

Global Energy Management System Implementation: Case Study

CHILE

TNT CHILE

Has reduced systematically the consumption, achieving 15% improvements in last 10 years



Representative TNT Team and Vehicles: Drivers, maintenance, back office, customer service, warehouse employee and salesman.

Business Benefits Achieved

During 2015 the consumption rate of our trucks was 3.15 Km/L (13.47 liters of diesel each 100 miles) , considering 2013 performance of 2.94 Km/L (14.44 liters of diesel each 100 miles), we achieved a reduction of 7.14 % against baseline.

Considering above we saved 444.490 liters of diesel meaning a reduction of 1.180 CO2 Tons, saving USD 250.000 in diesel purchasing.

Also we are recognized by our customers as environmental friendly company.

“In my 32 years working in fuel efficiency, I have never seen the level of improvements achieved and demonstrated. And this was thanks the application of the ISO 50001”

—Cesar Rojas, Mechanical Engineer

Case Study Snapshot

Industry	Freight Transportation
Location	Chile
Energy Management System	ISO 50001
Product/Service	Express Cargo
Energy Performance Improvement (%)	7%
Annual energy cost savings	USD 262,790
Cost to implement ISO	USD 21,507
Cost of Vehicle Improvements	USD 333,209
Payback period	17 Months

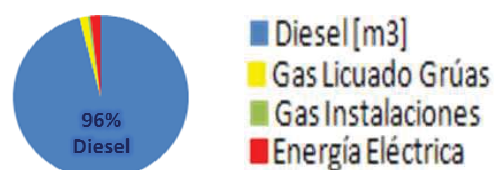
NOTE: The Payback period includes cost to implement ISO 50001 (internal cost, counseling, training programs)and the cost of Improve the vehicles (aerodynamic improvements and new engines).

Company (or Facility) Profile

TNT Chile, a branch of TNT, is a Express shipments company where the domestic business is the main activity. Our main figures are:

- 1.900 workers
- 82 Truck tractors for long distances
- 140 trailers
- 400 trucks for pickup and delivery
- 30 depots, 16 offices and 1 HUB
- 3 million consignments per year.
- 300 million kilos per year.
- 2.1 million of Km traveled monthly
- 650.000 Liters of diesel per month.

Energy Consumption in TNT Chile



Global Energy Management System Implementation: Case Study

CHILE

Business Case for Energy Management

Corporate Responsibility

At TNT, we have a long-standing commitment in protecting the environment, promoting the highest health and safety standards to conduct our operations with integrity and with respect for our employees, customers and in the interests of all our stakeholders.

Sustainability is a priority in TNT.

TNT has a global program **"Planet me"** with several initiatives to reduce the use of energy and CO2 emissions. Through corporate responsibility area, gives the following guidelines to all their operations around the world:

- Reduce consumption of energy and natural resources, decreasing our emissions.
- Improve carbon efficiency using the latest fuel efficient technologies, and by training our drivers with safe and energy-efficient driving skills.
- Continuously optimize our routes and networks.

TNT Chile merges in 2009 with a local express transport company, LIT Cargo, also with a great commitment in saving energy initiatives in the transport fleet with a very experienced team working for several years

TNT Chilean Way...

- **1997:** First engines with electronic management (Pioneers in Chile)
- **2003:** First Massive trainings about Economic and Safe Driving
- **2004:** Roof spoilers campaign
- **2007:** Pioneers in use of dry Nitrogen to Tire Inflation in cargo transportation.
- **2007:** Country Award in Energy Efficiency
- **2008:** Tire Management System
- **2010:** Covers Tanks fairings, side fairings, prototypes of side skirts.
- **2011:** First tests of efficiency under SAE J1321 protocol
- **2012:** Trucks safest and more aerodynamics (over national standard)
- **2013:** New Tests: "more efficient" tires (Energy), new aerodynamic devices, Hydrogen as additive, etc.
- **2013:** Achieve Energy Efficiency certification, gives by Chilean Ministry of energy.
- **2014:** Implementation Process ISO 50001
- **2015:** Certification ISO 50001

