



ONBOARD  
DYNAMICS

***Removing Barriers to Adopting CNG as a  
Transportation Fuel***

***July 24, 2019***

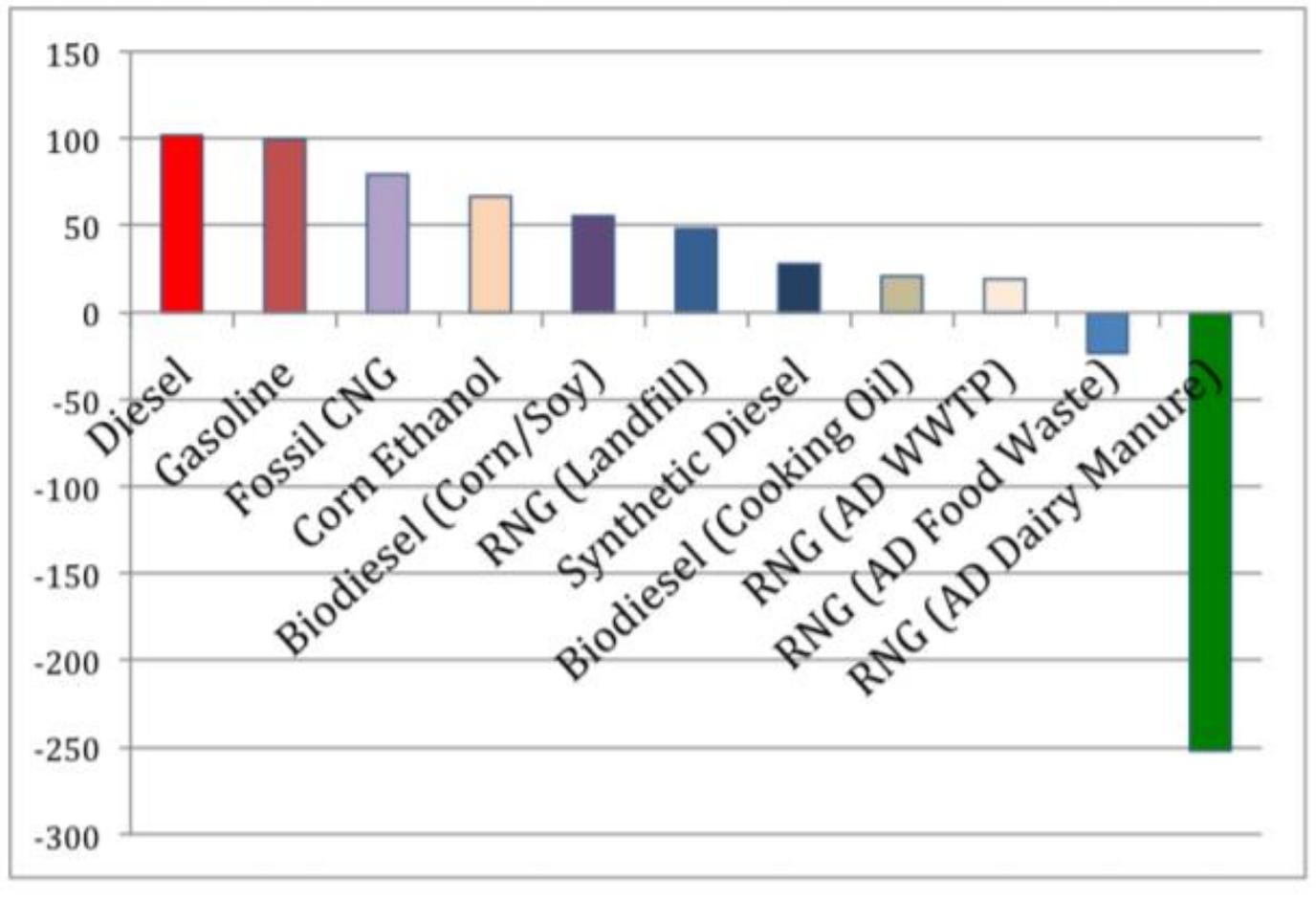
TODD PENDEXTER  
DIRECTOR OF SALES

**FORMER ARPA-E  
AWARDEE**

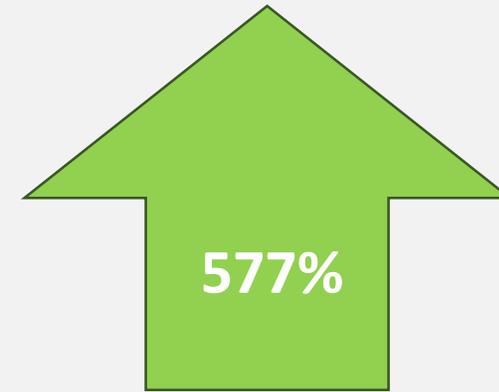
