

A LABORATORY SCALE MACHINE FOR PASTEURISATION AND DRYING OF FAECAL SLUDGE BY USE OF MEDIUM WAVE INFRARED RADIATION (LADEPA)

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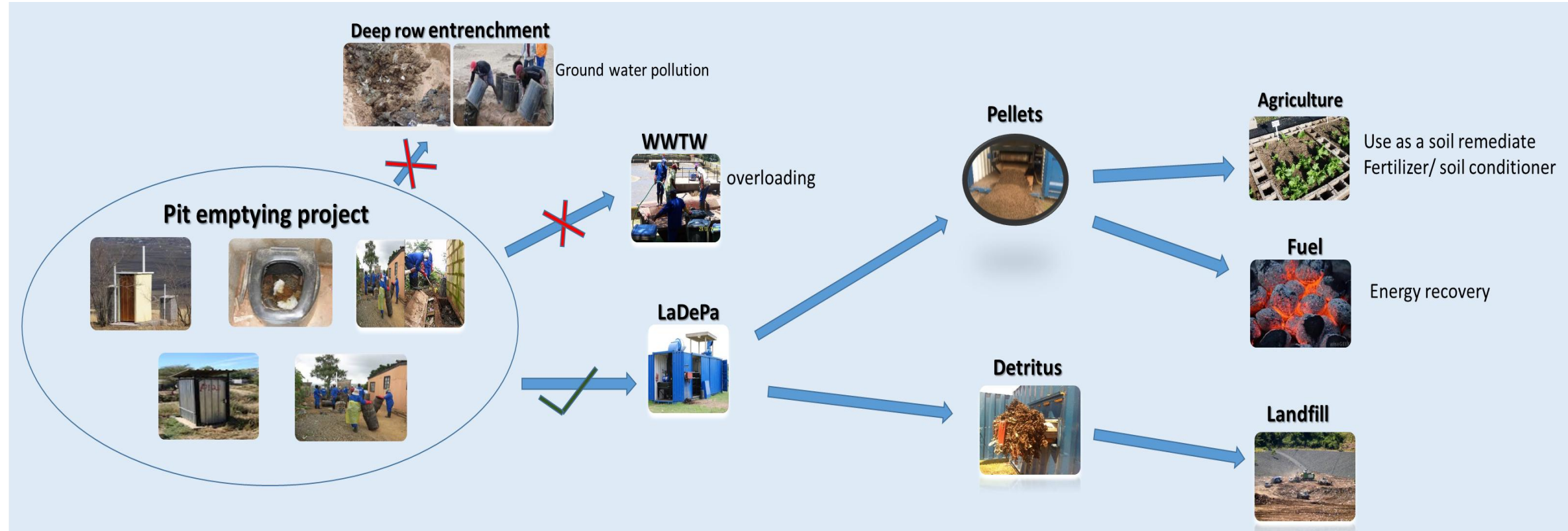
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INTRODUCTION

