MHG systems

# “New Business Models and Tools for Sustainable Biomass Procurement and Supply – Finnish and European experiences”

# Contents of this presentation

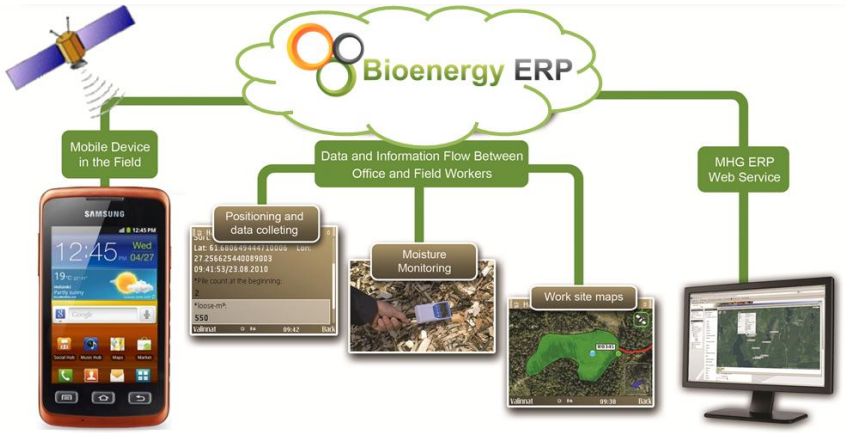
- About  MHG Systems Ltd
- MHG Bioenergy ERP  - Service for Biomass Procurement, Managing and Optimization of Supply Chains and Cultivation
- New EU Regulation
- New Sustainability Assessment Tools
- Multi-Use Composite Containers
- Europe´s Biggest Bio-coal Plant
- Moisture Monitoring and Optimization
- Feedstock Information Platforms
- Cooperation Opportunities

# MHG Systems Oy

Green ICT Winner 2010-2011 Tekes | Finland

Founded 2005

- Agile Green ICT Services for end-to-end automation of **entire biomass/timber acquisition process**
- **MHG Bioenergy ERP -** unique service linking novel technologies resulting in **situation view for various decision makers**
- Developed together with bioenergy players & researchers
- Strong forestry and bioenergy background
- Green ICT Winner 2011
- Top25 Scand. Cleantech 2010, Logica ICT Innovation Winner 2010






MHG systems

# On-Going Projects and Partners

**LogistEC & CASTLE**
• leading FP7 R&D projects to develop sustainability tools for feedstock procurement and supply chains in Europe

**Feedstock Monitoring; Romania, Thailand, Vietnam, Laos, Indonesia, the Alps**

**Waste Projects;**
• St. Petersburg

• Feedstock resource monitoring and integration with MHG Bioenergy ERP to enable operational planning of feedstock procurement and supplying
=> **Feedstock/Waste stock Exchange Platform development projects**

**Partners:**

Jab

Protacon

SIMOSOL

logica
be brilliant together

FORGIS Forestry Consulting

MHG systems

# Major Problems in Bioenergy Supply Chains

1. Not transparent; no trust => not real business
2. Inefficient operations

3. No accurate information; quality, quantity, no real-time
4. No trustworthy measurements

5. Material is forgotten/stolen

6. Presence of unsustainable material within supply chain



MHG systems

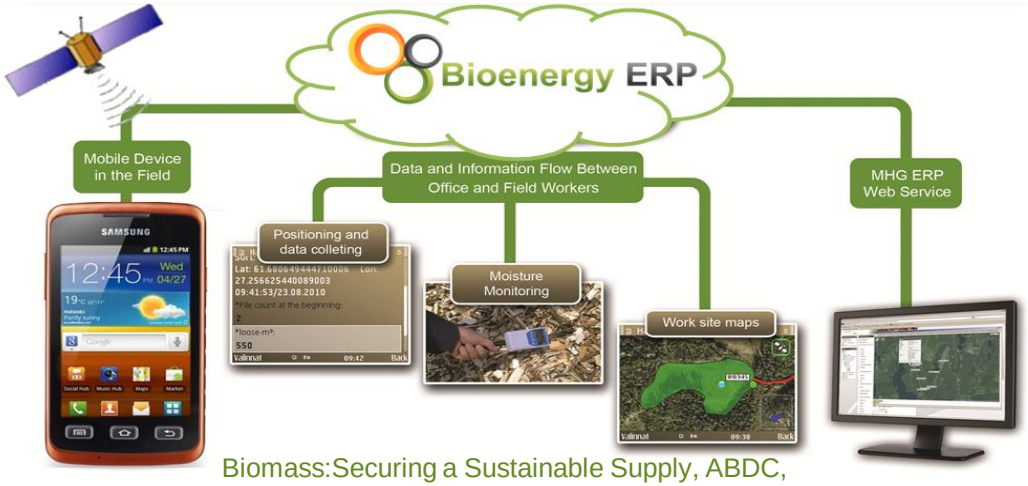
# Complete Feedstock Energy Supply Chain Management

## Management and optimization of procurement supply chains

| | |
|---|---|
| **Producer** | Location, quality and quantity documentation, contracts |
| **Fuel supplier** | Location, quality and quantity documentation, “ear-marking” for contractors and end-users |
| **Harvester** | Location, quality and quantity data |
| **Hauler** | Location, quality and quantity data |
| **Storage** | Location, accessibility, quality and quantity data |
| **Chipper** | Location, accessibility, quality and quantity data, moisture |
| **Transporter** | Load confirmation and location data, transportation schedule |
| **Terminal** | Location, quality and quantity data, transportation schedule, moisture content |
| **Power Plant Gate** | Transportation schedule, weighing, vehicle identification, load data |
| **Unloading Station** | Sampling data, moisture content |
| **Laboratory** | Analyses data |
| **Authorities** | Emissions data, Ash data, data for applying for subsidies/tariff fees |