Onboard Dynamics, Inc. 2019  
[www.onboarddynamics.com](http://www.onboarddynamics.com)

# Why are NGV's Important

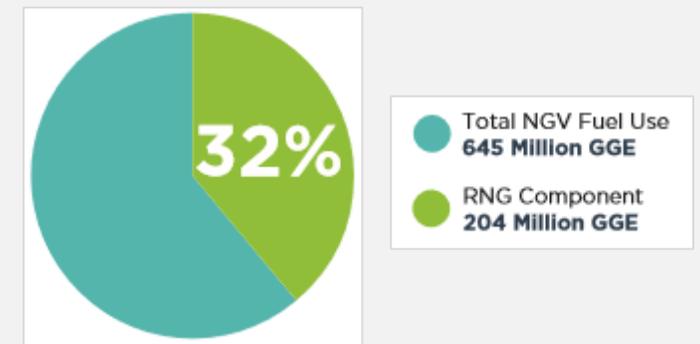
Carbon Intensity of Transportation Fuels



RNG Growth in 5 years



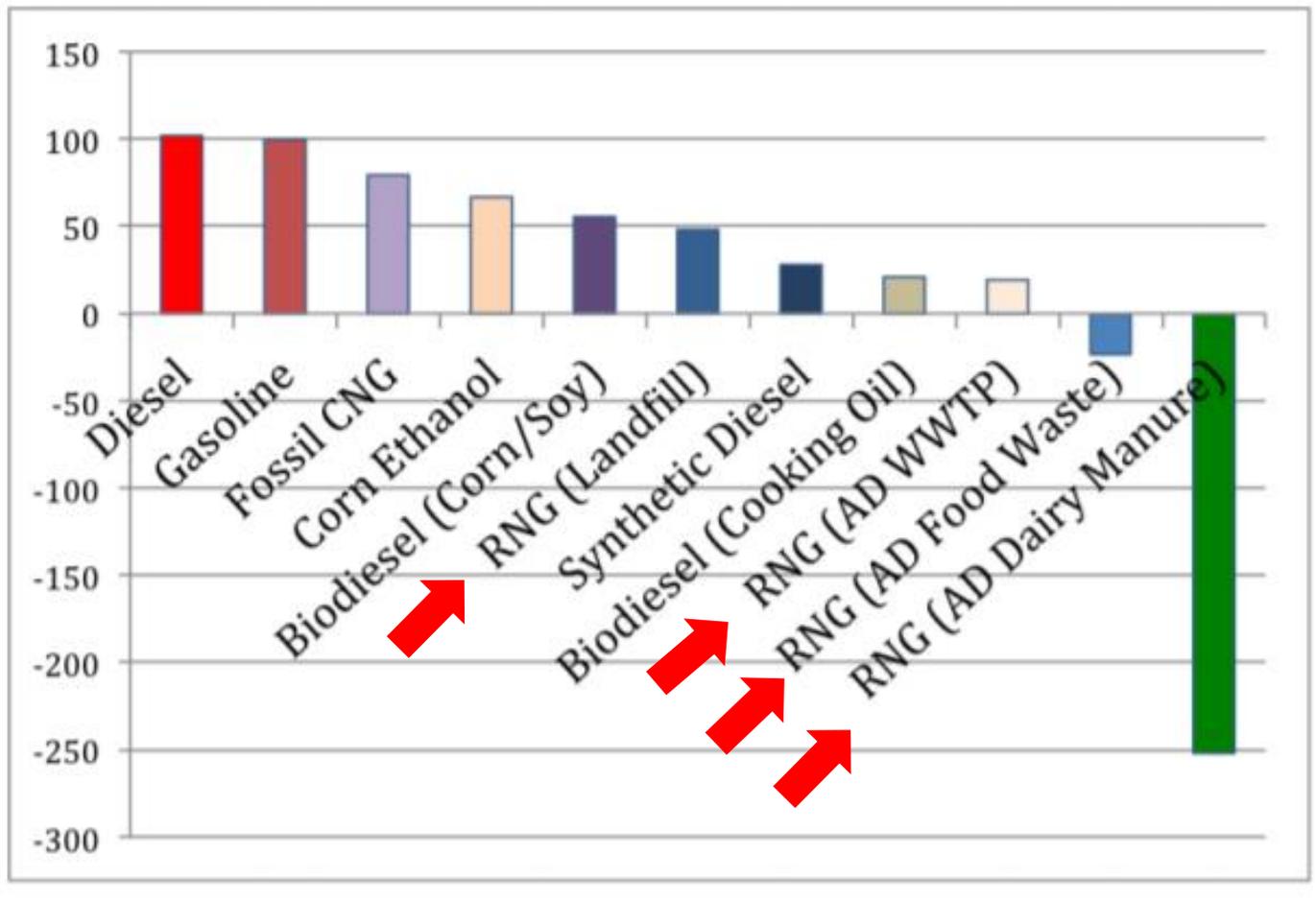
In 2018;



