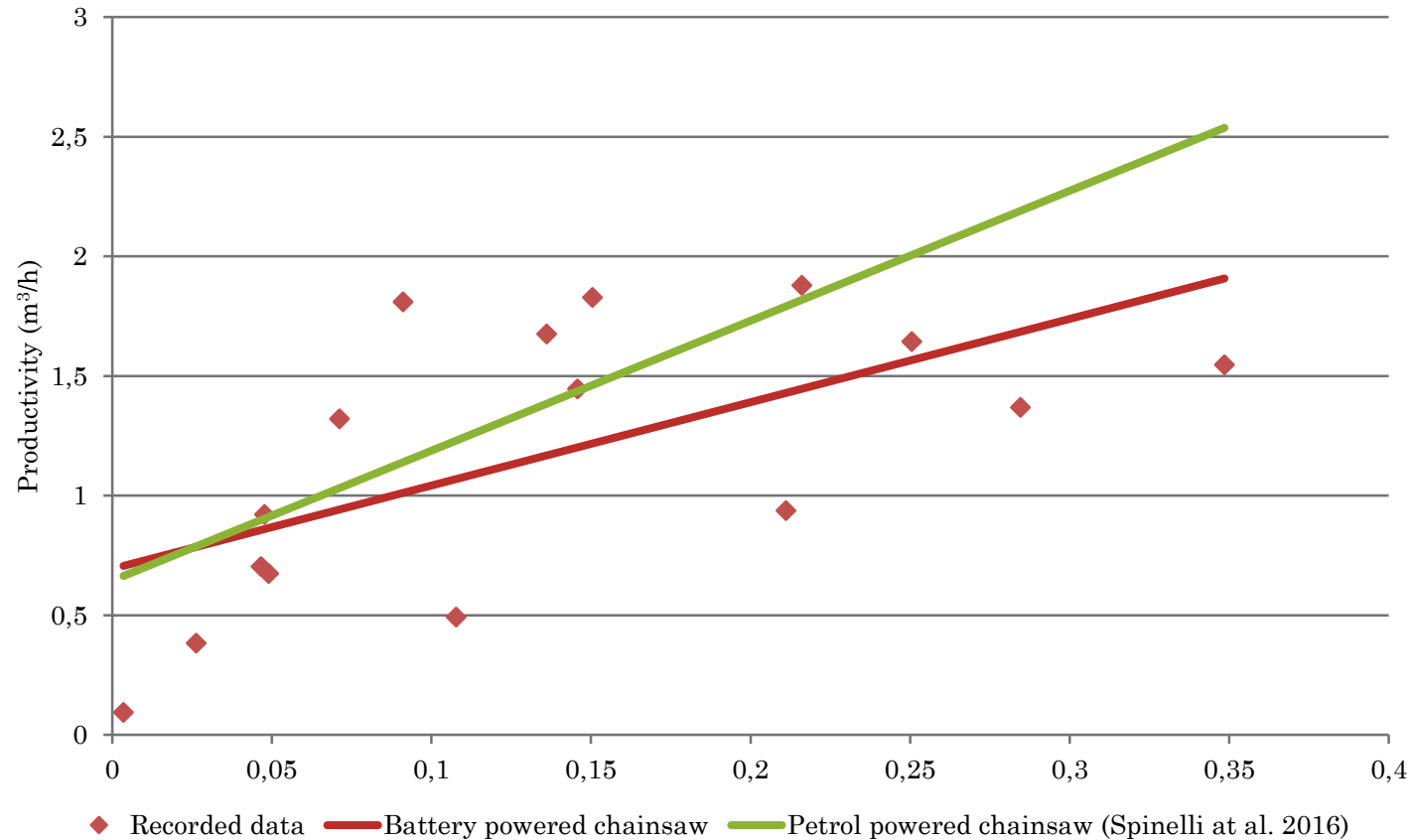


Figure 3: Harvesting productivity of battery and petrol powered chainsaw in coppice forest