**important**

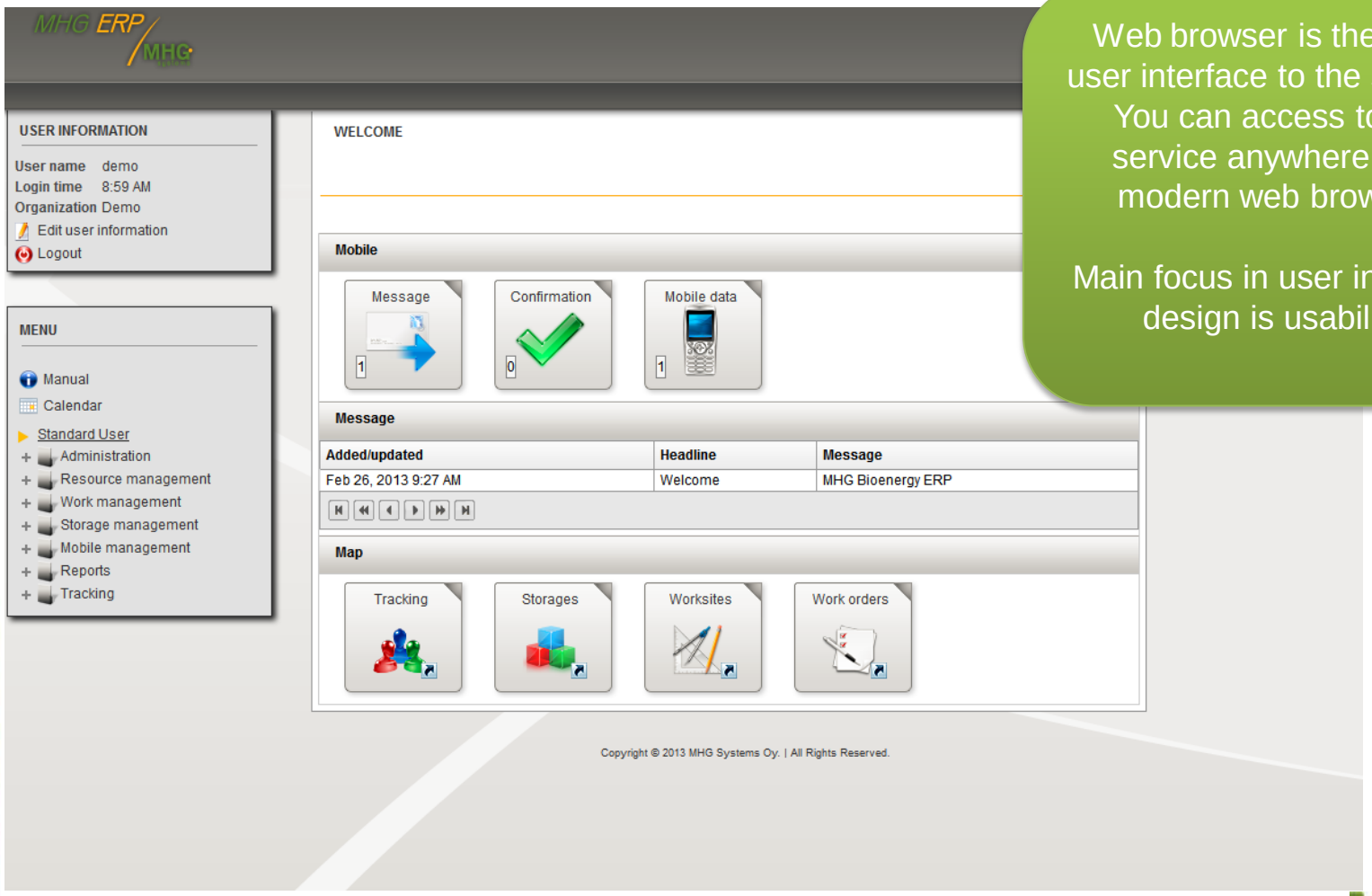
1. Easy and quick to deploy
2. No own IT personnel required
3. Grows together with your business – add new users and modules
4. Automatic updates






MHG systems

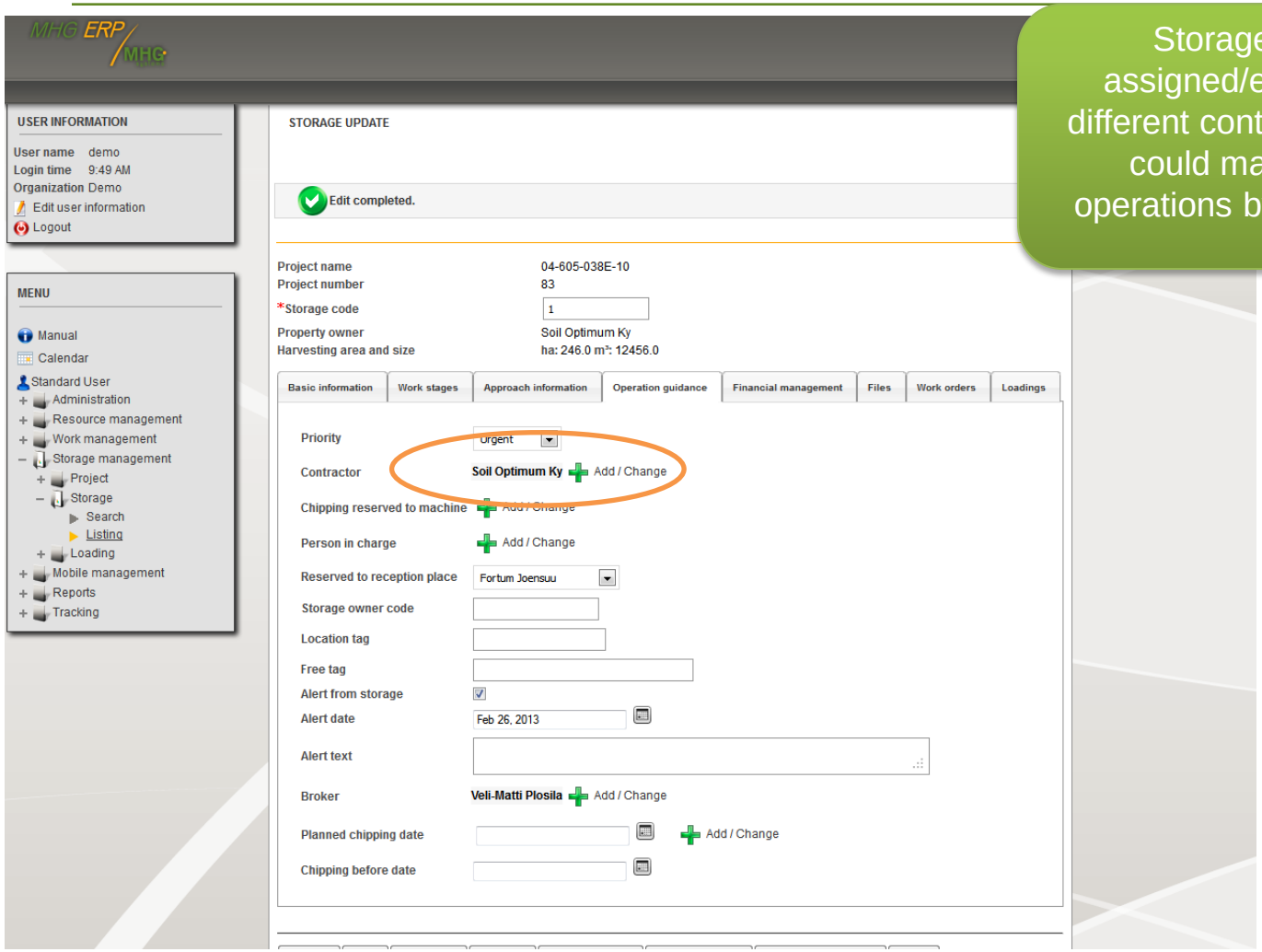
# Service User Interface




Web browser is the main user interface to the service. You can access to the service anywhere with modern web browser.

Main focus in user interface design is usability.