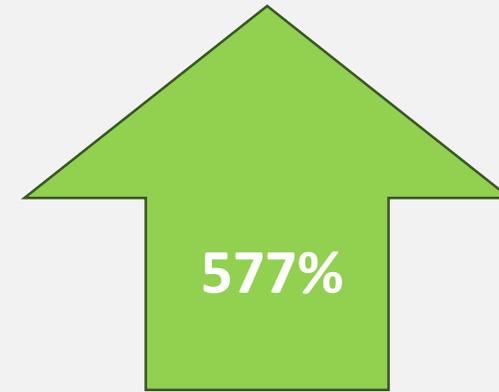
NG Utilities are greening up their pipelines with Renewable Natural Gas

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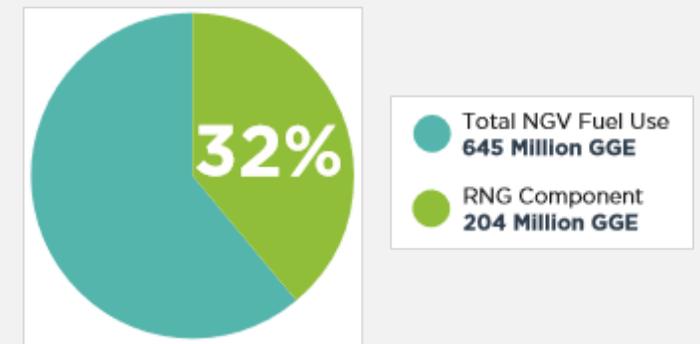
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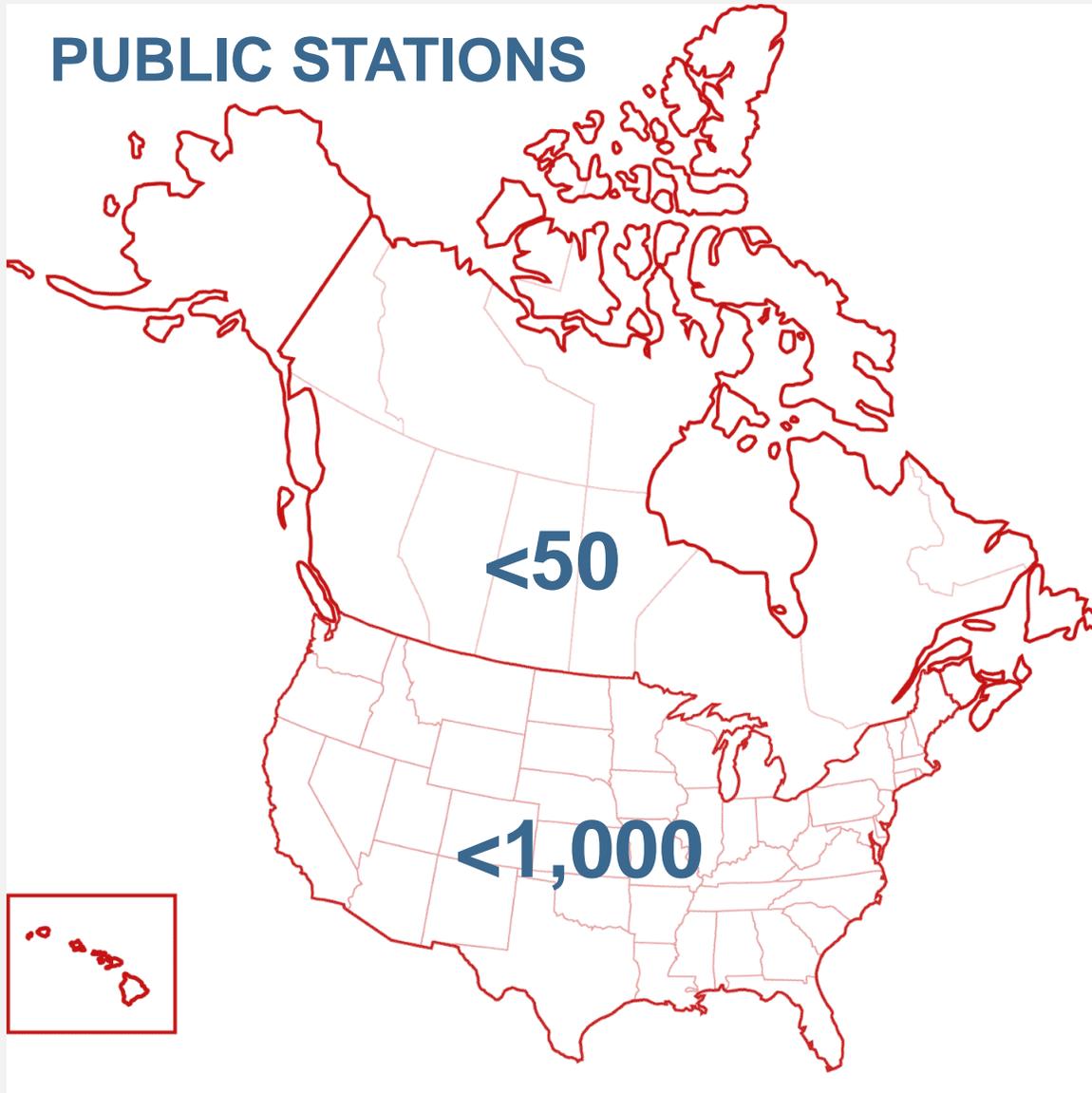


In 2018;