RESULTS

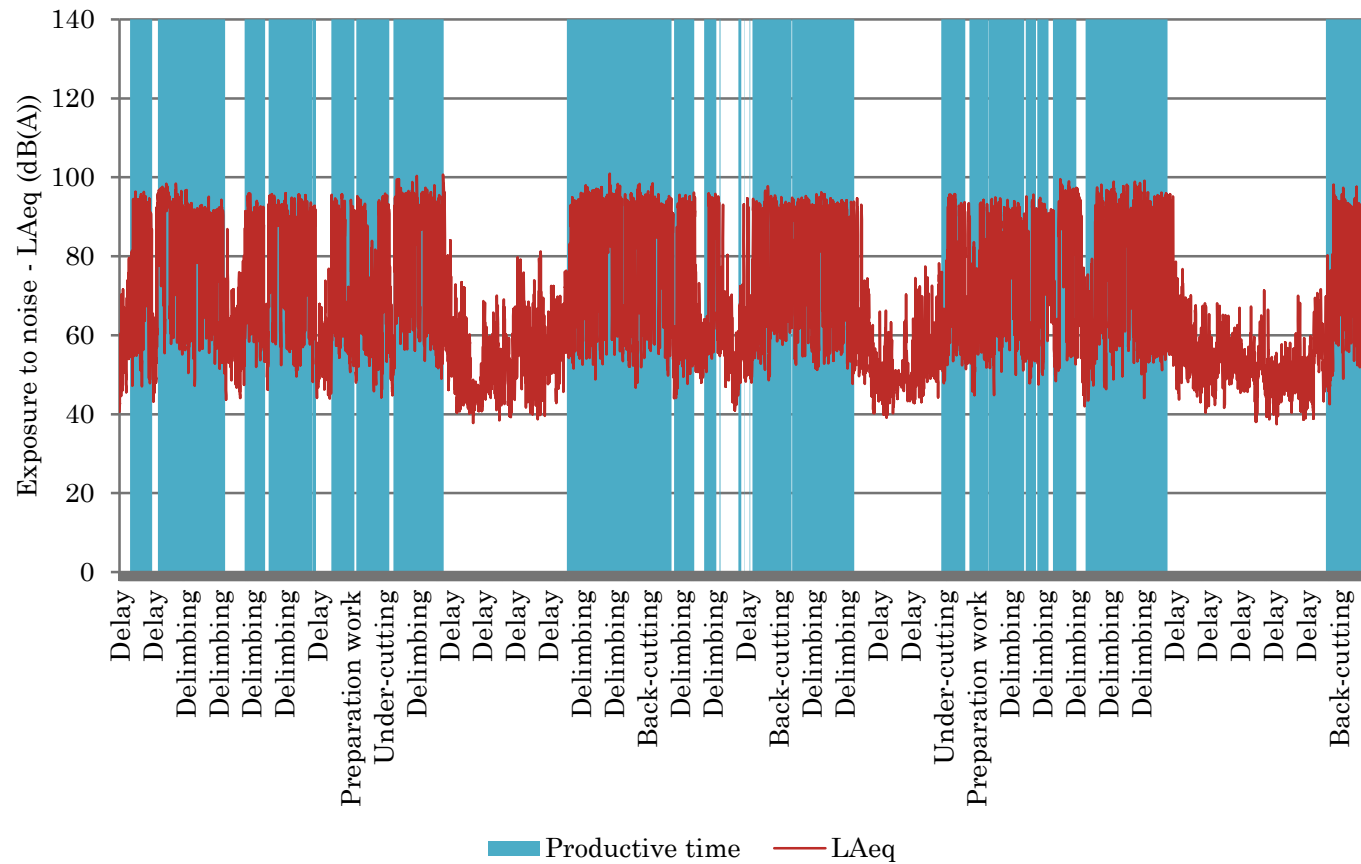


Figure 4: Exposure to noise during harvesting with battery powered chain saw in coppice forest