# Storage Management - Assigning Storage

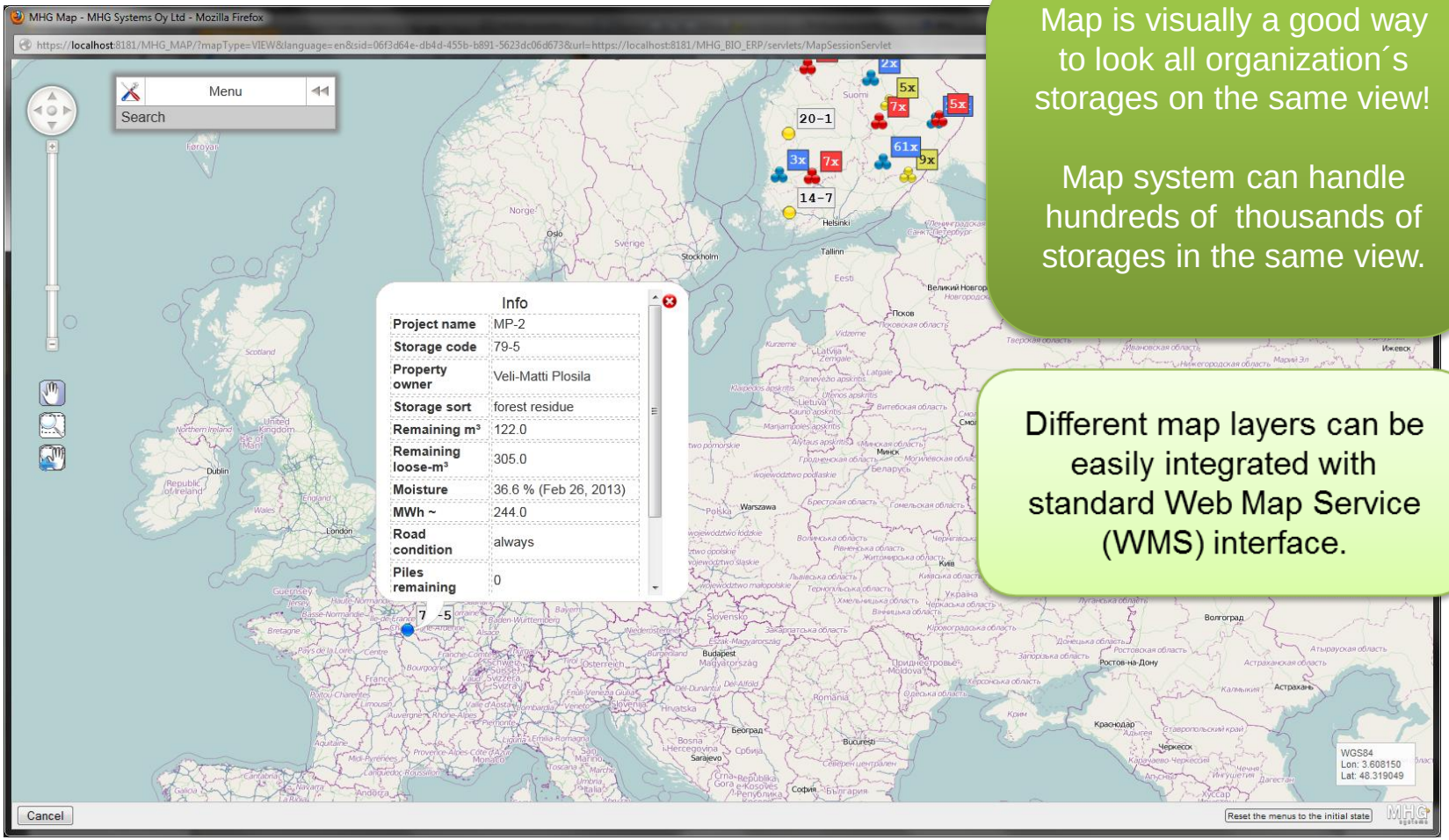



Storages can be assigned/earmarked to different contractors so they could manage work operations by them selves.



MHG systems

# Storage Management - Map Views

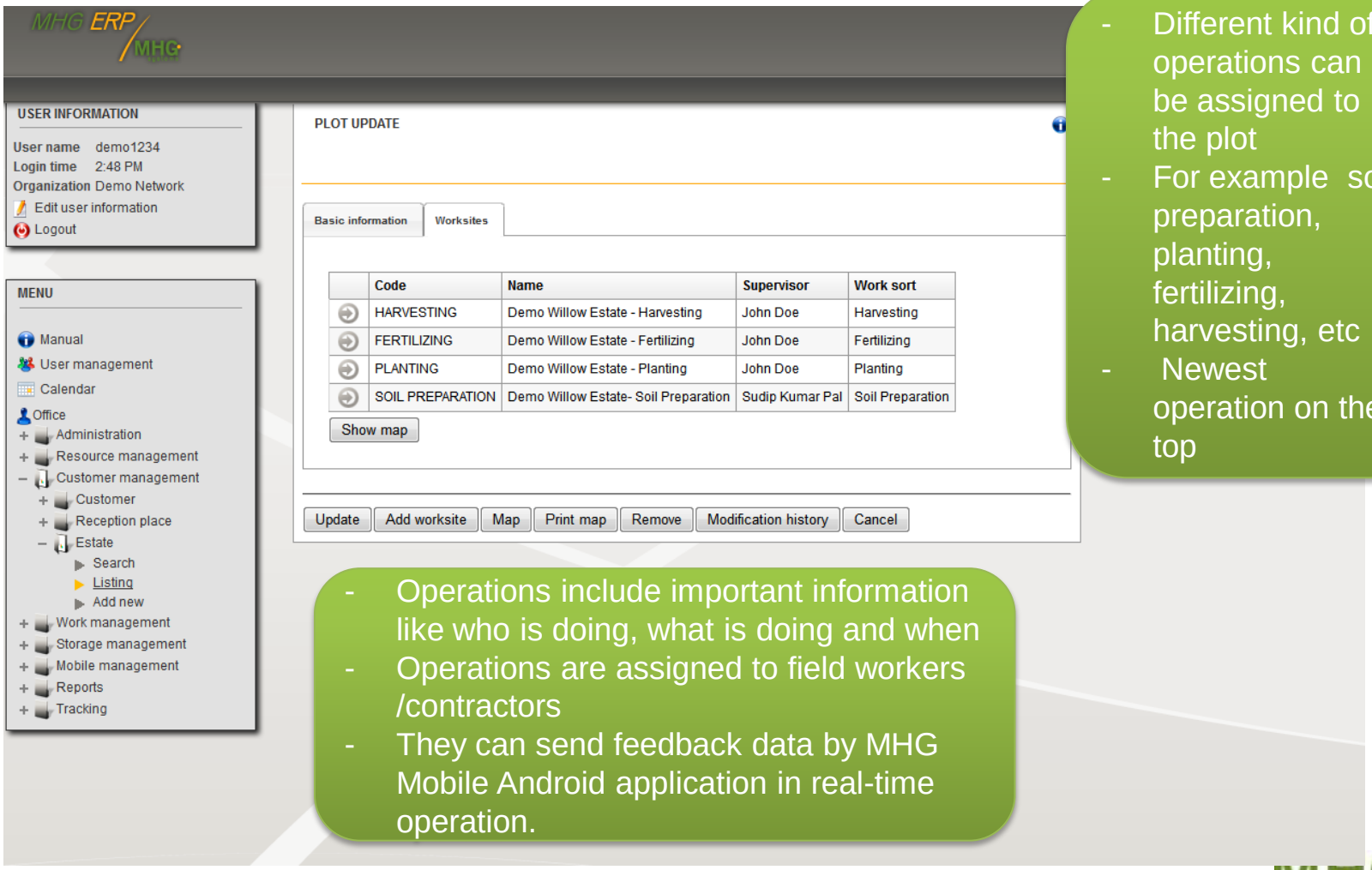



Map is visually a good way to look all organization´s storages on the same view!

Map system can handle hundreds of thousands of storages in the same view.

Different map layers can be easily integrated with standard Web Map Service (WMS) interface.

# Cultivation Management - Plot Level Operational Recording




- Different kind of operations can be assigned to the plot
- For example soil preparation, planting, fertilizing, harvesting, etc
- Newest operation on the top

- Operations include important information like who is doing, what is doing and when
- Operations are assigned to field workers /contractors
- They can send feedback data by MHG Mobile Android application in real-time operation.

# Deployment Models

## SaaS - Standard

- ✓ Standard SaaS approach
- ✓ Very low starting costs
- ✓ Very fast delivery time
- ✓ No system administration needed from customer side
- ✓ Shared technology stack, instance and database from enterprise cloud platform
- ✓ Limited customization capabilities because of shared instance
- ✓ Integration capabilities
- ✓ Logical data isolation in shared schema. Organization data is secured.