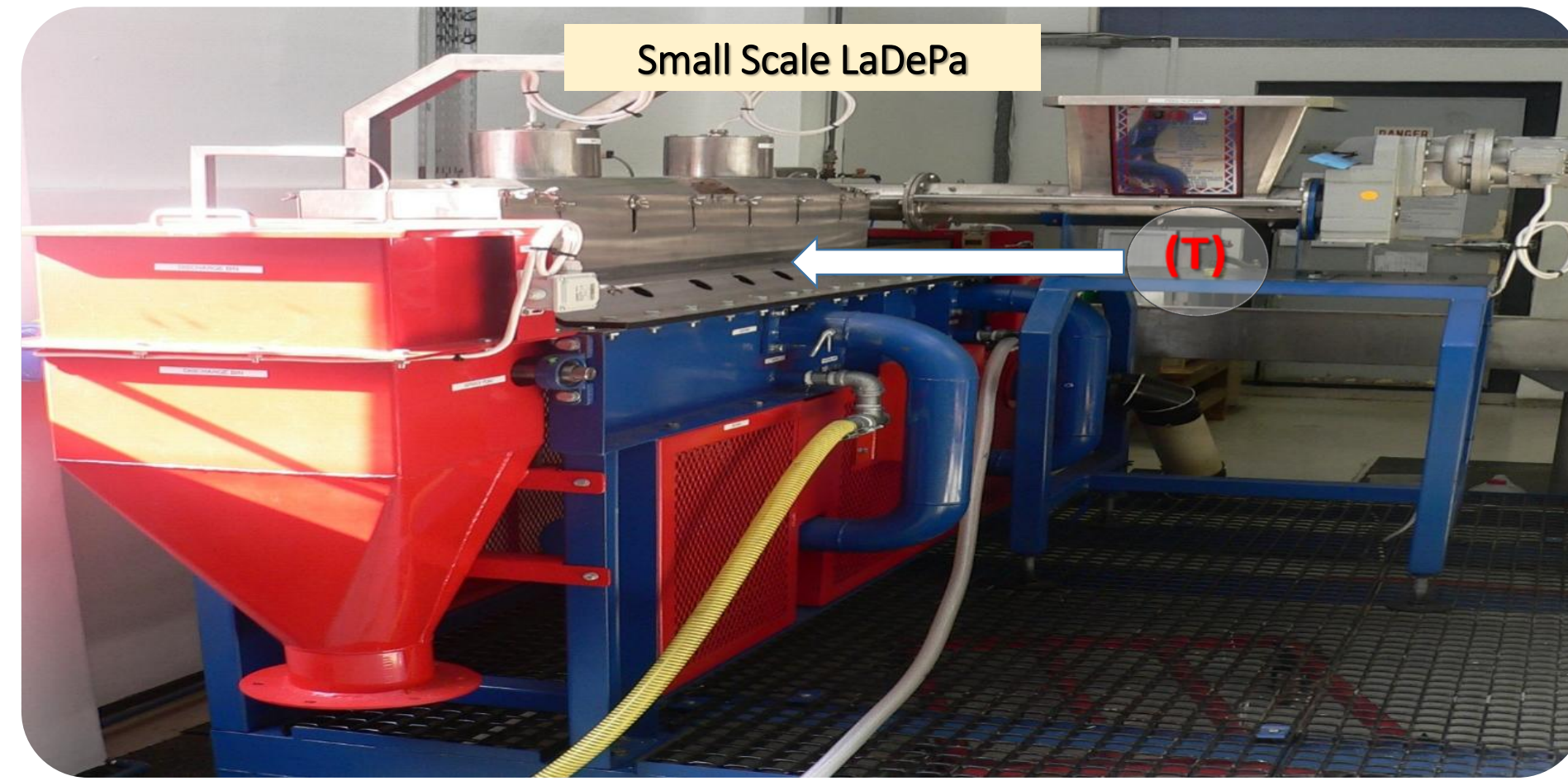
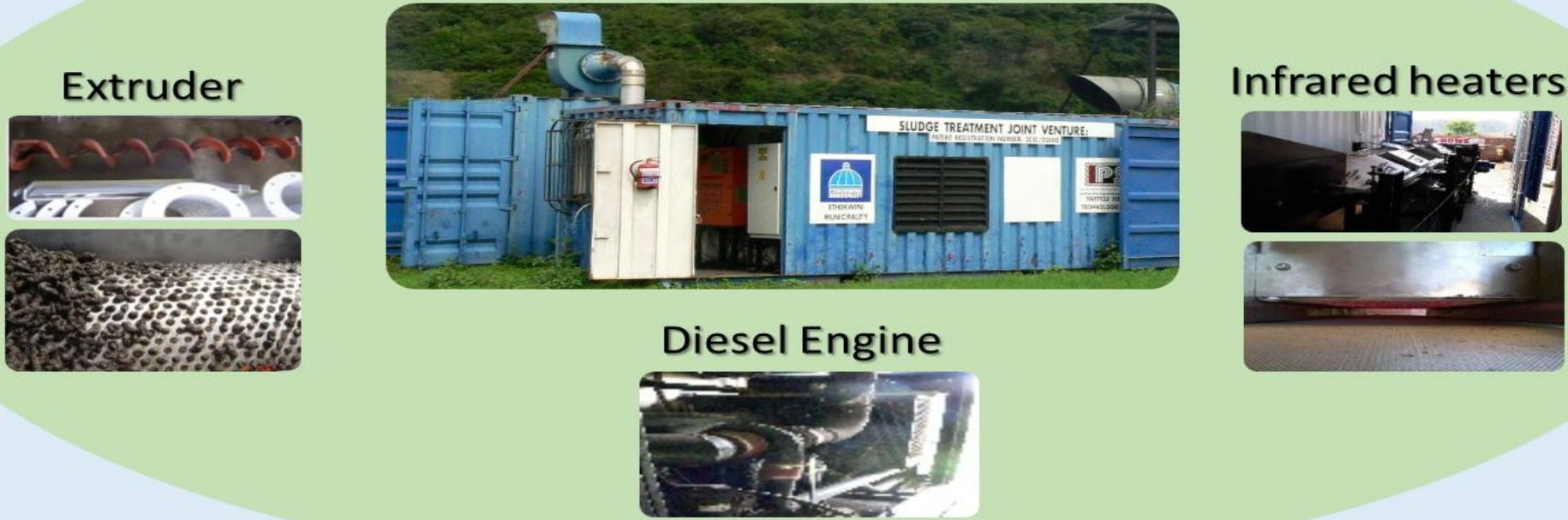
- Government/ EThekweni municipality commitment to provide adequate sanitation
- Full pits emptying
 - > 160,000 VIP latrines within municipality by 2007 (start of the project)
 - > Over 45,000 emptied by June 2011 (Still et al 2013)
- Need to dispose sludge in an environmentally safe way
 - > Disposal of sludge in waste water treatment works (WWTW) not viable due to overloading
 - > Deep row entrenchment cause ground water pollution, waste of nutrients
- Need to reduce cost of pit emptying