Keys to Success

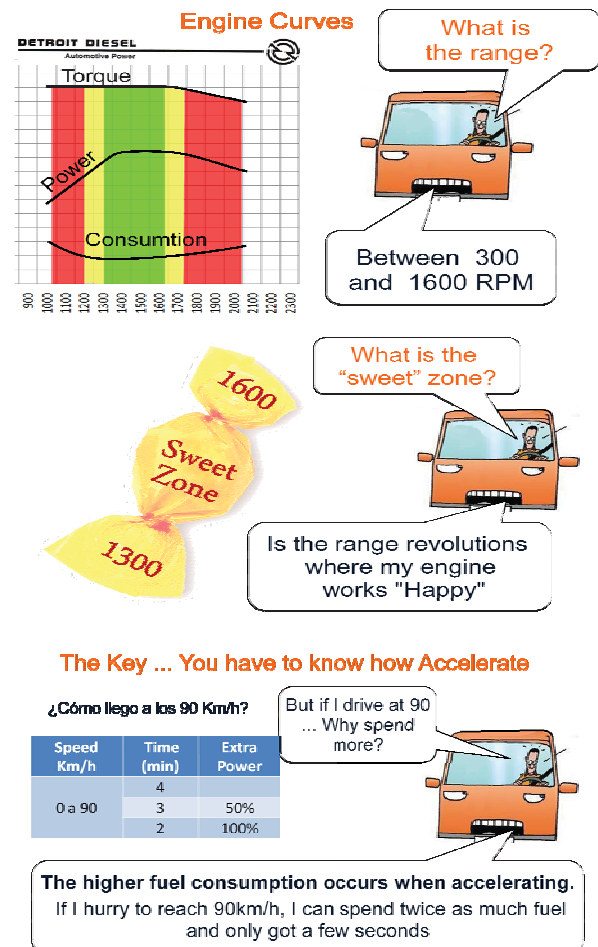
- Training programs
- Innovation and use of Technologies
- Work with partners: University / Govern Agency
- Systematic Controls.
- Exhaustive Vehicle selection process.
- Continuous Improving

Training Program:

We defined a technical committee; formed by two mechanical engineers, two senior drivers, the chief of workshop and a mechanical supervisors, create a Training program called: **"Safe and economic driving"** with 8 hours of duration, 10 to 20 drivers, in each session, learns about the vehicles, good practices, tips and the desired behavior to drive safer, techniques to save energy and about the impact of their single performance. Questions and Answers dynamics also are performed.

Main Energy Contents into training program:

- **Why is energy efficiency important?**
- **How I can help? What is Efficient driving?**
- **How to achieve efficient driving?**



- **The importance and influence of the speed.**
- **Anticipating also helps reduce fuel consumption**
- **Advantages of efficient driving**

Global Energy Management System Implementation: Case Study

CHILE

How does it affect my performance?



A bad driver can generate additional costs of several million pesos a year



... and produces additional contaminants unnecessarily.

Consumption In 25.000 km	Performance Example			
	Bad (2.6)	Regular (2.8)	Good (3.0)	Maximum Difference
Liters	9.615	8.929	8.333	1.282
Values in 1 Month	4.807.692	4.464.286	4.166.667	\$ 641.026
Values in 1 year	57.692.308	53.571.429	50.000.000	\$ 7.692.308

The main keys:

1. To Drive at the highest gear possible and at low revs.
2. Use the cruise speed (90km / h at 1400 RPM).
3. Keep speed as uniform as possible.
4. When accelerating, change up between 1300 and 1600 RPM
5. By slowing, downshift latest.
6. Always perform driving with anticipation and foresight.
7. Road try to decrease the space between the cab and the trailer.
8. If you have lift shaft, upload if not traveling loaded
9. Cares tire pressure. Remember we use dry nitrogen to inflate.
10. Maintaining a day helps the efficiency and reliability of equipment. Besides the engine is very important alignment.
11. Use air conditioning only when necessary. But remember that over 50 km per hour the air conditioner uses less fuel to circulate with the windows open.
12. Do not overfill the tanks (only as far as the neck of the neck) and avoid spills ...