## SaaS - Dedicated

- ✓ Low starting costs
- ✓ Fast delivery time
- ✓ No system administration needed from customer side
- ✓ Dedicated instance and database from enterprise cloud platform
- ✓ High customization and integration capabilities
- ✓ Physical data isolation on separate database instance
- ✓ From medium to big organizations

## System delivery

- ✓ System deployed to customer IT infrastructure
- ✓ Dedicated instance and database on customer hardware or virtualization environment
- ✓ Own system administration needed for server maintenance and backup operations.
- ✓ High customization and integration capabilities
- ✓ Data is stored on customer servers
- ✓ For medium and big organizations who wants to get system running on own servers.



MHG systems

MHG systems

# Selected Customer Study Cases

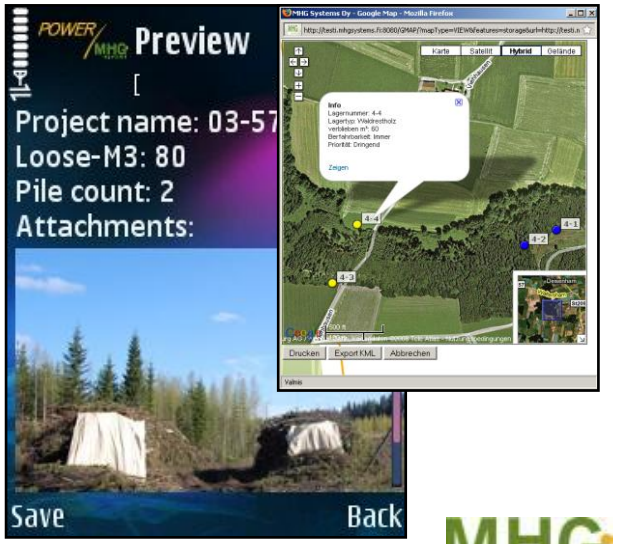
# Finland: From Stump to Boiler
# Main benefits to Hyötypaperi

- **access to market – partnership with forest associations due to MHG Bioenergy ERP**

- **storages, human and machinery resources can be managed on-line by easy-to-use technology**
  - **on-line alarms can be done when needed (weather and road conditions, demand etc)**

- **less supervising needed (savings 50%)**

- **outsourced contractors plan their daily work by themselves and can optimise work and save in driving distances and working hours due to better optimisation of routes and volumes (savings 5-10 %)**




BREADFRUIT CAPITAL
GROWING CLEANTECH COMPANIES



MHG systems

# Poland: Agropellet Supply Chain Management


More potential sourcing of biomass

Insurance contracts are easier to obtain and cheaper

BREADFRUIT CAPITAL
GROWING CLEANTECH COMPANIES

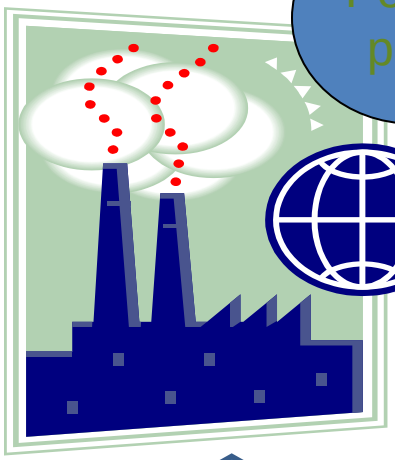


MHG systems

# Spain: Feedstock to Energy Supply Chain Management

Over 20 feedstock sorts

Being considered and marketed as a “sustainable biomass producer”



Power plant

Buffer straw storage



MHG systems

MHG systems

# Europe; New Regulation to Secure Sustainability

# EU TIMBER REGULATION

The EU has adopted a new regulation No 995/2010 laying down the obligations of operators who place timber and timber products first time on the internal market. (OJ L295/23 of 12.11.2010). This regulation becomes effective in March 2013. ”Operator” means any natural or legal person that places timber or timber products on the market.

This regulation introduces 3 obligations:

1. Prohibition of placing illegal timber on the EU market
2. Use of Due Diligence systems to ascertain that products are legal
3. Apply traceability systems



MHG systems

# EU TIMBER REGULATION - MAIN REQUIREMENTS

Requirements set for both operators and traders. (Common Custom Tariff 4401 - wood chips, etc.). RES Directive for biomass.

Traders are required, throughout the supply chain, to be able to identify:

1. The operators or the traders who have supplied the timber and timber products; and

2. Where applicable, the traders to whom they have supplied timber and timber products

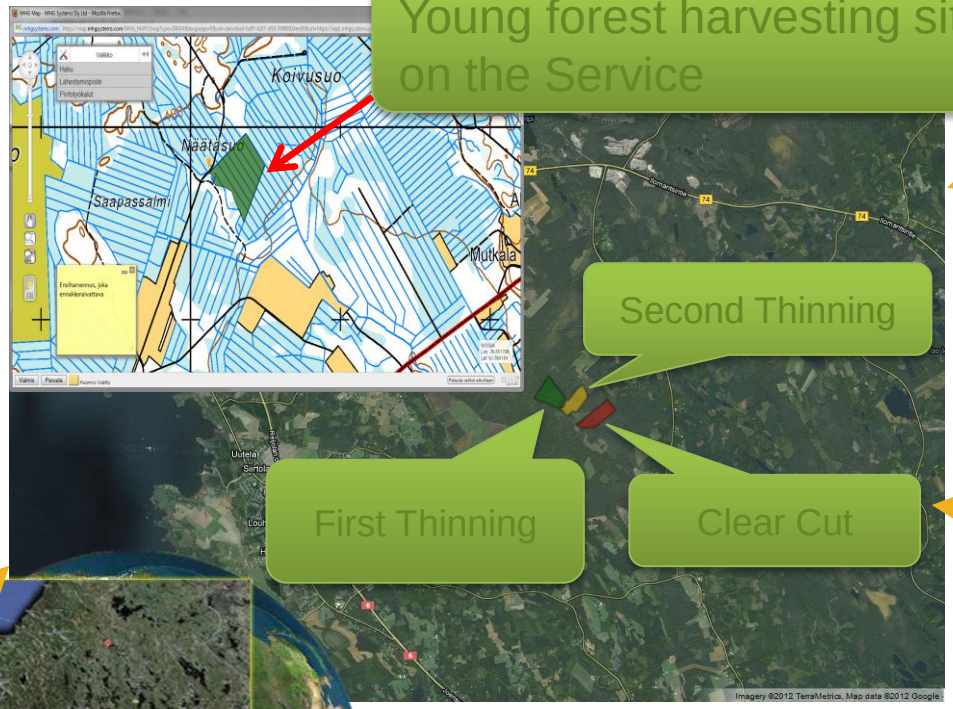
   Energy producers shall request from the operators (suppliers) compliance with the three main operator requirements. The best way will be to require the use of harmonised system (MHG) that can import into the Energy producers´ operation management system key evidence (data) on the required key elements of the **due diligence, sustainability and traceability systems**



MHG systems

# Verifying of Origin and Sustainability Criterias in Forest (Energy) Harvesting

Harvesting data input of all suppliers via automated interfaces. Enables gapless origin tracking and sustainability monitoring (Area, volume, MWh; $CO_2$/MWh, etc)