RESULTS

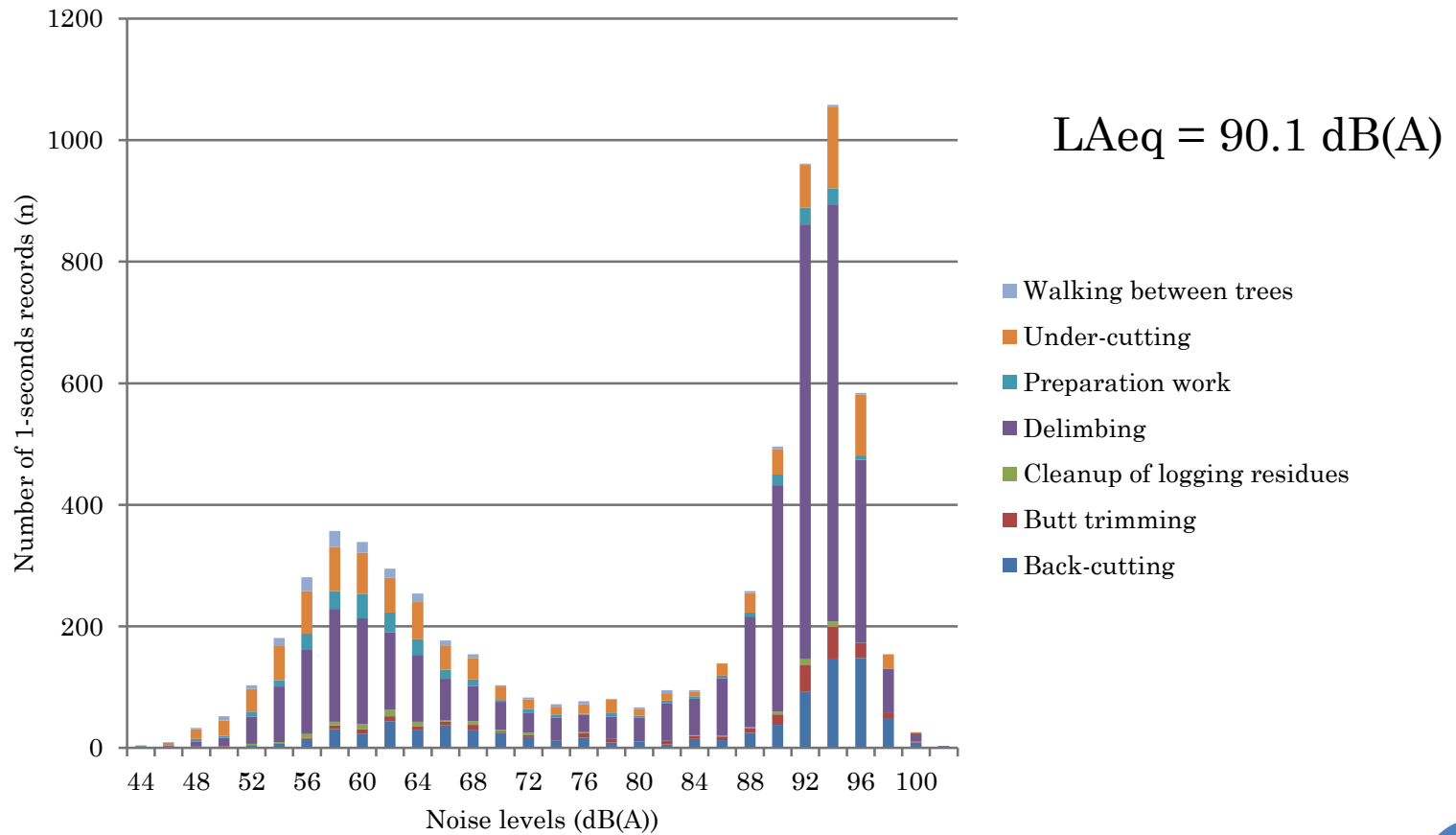


Figure 5: Exposure to noise per working operations



RESULTS