NG Utilities are greening up their pipelines with Renewable Natural Gas

# The Obstacle to Overcome



## A typical fixed station requires:

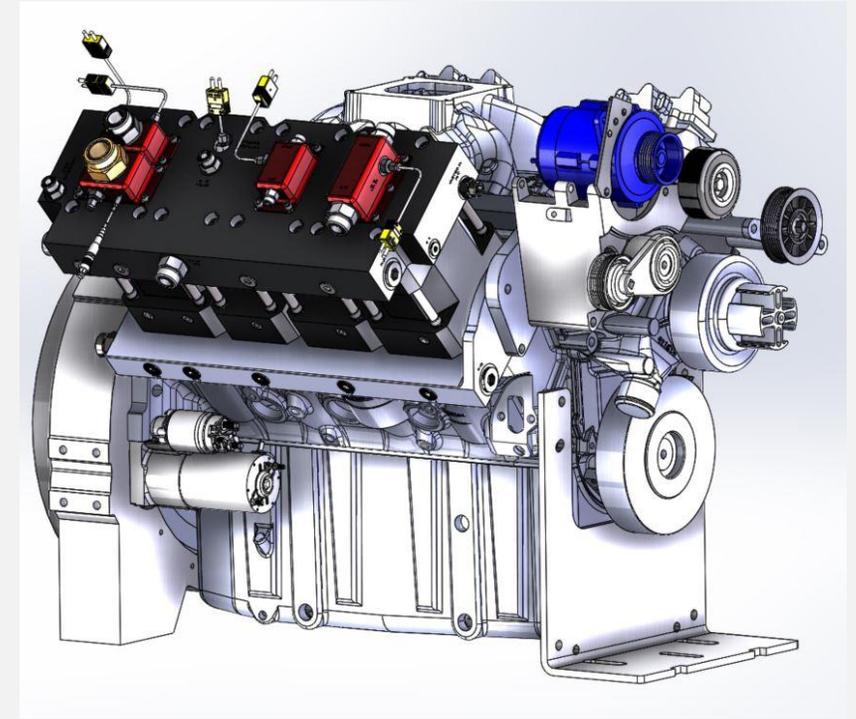
- ✓ Electrical service (typically >200 amps)
- ✓ Stable high pressure (>50PSI) natural gas
- ✓ Large number of vehicles to justify build (>50)
- ✓ 18 – 24 months to complete construction
- ✓ > \$1M(USD)+ per commercial station

***Lack of Available, Affordable  
CNG Refueling Stations!***



Introducing the GoFlo® CNG80 Compressor

# Powered by Natural Gas



## The Technology:

- Patent-pending = 6 PCT's
- Based on an industrial V8 engine:
  - ✓ 4 stages of compression in one bank of cylinders
  - ✓ Powered by natural gas via the other bank of cylinders