Supplier

Supplier

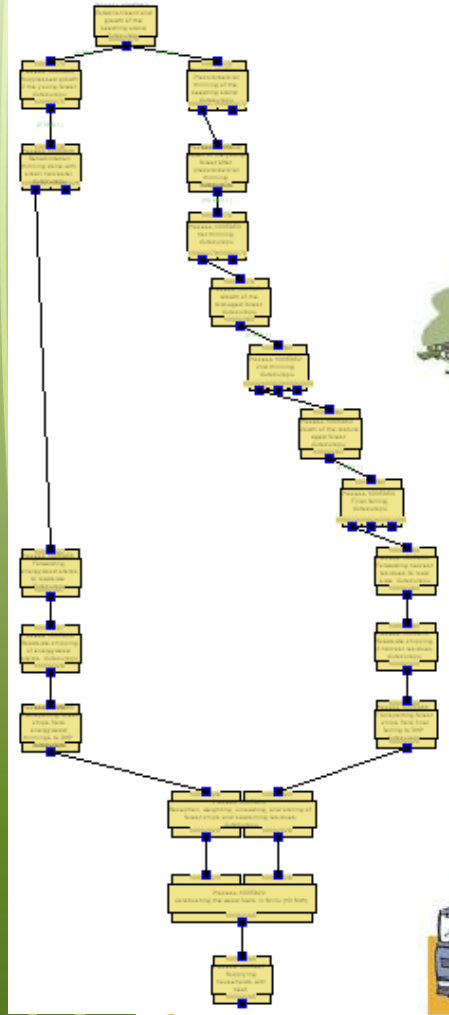
Supplier

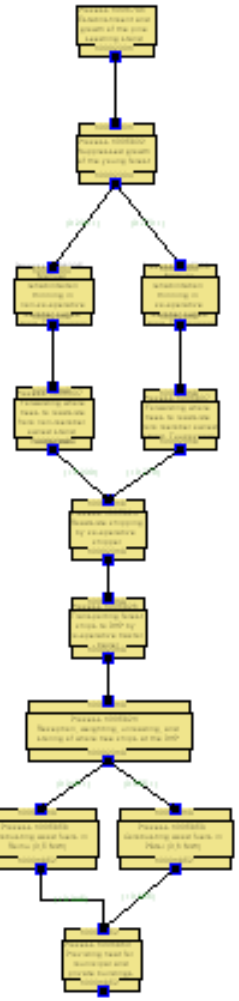
Option. Automated Satellite monitoring of harvesting areas and sustainability (”big brother control”)

MHG systems

# Development of New Sustainability Impact Assesment Tools

# Forest Energy Supply Chain Sustainability Assessment





# **ToSIA** (Tool for Sustainability Impact Assessment)

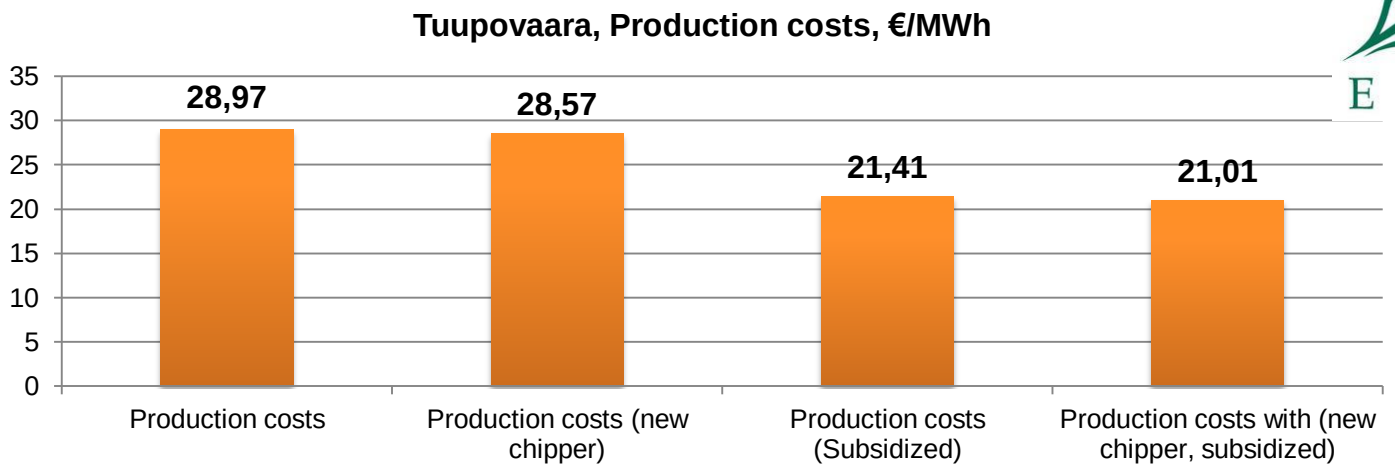
- The Decision Support Tool
- Analyzing environmental, economic and social impacts of changes in forestry-wood production chains
- **Both** software and methodology
- Data driven; http://tosia.efi.int/forest-wood-chains.html
- Answers to What if questions like:
- How to better **optimize** the supply chain?
- What machinery will **boost effectiveness**?
- What transportation technology **suits best**?
- What if regulations change?
- **MHG involved in development through TMUG collaboration and R&D projects**

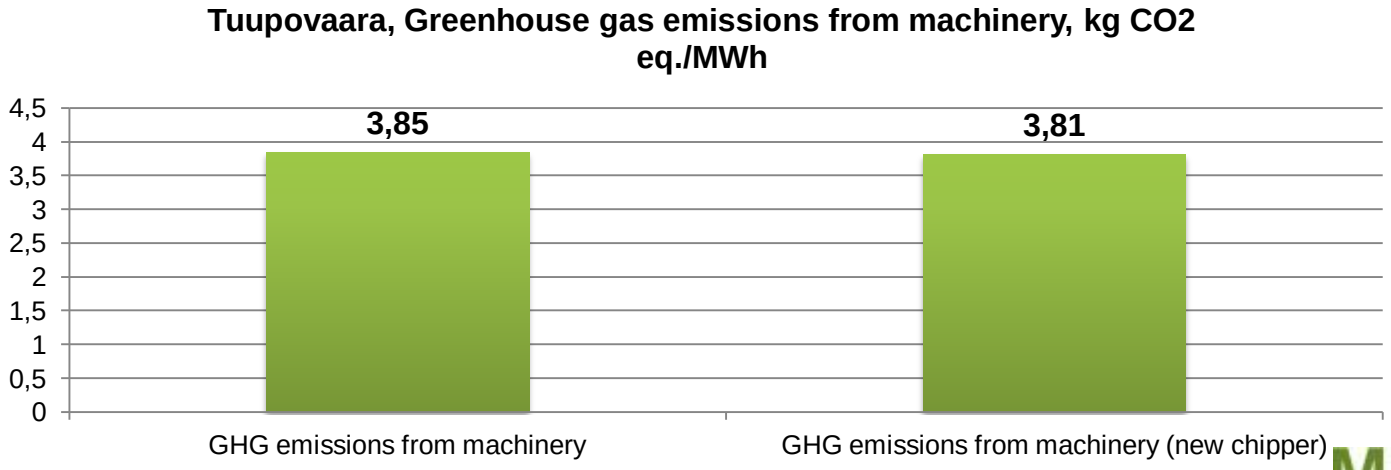
EFORWOOD
Sustainability Impact Assessment of the Forestry-Wood Chain

