

# Blue Yonder's Sustainable Supply-Chain



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The past years have seen a tremendous shift in mindset for major companies and industries in terms of the growing momentum to be more accountable and proactive towards building a sustainable and green business model. The COP26 held in Glasgow was a turning point that emphasised the growing need to set clear sustainability goals and build actionable plans to build a zero-emissions economy. As per the requirements of NAWCI, we have split the problem into 3 main parts which we will be tackling separately, namely- Warehousing, Transportation and Packaging and devised an implementation strategy for each domain to help them achieve their end goals of significant carbon reduction in the supply chain.

## Warehouses

"Warehousing industry in India is estimated to be around Rs.560 billion. :

The Indian logistics sector contributes to around **7% of total CO2 emissions**. <sup>[1]</sup> Warehousing is an essential aspect for all the NAWCI members. As products start to be shipped over long distances, and efficient storage and distribution system becomes the need of the hour.

For the warehousing aspect of our five-year plan, we offer some long term and short term solutions to control the members' carbon footprint following the MAQ framework.

### Short term plans :

With the ever-growing demand for goods from all across the country, the power consumption of warehouses has also skyrocketed. In addition to storage, warehouses consume power for value-addition processes such as packaging, labelling, assembly and repair. The storage of perishable goods adds to the electricity demand for temperature-controlled systems.

Lighting and temperature control issues are one of the biggest causes for the increased carbon footprints of these large warehouses.

Indian warehouses are also missing out on the untapped potential in the form of solar energy as an alternative to traditional forms of energy.

The **COP26 summit** implicitly mentioned coal as one of the most significant causes of carbon emissions. Installing solar panels over warehouses would be beneficial as large warehouses can install up to **2 MW** solar panels on their rooftops.

### Long term solution :

Around **80 - 90 % of significant companies utilise 3PL services** for warehousing and distribution operations <sup>[2]</sup>. The highest cost to the company occurs in the form of inefficiencies in warehousing and planning regarding the products' movement.

India has the lowest warehouse capacity with modern facilities in the developing world. Given the fragmented industry state (large share with unorganised players), investment in IT infrastructure is almost absent at the required scale.

We propose the NAWCI implement a **hybrid blockchain** at a central level for its members to utilise and then automate their storage and movement using the collected consumer data. NAWCI members can operate their warehouses as a network for the fast movement of products. It will connect all of the available warehouses, and each party will be able to deploy blocks for obligations like product location, transactions etc., visible to the organisation specific. Being a central blockchain, it is easy to deploy for everyone to use without the risk of data redundancy. It will help in the following ways :

- ☐ The distributed 3PL services require transactions at the local level at every junction of the product, making it slower than its potential.

Every time a product reaches/ leaves a warehouse, it involves transactions between the concerned parties, which is inefficient. The centralised blockchain can seamlessly deploy smart contracts to carry out operations nationwide. Such automation will give around a

**15% boost in efficiency** <sup>[4]</sup>, thus decreasing the delivery time and ultimately lowering the carbon emission per product.

- ☐ The supply chain is also opaque in its transportation phases to different parts of the organisation; hence collecting data about possible emissions becomes very difficult.

The journey of a product from the factory to the customer involves several destinations and is usually not transparent for immediate improvements. The central blockchain will give spot-on precise data regarding possible emissions and better movements/ storage techniques.

- ☐ Automation of these processes will give huge profits and reduce losses incurred.

Once the company has set up the chain, sending and receiving goods from warehouses can be automated by setting up predictive patterns. Also, since the warehouse and its contents will be pre-defined, storing them individually can be automated with minimal human interaction. It will stop all errors caused by inadequate storage techniques and will be better than existing warehouse management systems as this system would have the knowledge of the future and past movement of the product in advance

Estimates from western counterparts <sup>[3]</sup> indicate a possible **two-fold increase in efficiency**, reducing carbon emissions from repetitive shipping according to demand.

- ☐ Inventory at warehouses is majorly stocked according to demand, which can be significantly improved by chain automation.

As most of the NAWCI members deal in FMCG, a broad spectrum of products have a massive potential in a completely automated supply chain. Primitive forms of such methods exist at local levels, but with the exact details, transportation improvements will give an **efficiency increase of 30%**. <sup>[4]</sup>

- ☐ Inventory management at the individual warehouse levels can be made more efficient.

Companies like Unilever and Walmart have already tried blockchain technology for their inventory management across the nation and reported profits. An efficient inventory will drastically reduce the waste generated at these warehouses, accounting for almost **0.45 kg of waste per 100 square feet** in the US. <sup>[5]</sup>

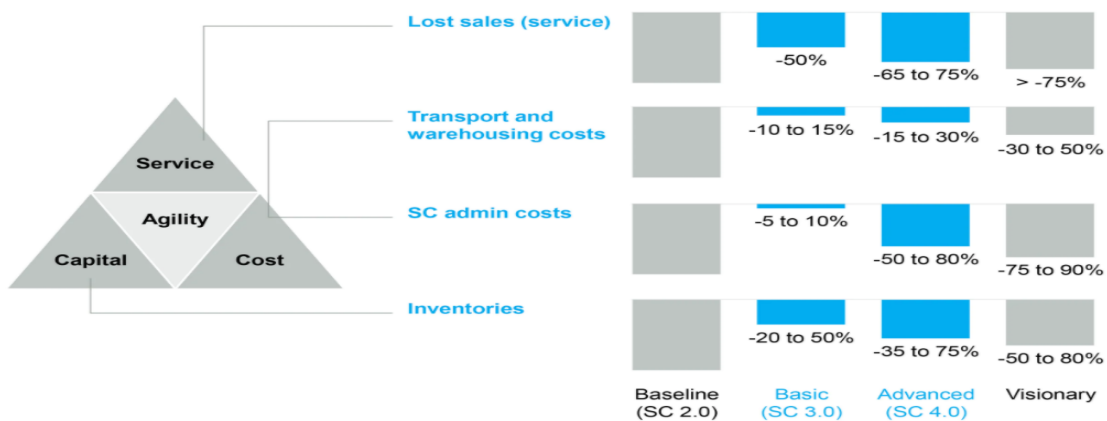


Fig1: Estimates for efficiency by automated supply chain <sup>[4]</sup>

This solution is planned to be executed over the next five years with the cooperation of all NAWCI members. The members will implement renewable energy in the form of solar panels, which will generate **1.5 million units a year**, offering benefits such as reduced costs, reliable power and strengthening corporate reputation.