- Operates on low pressure natural gas
- No electricity required!

# Product Highlights

## No Electricity

- ✓ Reduced OPEX
- ✓ Emergency backup
- ✓ Remote access

## Mobile

- ✓ Easy redeployment
- ✓ Temporary use

## Scalable

- ✓ Great starter kit

## Easy to Install



# Applications and Uses for the GoFlo Compressor

1. On-Site Refueling for Smaller CNG Fleets
2. Plug and Play Backup of Existing CNG Refueling Stations
3. Supplemental CNG Refueling Capacity
4. CNG Refueling 'Starter Kit'
5. Natural Gas Utility Operations
6. Recovering remote sources of Renewable Natural Gas (RNG) and "stranded" natural gas

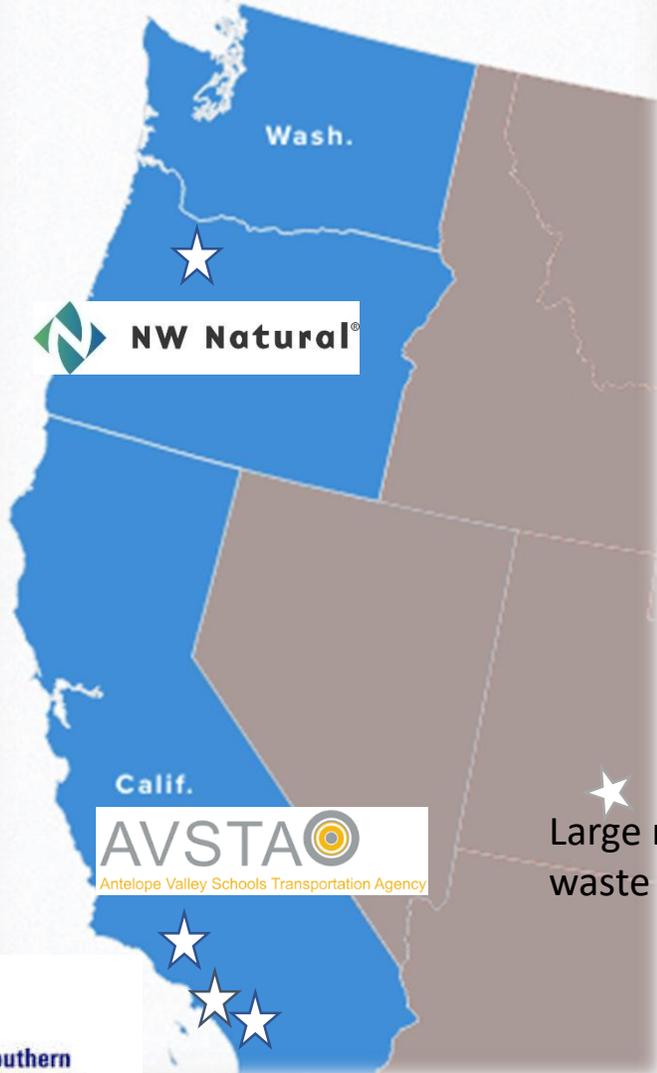
# Applications and Uses for the GoFlo Compressor