E F I

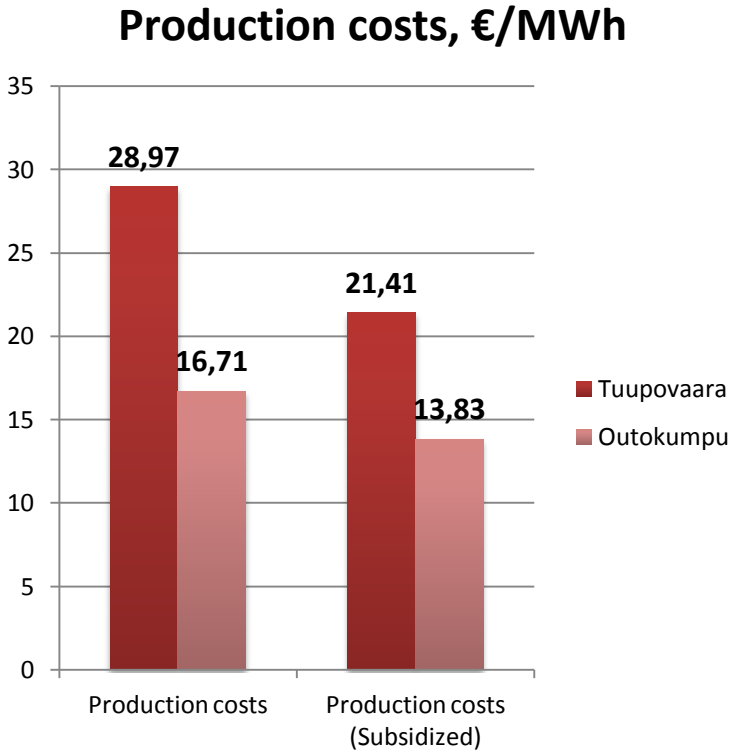
MHG systems

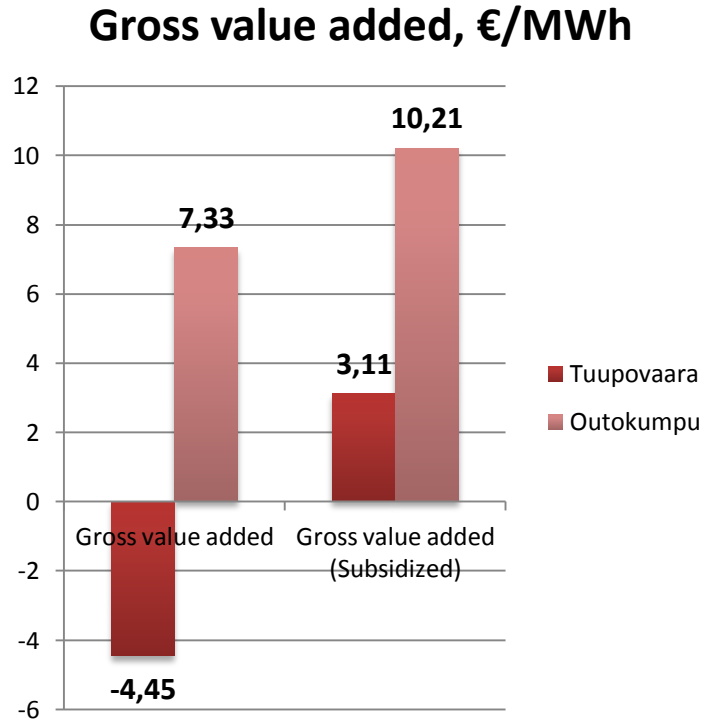
# How Different Machinery Influences Production Costs And $CO_2$ Emissions



# How Regulations Affect Production Costs



MHG systems

# Multi-Use Containers and Return Transport

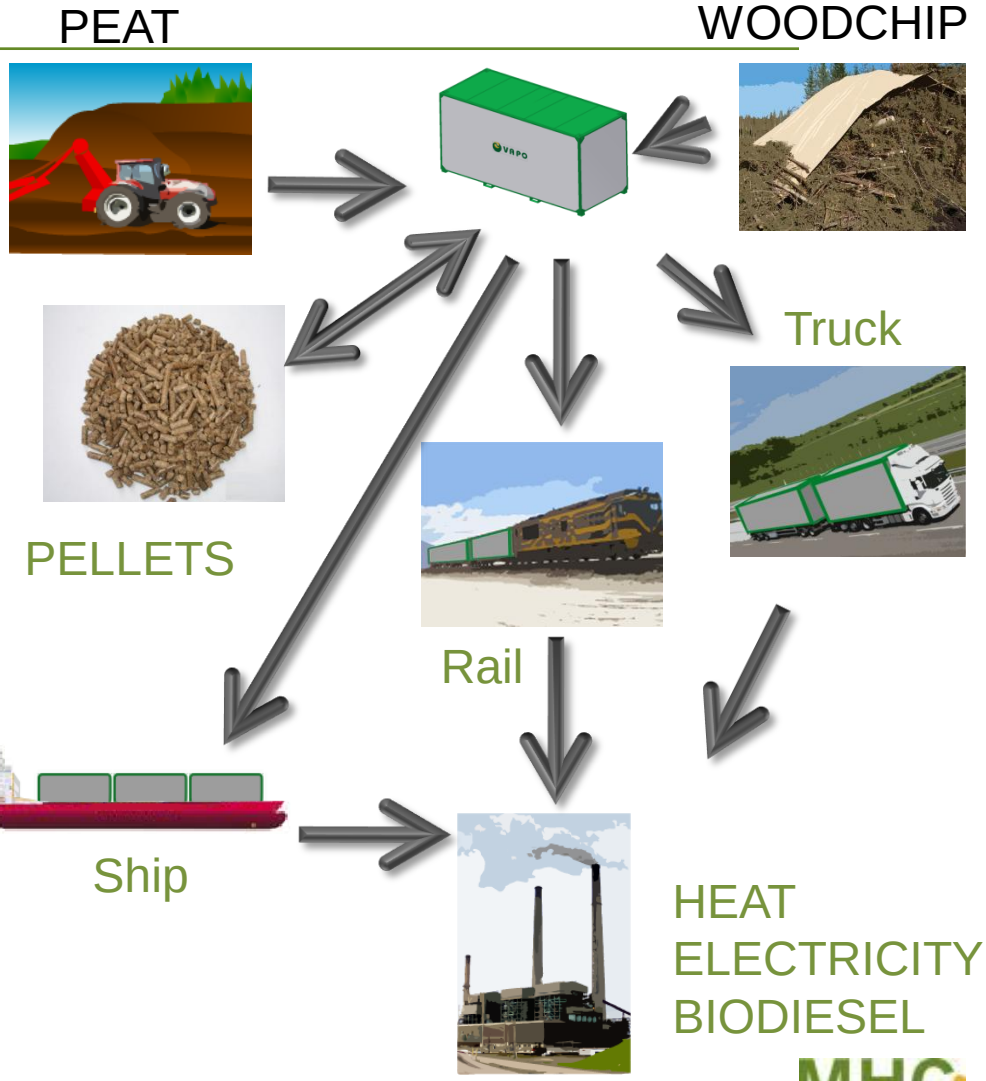
# Multi-Use Composite Containers Save Money and Environment

