Preserving the Environment Through GPS Applications

Sixth Meeting of the PNT Advisory Board
Alexandria, VA USA

November 5-6, 2009

Jeff Hamilton
Director, Strategic Partnerships
Trimble
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Agenda

- Executive Summary
- Three Key Concepts
- What are the GHGs?
- How can AGHGs be reduced using GPS? Two approaches:
  - Increased fuel use efficiency
  - Process innovation
- AGHG Reduction examples
  - Heavy Truck idling
  - Heavy & Highway Construction
  - Mechanized Agriculture
  - Fleet management
Trimble AGHG Reduction
Executive Summary

1. Strategy: Transform the World’s Work through technology and innovation.
2. We use GPS on complex workflow problems
3. Environmental sustainability and AGHG reduction are examples of complex problems
4. We have GPS in > 250,000 customer “vehicles”
5. Our solutions have the ability to reduce CO$_2$ emissions by >100m tons annually
6. Equal to carbon footprint of ~5M people
7. The ROI on these GPS solutions is typically less than 1 year
8. There are many adjacent areas available for sustainability and AGHG reduction innovation with GPS
Three Key Concepts for Sustainability

- Measurement
- Verification
- Process Innovation

All enabled by GPS

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GPS: an inherent management tool

- “If you can’t measure it, you can’t manage it.” ~Unknown

- GPS
  - Position
  - Navigation
  - Timing

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Measurement

- We want to know where an event has occurred, when it has occurred, and its relationship to other events
  - Plume of an oil spill (point source pollution)
  - Carbon sink status
  - Changes in the Cryosphere
  - Tectonic activity
  - Air quality (chronic vs. acute)

This can be for baseline, reduction, acute, episodic events
Verification

- GPS’ inherent abilities make it a great verification tool
  - Fleet management productivity
  - Biomass calculation
  - Fuel use; real-time as-builts; quantities
  - Agricultural tillage methods
  - Agricultural herbicide/nutrient application
Process Innovation

- Guidance
  - Agriculture; heavy construction
- Driver Assist
  - ITS
- Innovative methods
  - Idle exception reporting
- Data rich world: high speed and real-time
What are the Greenhouse Gases?

- **GHGs**
  - Water vapor
  - Carbon dioxide (CO₂)
  - Methane (CH₄)
  - Nitrous oxide (N₂O)
  - Ozone
  - CFCs

- **Anthropogenic GHGs**
  - Carbon Dioxide (72%)
  - Methane (18%)
  - Nitrous Oxide (9%)

GHG Reduction Approaches with GPS

- Increased fuel *use* efficiency
  - Idle time reduction
  - Route selection
- Process innovation
  - Guidance
  - Driver assist
  - Innovative methods
  - Other…
US Heavy Truck - Idling

- 458K US heavy trucks, traveling over 500 miles (800 km) per day
  - Generally idle overnight (~5 hours)
  - 1 gallon (3.78 liters) per hour
  - In the US this is ~598 M gallons of fuel (2,260m Liters) used for idling annually
  - Heavy Truck fleet generates ~6.6m tons of CO₂ annually idling
  - 25% reduction in fleet idle time = 1.6 m ton annual CO₂ reduction

25% idle reduction is achievable using GPS enabled systems
Construction Activities

- Machine control: up to 70% increased job site productivity
  - Reduced fuel consumption and therefore reduced AGHG
Construction Activities

- Improved asset utilization increased job site efficiency
  - Reduction in idle time reduces AGHG emissions

34% idle time reduction
Agricultural Activities

- **Guidance**
  - The ability to consistently navigate an implement to about 1 cm allows process innovation
  - Enables strip tillage/no tillage
  - Reduces load on equipment and reduces fuel consumption
  - Reduces process time

- **Herbicide/nutrient application**
  - New technology allows for plant specific applications
    - Up to 80% increase in efficiency
    - This results in less CO₂ and N₂O
250,000 Trimble GPS Users on the Road

Processing ~16,250,000 Transactions Per Day

Nationwide Coverage

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Trimble Fleet Management GPS System Overview
## OBDII-Based Trip Summary Report

(Provides baseline & progress metrics)

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Exceptions Notification Methodology

EMAIL and/or CELL PHONE SMS Message

GENERATED REPORTS
Automatic or Manual By Exception Type, Selected Employees, Date Range

NOTIFICATION CONSOLE
Updated in Real-Time as you view it!
Recent Pilot Data Using Trimble GPS
(data shown is engine idle minutes/vehicle/day)

100 minutes/vehicle/day saved between start and end of pilot period. 60 minutes is used in most business cases to be more conservative.
# 60 Min/Day Idle Reduction Annual Savings

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Summary

- GPS is a powerful tool for environmental sustainability
- GPS enables: measurement, verification, and process innovation
- Multiple economic sectors can benefit from GPS and its role in AGHG reduction.
- Heavy trucks, Construction activities, and fleet management are just a few examples of where GPS is being used to reduce AGHGs today.
- There are many other areas not mentioned that have tremendous potential: carbon sequestration and process innovation in agriculture
Questions ?

Jeff_Hamilton@Trimble.com