LaDePa process: conversion of faecal sludge into a pathogen – free, soil remediate through **drying** and **pasteurization** with waste (detritus) disposed in landfill



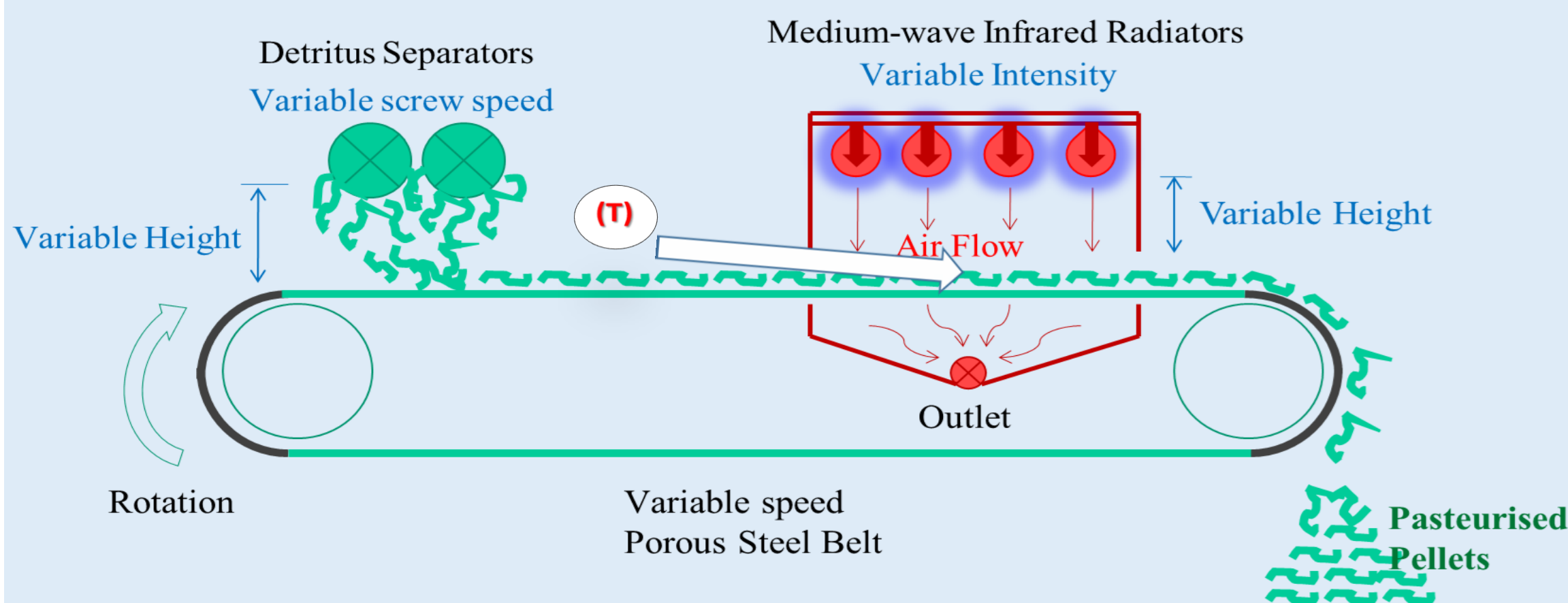
LADEPA MACHINE DESCRIPTION

Full scale LaDePa and its components



EXPERIMENTAL SETUP

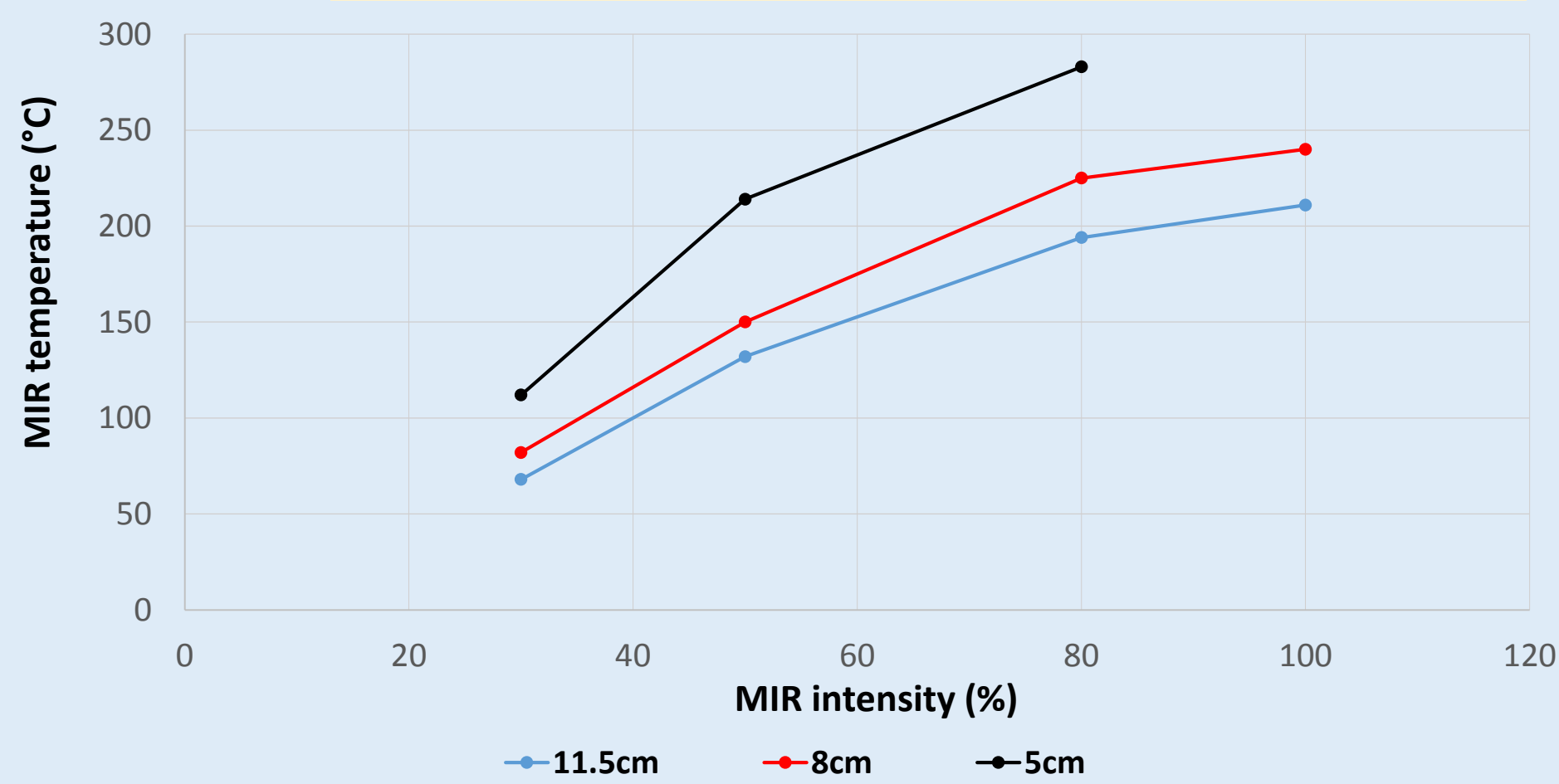
Small-Scale LaDePa Operation



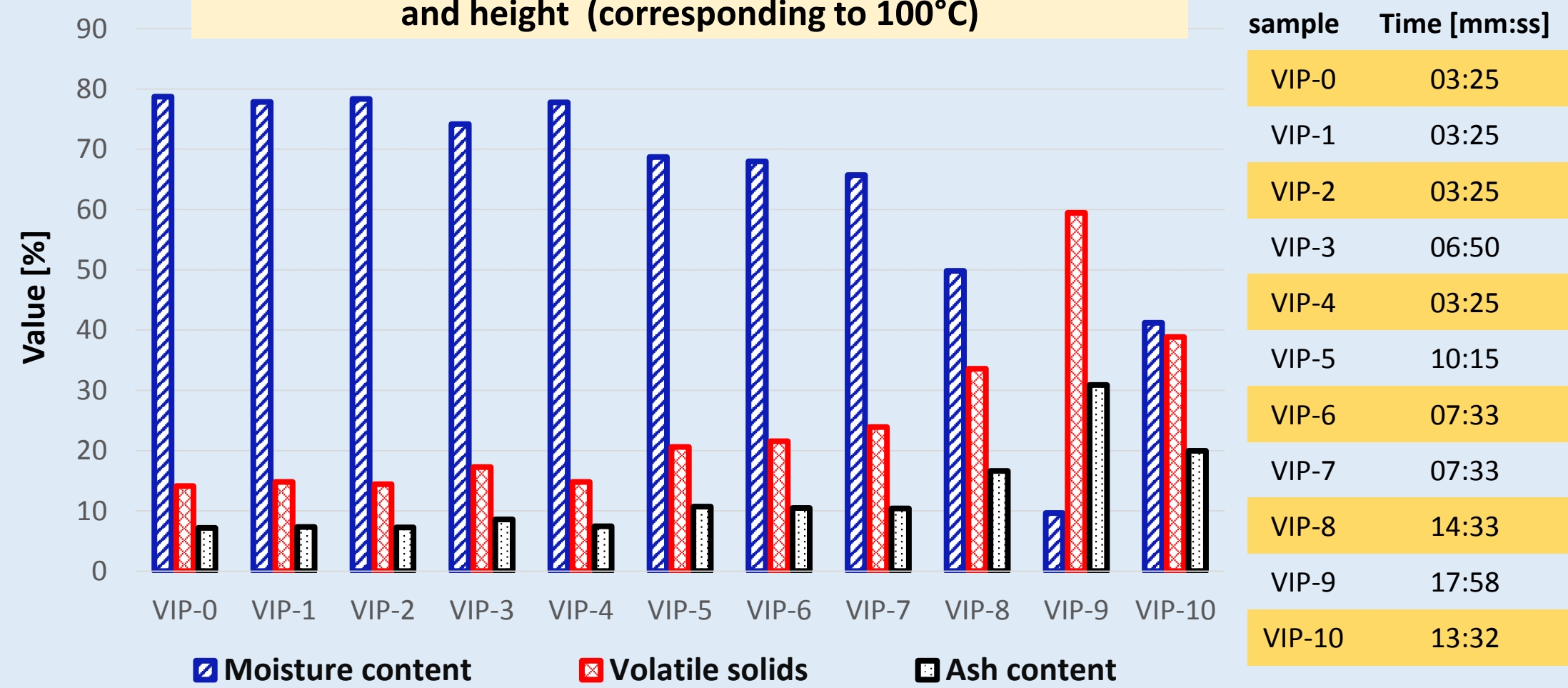
- Temperature of LaDePa measured using K-type thermocouple at center of MIR heater indicated (T)
- Preliminary studies on drying and pasteurization of synthetic sludge (SS) and ventilated improved pit (VIP) latrine, sludge
 - Investigation on effect of changing MIR intensity (changing dial reading between 0 to 100%)
 - Investigation on effect of changing residence time from VIP-0 to VIP- 10 (changing belt speed by dial reading from 0 to 100%)
 - Determining moisture content, volatile solids and ash content by oven drying at 105°C then combustion in furnace at 550°C