Energy Efficiency Task of All



"In my years of experience, I have never known another transport company that works best energy efficiency. I feel proud to work at TNT"

— Claudio Bravo, Linehaul Driver

Vehicle selection

To ensure a right investment, we use a selection Matrix, with the following criteria for trucks:

CRITERIA	WEIGHING
Reliability	15%
Maintenance, Service, Spare Parts	15%
Health and Safety	20%
Price	10%
Backup and Geographical coverage	10%
Performance in CO2 emissions	18%
Comfort	7%
Fleet Standardization	5%

Efficiency being the second one only behind Health and safety, with 18% of weight.

And for Trailers, the criteria are:

CRITERIA	WEIGHING
Technical Evaluation	15%
Price	25%
Backup and Geographical coverage	5%
Performance and CO2 emissions	30%
Cargo Capacity	20%
Fleet Standardization	5%

Where the fuel performance is the most important criteria with 30% of weigh.

Innovation and use of Technologies.

Background of ISO 50001:

How Measure small improvements?

SAE J1321 allows measures and checks the contribution of different technologies and devices that promises fuel savings.

But To Carry on the efficiency tests (under SAE J1321), is necessary to use and move a huge amount of resources.

Main Test considerations:

- Controlled highway, velocity, cargo weight, driver performance, etc.
- Use 2 Trucks (control and test) to isolate environmental factors.
- Measure fuel by gravimetry (using dismountable tanks)
- Control temperature, wind, maintenance factors, tires, etc.



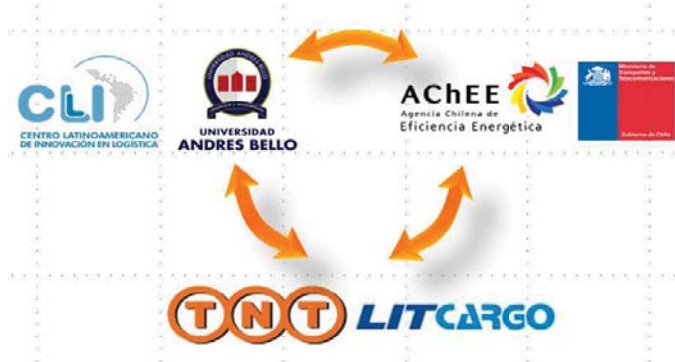
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Association

Considering the huge resources involved Proper Partners where needed to do the tests.

The association was done with University Andrés Bello with their Logistic Innovation Center and with the Government through the Chilean Agency of Energy Efficiency.



With the support of the University, that contributed with experts in different matters (transport, logistic, statistics, procedures, etc), and the financing of the government, through the Chilean Agency of Energy efficiency, we could perform several tests that helped us to make right decisions and argue and substantiate the, use of capital to invest in new technologies to improve our performance.

Also AChEE co finance counseling and experts to prepare TNT Chile for the ISO 50001 certification.

Aerodynamic Kit

Year 2009: The first Aerodynamic prototypes.



The Kit allows 15% fuel savings at 90 Km/h

Influence of Cabin design in fuel economy:



Freightliner Trucks with cover hood, help to save 4.0%

The weight influence in fuel consumption:



Each 1 ton less, fuel performance improves 1.4%

And many other tests, with different results.