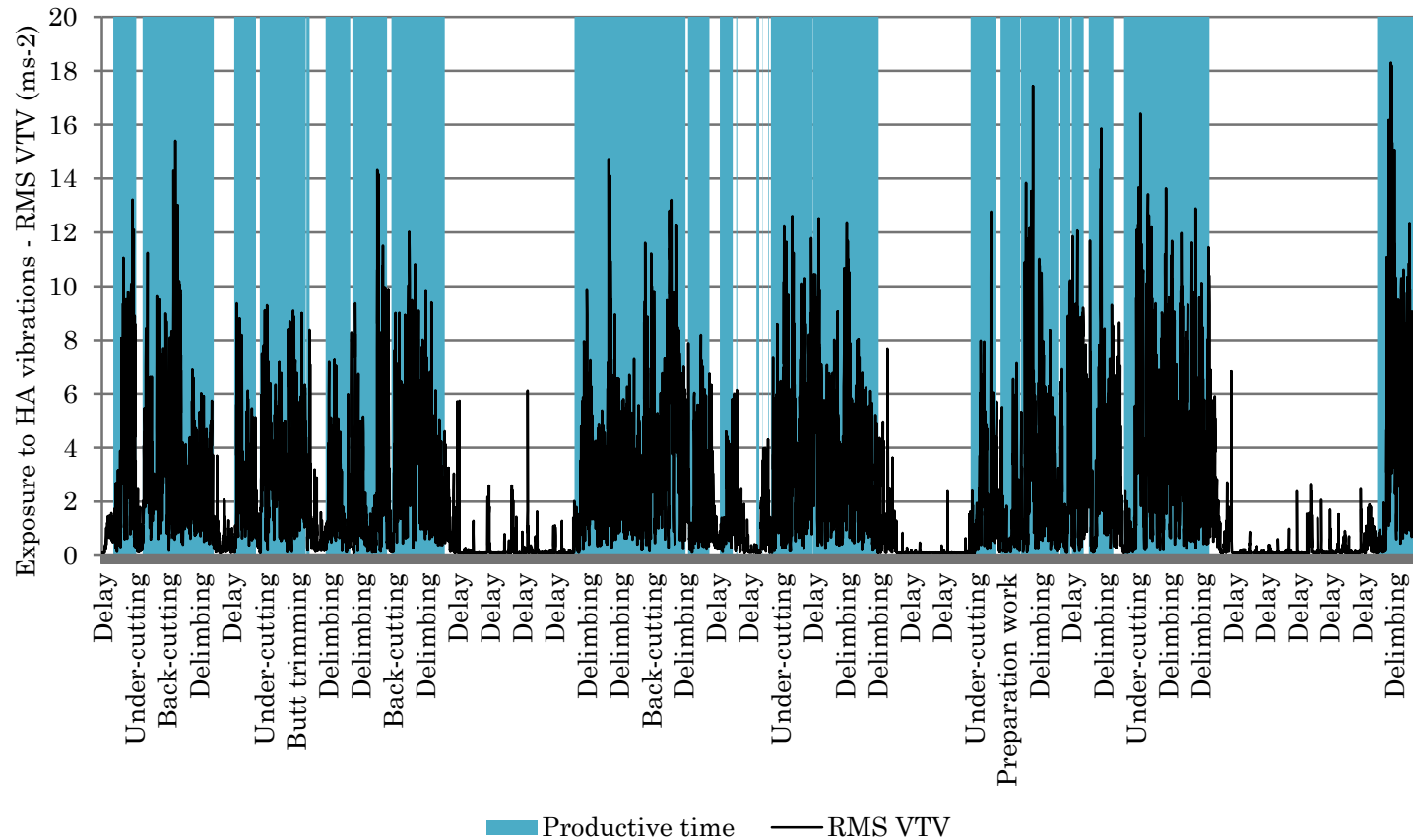


Figure 6: Exposure to HA vibrations during harvesting with battery powered chain saw in coppice forest