EXPERIMENTAL RESULTS

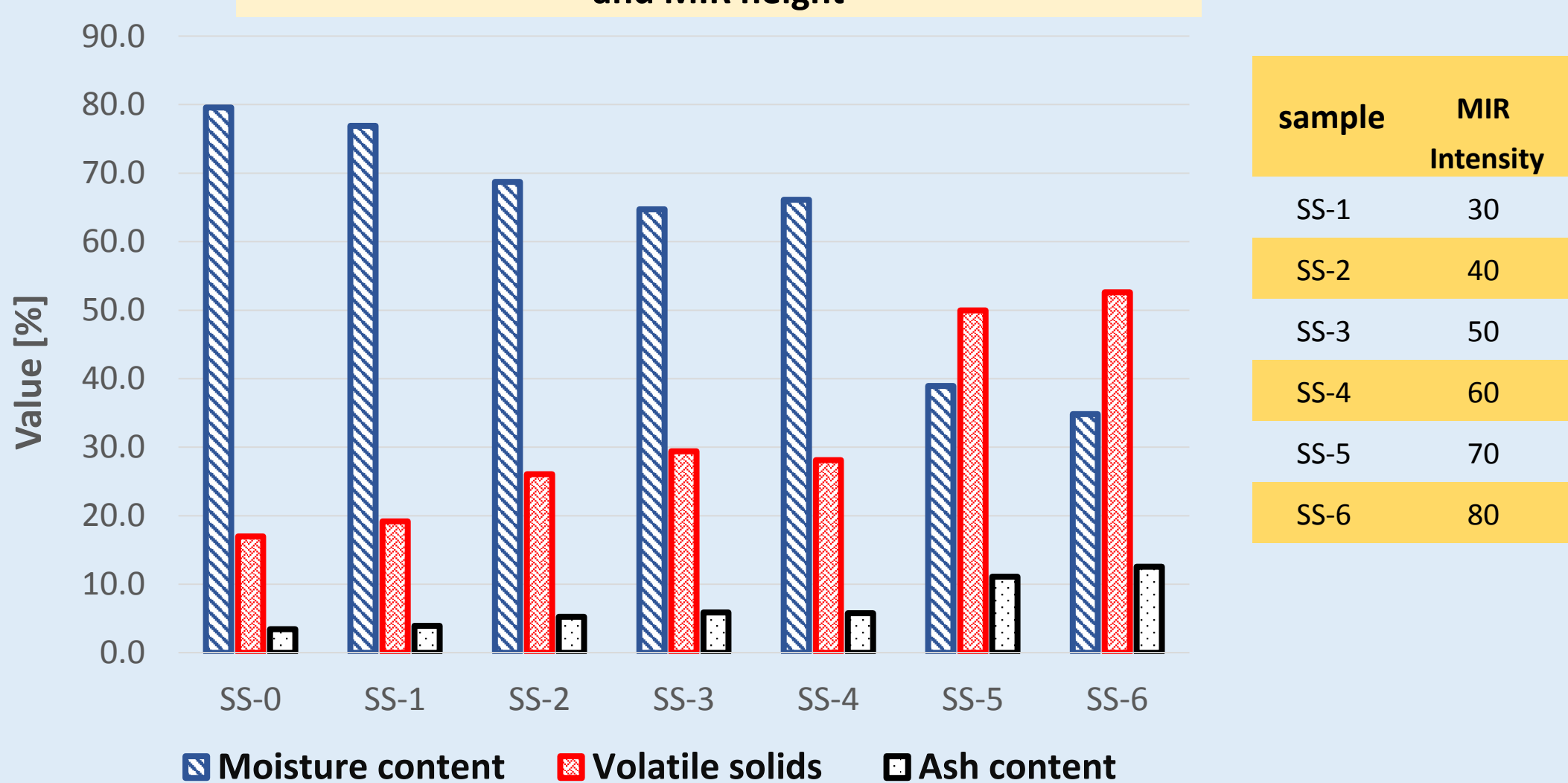
Effect of varying MIR lamp intensity and height above the belt at constant belt speed



Effect of varying residence time at constant MIR intensity 30% and height (corresponding to 100°C)



Effect of Varying MIR Intensity at constant residence time and MIR height



DISCUSSION

- Temperature on the belt increases with increase in MIR intensity and with reduction in height above the belt
- Level of drying increases with increase in residence time and MIR intensity
- 18 min at 100°C sufficient in drying sludge to moisture content of about 10% (wet basis)
- Volatile solids and ash content increased with the level of drying

CONCLUSION

- Temperature of drying influenced by MIR height and intensity
- Longer residence time and high intensity result into better drying

FUTURE WORK

- Investigation effect of drying due to varying air flow, pellet diameter, initial moisture content
- Determining effectiveness pasteurisation in the LaDePa
- Determining the nutrient content and calorific value of pellets at various drying conditions
- Modelling of the drying process

ACKNOWLEDGEMENT

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- The pollution research group
- Particle separation systems for fabrication and design and support in running the laboratory LaDePa

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