Fibrocom®

**SUPERCONT Solution**

- With one loading, with minimum handling,

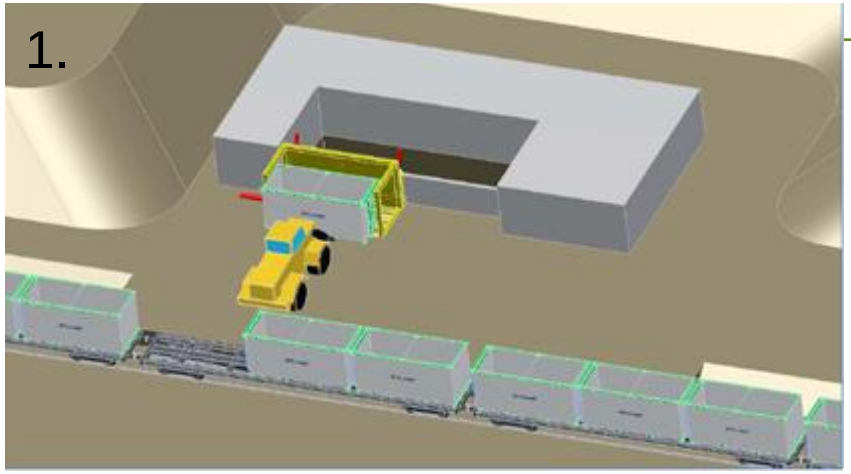
  to the destination.
- Can be handled with existing container and demountables handling equipment.
- Savings appr. 10-30 % (1-3 €/MWh) (LUT)



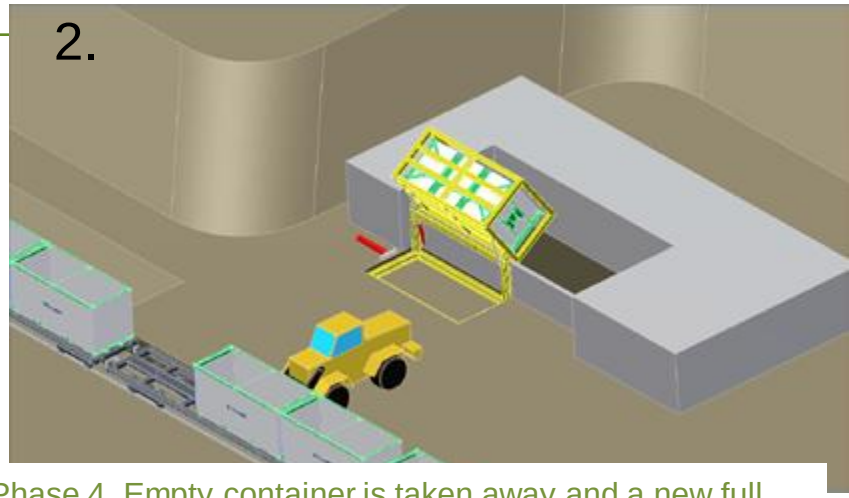

MHG systems

# Unloading Procedure

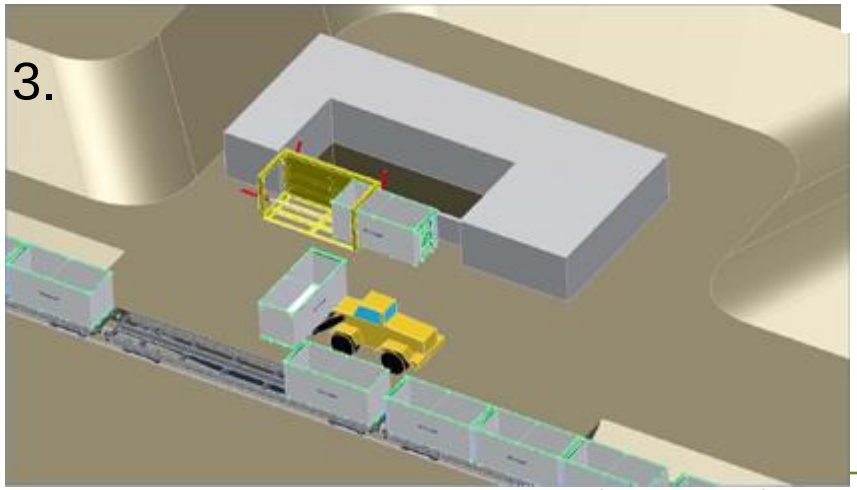
Phase 1. Transfer of the container to turning device with wheel loader.



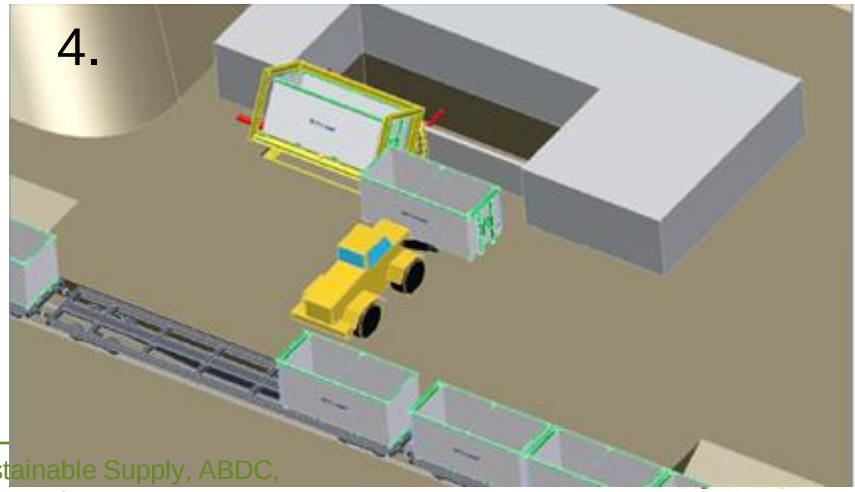

Phase 2. Turning device starts to empty the container by tipping over. Wheel loader fetches a new container.




Phase 3. Turning device moves the empty container aside and is ready to receive a full container. Wheel loader brings a full container to turning device.




Phase 4. Empty container is taken away and a new full container is taken in its place while turning device empties the previous container. Steps 3 and 4 are repeated until the train is empty.



# Case: Biocoal Production Factory in Mikkeli, Ristiina, Finland

**Target**

- To be the largest biocoal pellet factory in Europe
- The site enables also other biorefinery activities on the site

**Milestones**

- Coordinating different players to join
- Several reports 2010-2012

**Timeframe**

- Kick-off 2010, pilot production 2013-2014
- Production 200 000 tons/a (2015)

**Impacts**

- Increasement of wood use 500 000 m3
- New jobs >100 (www.miktech.fi)

MIKTECH

MHG systems

MHG systems

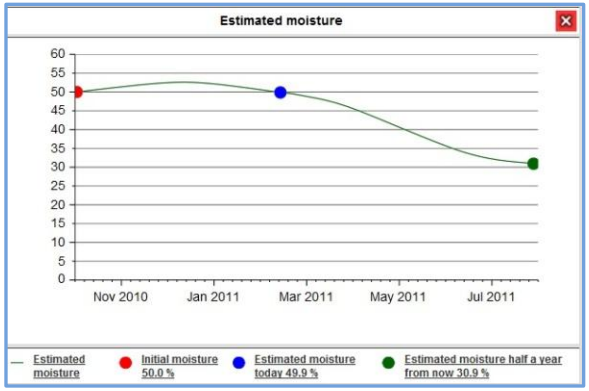
# Quality Issues – Moisture Content

# Moisture Monitoring of Biomass

BIOENERGY ERP / MHG systems

1) Handheld devices
   - woodchips , straw
   - round wood etc
2) On-line monitoring

3) Predicting moisture content
   - algorithm for energy wood




Meteorological real-time data containing algorithm will be implemented in summer 2013 resulting in very accurate moisture/ energy content info