- Save energy tires
- Fuel additives
- Hydrogen as additive in combustion
- Low profile tires
- Aerodynamic devices

Tire Management:

The use of tire management software allowed us:

- Systematization of inspections.
- Historic data registers (Life cycle, duration, costs)
- Asset control (Tire location: depots, vehicles, repairs, etc)
- Control and adjustment: Deep and pressure Tools



Use of Nitrogen to Inflates Tires

- Keeps inflated pressure along time.
- Safer than compressed air.
- Is not corrosive, Is not explosive.
- Steadier pressure and temperature.
- Reduces heat generation (rolls 20% colder)



Results of Tire management:

- Increased the useful life of tires 25%
- Reduced the fuel consumption around 2%

Global Energy Management System Implementation: Case Study

CHILE

Systematic Controls

To manage, we have to measure: Meribia System.

Every trip of our Line Haul fleet has a unique number, registering all information related; drivers, destination, km driven, fuel used, tolls, etc. If a truck does not have this number in the route sheet it will not leave the premises.

This rich data base, allows us to measure and manage our energy use and also detect deviations or good practices.

To control the fuel refills, in our facilities we have our own fuel tanks, equipped by RFID systems that identify the vehicle and also the driver.

When the drivers and trucks come back to the base (At Santiago), the transportation department receives the route sheet and closes each trip. Then we have the fuel performance of every movement.

“For our company is critical to keep a track record of our fuel consumption not only for the costs related but also because we recognize we are part of a contaminating industry, for us is critical to reduce as much as possible our emissions”

—Felipe Barriga, Operations Director

Our Organization to Save Energy

Senior Management of TNT Chile has established, implemented and maintained a policy of Quality & Energy Efficiency. They set the objectives and provide the support and resources needed to improve energy efficiency programs. For assuring the continuation of this support is critical to have a reliable control system with consistent information.

Implementing an Energy Management System, based on ISO 50001, has enabled to establish training activities, to determine responsible for system control and to set the consumption reduction targets;

- Systematic training in efficient driving of our drivers. Because in them lies much of the energy management of the fleet.
- Testing and incorporation of new aerodynamic devices and technologies to our fleet.
- Keep maintenance standards.
- Ensure process compliance, keep a right register and due diligence of documentation and improvement planning.

To ensure compliance with the goals, Measurement and Verification Procedures were also defined, based on weekly reports of diesel oil consumption in entire LH fleet. Also

periodically we perform audits to our process and registers made by internal qualified auditors.

Achievements made have been recognized by senior management and also by a global TNT contest, where one of the collaborators key in fuel efficiency success was recognized as one of the 5 key employees around the globe for innovation, passion and perseverance to achieve low energy consumption.

The team is formed by the operations director, Maintenance Manager, Technical Assistant Manager and Fleet Coordinator. Members were key to achieving this certification

TNT through Maintenance Management developed procedures **(NTP-072)** to establish the methodology to be used for:

- Identify and assess the energy consumption of the company according to the defined scope.
- Based on the assessment generate action plans to improve the energy performance of TNT Chile.
- The company establishes a baseline of energy used and fuel consumption according to records of 12 months, between January and December 2013.
- Base line is registered in Matrix of energy review **(Reg.309)** and Energies used into the company will be considered significant if fulfills at least one of the following criteria:
 - **Criteria 1:** Significant Zones of routes will be considered significant if the pooled annual consumption exceed 5% of total consumption.
 - **Criteria 2:** Will be considered significant any use of energy which indicator has varied by more than 10% compared to the value recorded in the base line year and in a significant zone (criteria 1).
 - **Criteria 3:** Energy consumption will be considered significant whenever presents a potential for significant savings, about 2%, with a period of return less than 5 years.
- The technical committee holds regular meetings, at least 4 times a year, where opportunities of improvements are reviewed and evaluated. Once identified the opportunities are recorded in the document "Opportunities for Improvement" **(Reg-312)** that has the following information:
 - System involved
 - Energy source where we expect savings
 - Description
 - Investment description
 - Expected annual energy savings.
 - Expected annual economic savings
 - Date of opportunities improvement identification.
 - Start of operation of improvement.
 - End Date of Execution
 - Difficulty of implementation.