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# Product Specs

Product Feature	Nominal Specification
Capacity/Fill Rate	25 to 40 GGE/hour (50 to 80 scfm)
Suction (Inlet) Gas Pressure	5 to 20 psig
Maximum Gas Outlet Pressure	3600 psig standard
Engine/Compressor Control & Management	ECU/CCU: combustion, compression, calibration, closed loop control, fuel maps, timing
Operator Control	PLC with LED HMI display: start/stop, diagnostics, performance, maintenance
Fuel Consumption	~10% of CNG produced
Factory Packaging	Mobile, trailer-mounted, self-contained
Sound level	< 85 dba @ 10 feet
Regulatory Compliance	NFPA-37, EPA
Remote monitoring	Cellular communications via Telematics system
Operating Weight	< 4,500 pounds

# Our Projects



SoCalGas - MVSD  
(El Monte, CA)



SoCalGas Demonstration Project. GoFlo® fueled a fleet of 8 CNG buses for a period of 6 months.  
Avg 83 GGE/ day

SoCalGas – AVSTA  
(Lancaster, CA)



SoCalGas 2<sup>nd</sup> Demonstration Project. GoFlo® is providing additional CNG capacity for a time-fill station supporting a fleet of 43 CNG school buses.  
Avg 200 - 400 GGE/day

NW Natural  
(Portland, OR)



GoFlo is being used to fill tube trailers for pipeline maintenance work and for backup to CNG station

- NOT PICTURED**
1. Time-Fill Station for Small, Private Waste Hauler in Los Angeles
  2. Time-Fill Station for Large National Waste Hauler in Rocky Mountains
  3. Project with NRCAN and CNG Station Developer in Canada

# Use Case



## *The Independent Waste Hauler*

<b>LOCATION:</b>	Montebello, California
<b>FLEET SIZE:</b>	15 Trucks total @ 30 gallons/day (10 diesel, 5 CNG)
<b>MANDATE:</b>	Refuse trucks need to be alt-fuel by 2020 (SCAQMD Rule 1193)
<b>PAIN POINTS:</b>	Dump Fees; Driver Wages; Fuel Costs; Rising Electricity Charges
<b>REFUELING:</b>	Drivers refuel at local utility CNG station @ <b>\$2.10/GGE</b>
<b>GoFlo®:</b>	All-in refueling savings (excluding RNG/LCFS credit): <b>\$1.11/GGE</b> Other avoided costs: <b>\$0.90/GGE</b> Total customer value: <b>\$2.01/GGE</b> Payback for refueling system: <b>&lt;2 years</b>

# Key Product Metrics

List Price = \$180K/unit

## Other Services Provided:

- Installation & system integration
- Service & Support Contracts
- Short-term Leasing (6-12 months)

## Warranty & Preventative Maintenance:

- 12 months warranty, parts and labor
- Standard engine PM at 3-month intervals

***Companion Fueling Trailer available in October...***





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DYNAMICS

*Thank You!*

***Todd Pendexter***

*Director of Sales*

*(503) 523-6566*

*Todd.Pendexter@onboarddynamics.com*