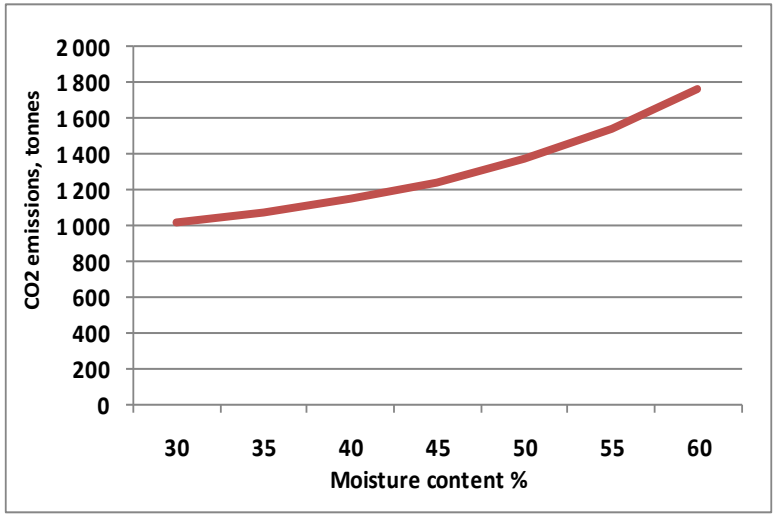

MHG systems

# MHG Bioenergy ERP Helps to Cut MC of Woody Chips and $CO_2$ emissions by 5-10%

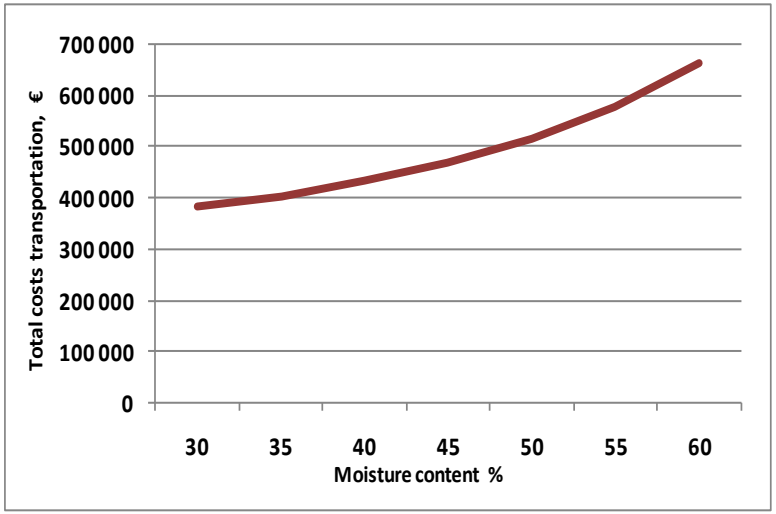
| | | |
|---|---|---|
| Annual fuel need | 170 000 | MWh |
| Volume of the truck | 130 | m3 |
| Max net payload of the truck | 33 000 | kg |
| Average transportation distance | 150 | km roundtrip |
| Transport costs | 1,50 | €/km |
| Weight of the chassis | 27 000 | kg |
| Maximum allowed vehicle weight | 60 000 | kg |

Prof. Sikanen 2010

UNIVERSITY OF EASTERN FINLAND




$CO_2$ emissions tonnes



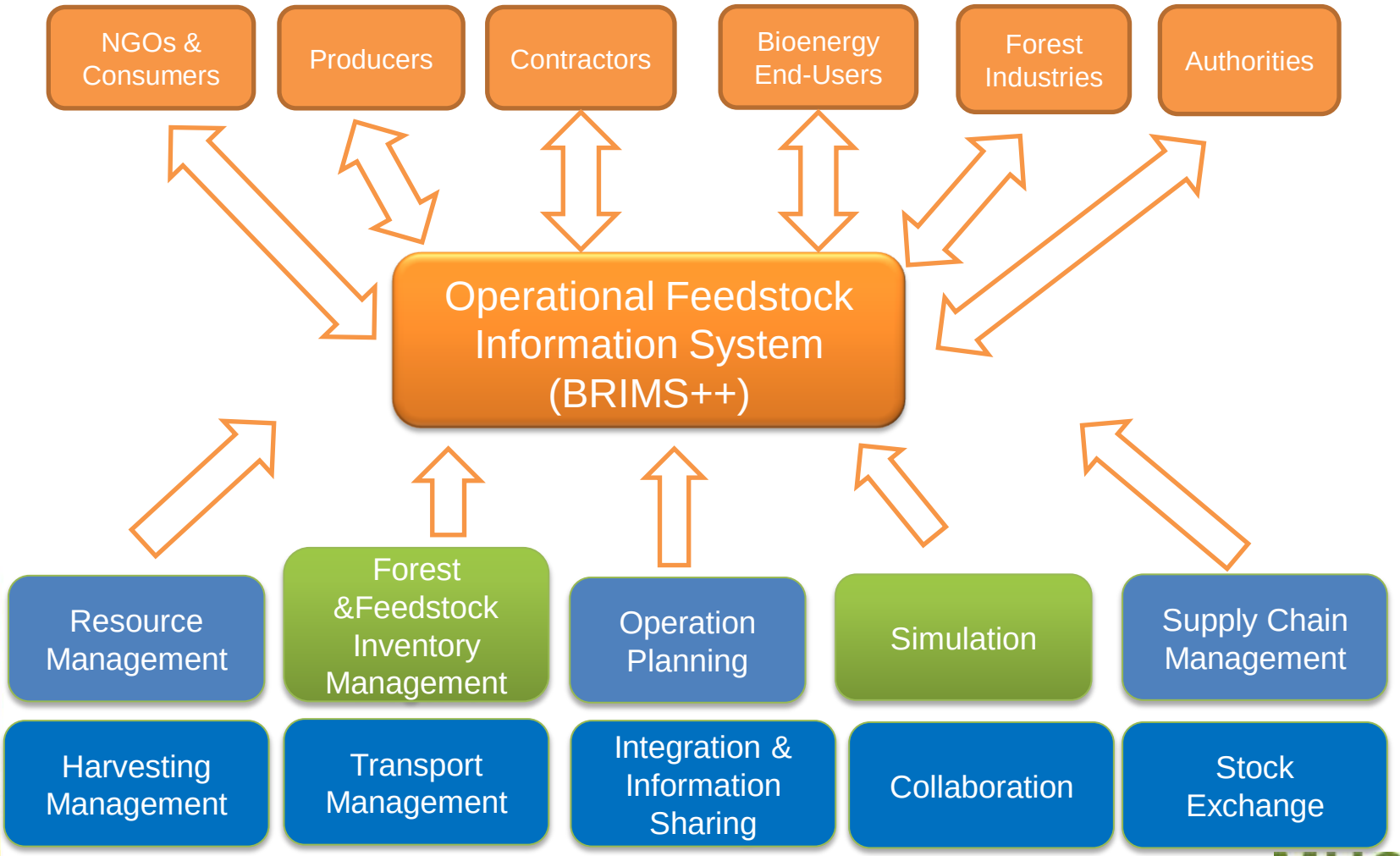

Transportation costs €

MHG systems

MHG systems

# Development of Feedstock Information Platforms

# Feedstock Information System - Features & Users






MHG systems

# Wanted

- Project collaboration
  - **Alberta Bioenergy Optimization Project**

- BtoB: Supply chain development, plantation management
  - Energy, forestry and fuel supply companies; novel technology providers; pilot projects available!

- Partners:
  - Engineering companies (energy & forestry field)
  - ICT-companies (integrators)



MHG systems

# Contact Information

Contact:


- Seppo Huurinainen, CEO
- GSM: +358 44 5814 950
- Email: seppo.huurinainen@mhgsystems.com
- Skype: seppohuurinainen
- Address: Patteristonkatu 2, FIN-50100 Mikkeli, Finland


Thank you for your attention!