Global Energy Management System Implementation: Case Study

CHILE

- Once a while when the data is completed it is presented to Management Representative and Senior Management for approval and preparation of guidelines to formalize the communication of the implementation process.
- Consumptions identified as significant, will be reviewed at the meetings with the technical committee, to analyze their root causes and propose improvement plan, actions and follow up (At least 4 times a year).

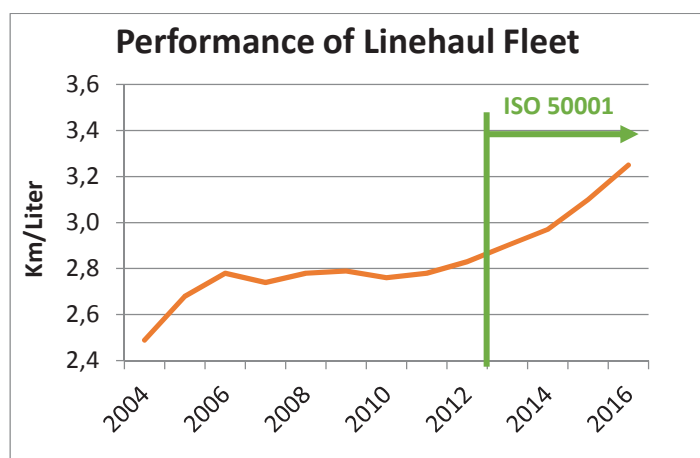
“The ISO 50001 and EnMS gave us the structure and tools but overall, the systematicity to focus our efforts and achieve results never seen before.”

—Jose Luis Vásquez, Maintenance Manager

EnMS Development and Implementation

TNT Chile starts working in ISO 50001 on year 2013, but with the previous experience in QMS, where the system already was mature.

The ISO 9001 certification and the experience working under this system, was helpful and allowed us to obtain great results in brief time.



The graph shows the impact of the improvements and how the ISO 50001 has allowed keep improving continuously.

Lessons Learned

The efforts done following a structure and been systematic, allowed us to align the company and the people behind a common target: The energy efficiency

The energy efficiency brings only good things:

- Save Costs
- Reduce exhaust emissions.
- Help to be sustainable.
- Enlarge the span life of the vehicles
- Reduce use of tires and the scrap generation
- Improve the Image of the company
- It's a sales pitch
- Care the vehicles and devices (reduce maintenance)

Having had a strong system of quality management was key to rapid and successful implementation of ISO 50001. They are very complementary systems.

Have a clear information about the consumption, the performance, the savings and be assured that all data are correct and you have a methodology to find, develop and implement improvement opportunities is key to success.

Thanks to ISO 50001, the Technical committee have had credibility, and due this, have obtained resources to continue working in energy efficiency. A virtuous circle is generated.

The Team behind the ISO 50001 certification

The people in the picture, from left to right:

- **Cesar Rojas:** Mechanical engineer, crazy genius and a passionate environmentalist.
- **Pablo Almendra:** Fleet controller, demanding and rigorous.
- **Marcela Solari:** Quality coordinator and the engine of the ISO.

Global Energy Management System Implementation: Case Study

CHILE

- **José Luis Vásquez:** Maintenance manager, hard worker and motivator.



Out of the picture, but not less important:

- **Gabriel Russell:** Chief of workshop and a perfectionist.
- **Claudio Bravo:** Senior Driver and passionate for achieve improvements.
- **Juan Luzoro:** Senior Driver and confident speaker (he loves to give presentations)
- **Sergio Hernandez:** Maintenance supervisor and hard worker.

Special Mention to our Operational Director, Felipe Barriga (in a picture). Who always has supported us and encouraged to improve.



Felipe Barriga Phillips
(Operations Director TNT Chile)