RESULTS

$$\text{RMS VTV}_{\text{OPERATING}} = 4.61 \text{ m/s}^2$$

$$\text{RMS VTV}_{\text{PRODUCTIVE}} = 3.54 \text{ m/s}^2$$

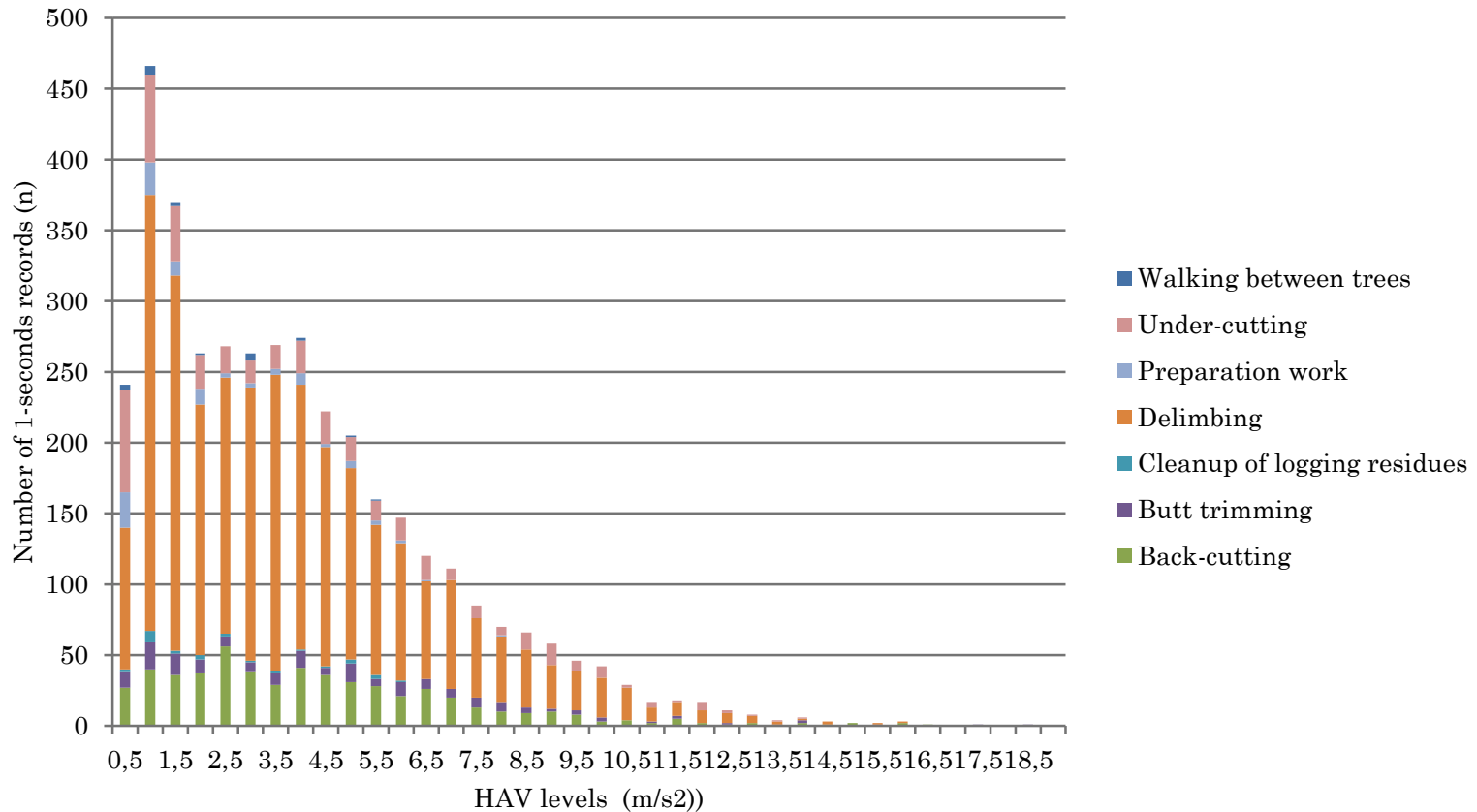


Figure 7: Exposure to HA vibrations per working operations



DISCUSSION

- Productivity is lower than that of petrol chain saw, but comparable when cutting small trees
- Noise exposure is significantly lower compared to petrol chainsaw ~ 10 dB(A)
 - Personal hearing protection is still required!
- Reduction of exposure to HA vibration is less significant



DISCUSSION

- Electricity has perspective, from the aspect of worker health and environment
- Productivity is expected to rise with development of technology
- We are not there yet
 - Problems with the chain saw details
 - Battery - capacity
 - Engine power
- Motor- manual felling will continue to dominate coppice in the future
- Battery power has real perspective in coppice in future



THANK YOU FOR YOUR ATTENTION