This solution will be deployed along with existing operations to ensure zero stops in company operations. It will follow the MAQ framework as :

- Measurable profitability and revenue impact: The proposed idea would cut off all the middle transactions at an individual level by **automating the process** and thus create an optimum continuous supply flow. It would tremendously improve the transparency in the process for the

company, thus allowing them to make further amends in their operations. Similar usage by companies like Unilever and Walmart suggest around **30% increased efficiency**. Also, the automation of storing and inventory management is expected to give 30-40% improvements in inventory-related costs

- Actionable Initiatives: Currently most of such independent companies use their own warehouse management system at an individual level, and integrating the information into a central chain can be done alongside normal functioning. The process will also help predict in advance the amount and types of goods to be stored in a warehouse, and hence they can be prepared for in advance. Most NAWCI members deal in FMCG products, their product movements can be planned more effectively using data for all the warehouses in their network.
- Quantifiable and predictable benefits: Increased efficiency for storing and sending off the products in a supply chain will drastically reduce the carbon emissions due to 1) Waste generated due to delays 2) Sub-par storing and transporting techniques done without a clear view of the supply chain, 3) Inefficient usage of the available warehouse space by stocking inventory with not in-demand products.

## TRANSPORTATION

### Introduction:

Transportation is of utmost strategic importance when it comes to reducing carbon emissions in the supply chain, because it is the link that connects the various stages of the supply chain, and is its backbone. It accounts for 14% of the total global greenhouse gas emissions as per the IPCC 2014 report. With the fast pace of globalisation, goods, people and capital increasingly 'flow' beyond geographical boundaries. The role of transportation becomes more conspicuous in supply chains that are inherently dependent on nature, such as those of food and seasonal products, which require sourcing from distant areas.

For example, when it comes to climatic conditions, sustainability of the production processes and efficient management, specific to certain regions, importing produce often leads to overall lower carbon emissions, as has been found in the case of apples, lettuce and milk solids in European markets. Also, the choice of mode of transport is an important factor. Thus, in such conventional supply chains, the difference due to transportation plays a more significant role than the production (manufacturing process) choices<sup>[6]</sup>.

Distribution network emissions of company

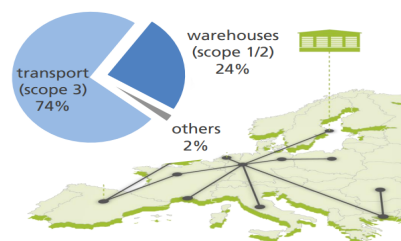


Fig.2: Contribution of transportation to carbon emissions

### Major Problems:

The most pressing issues faced while addressing the carbon emissions due to transportation are:

- A report by the World Health forum predicts that by 2030, the number of delivery vehicles on the road in the top 100 global cities will increase by 36%. The average diesel delivery truck emits

18.7 tons of carbon dioxide annually. More heavy-duty diesel vehicles on the road mean more tailpipe pollution, worsening air quality, and increased global warming emissions<sup>[7]</sup>

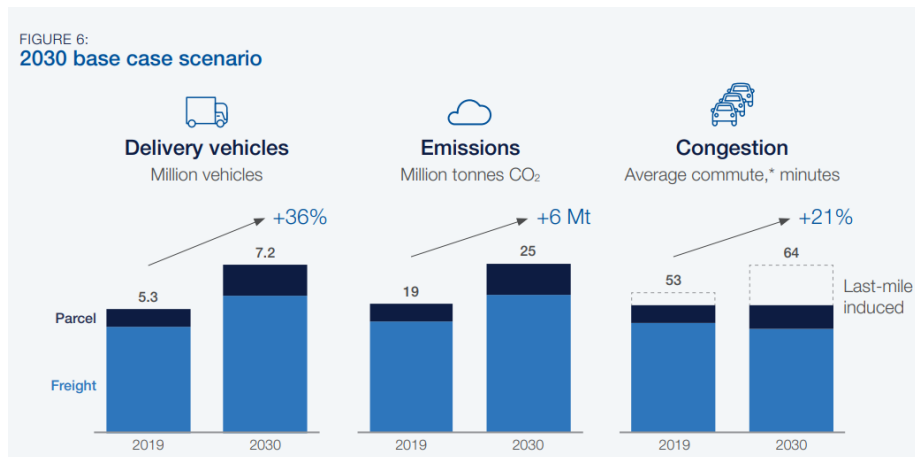


Fig.3: Estimation of carbon emissions over the next few years

- One major reason for increased carbon emissions in the transportation industry is that the long supply chains of many industries caused by globalisation, increase freight movement. For instance, most delivery trucks use diesel since that is the affordable fuel option, but using **diesel increases the carbon footprint**, by releasing 13 per cent more CO<sub>2</sub> into the atmosphere.
- Accurate measurements of the emissions are not possible as there is no single standard of estimation. Methods used vary from organisation to organisation.
- Imports and exports constitute a major part of the supply chain, but very often, the emissions are not considered by either of the countries involved.

## SOLUTIONS:

1. **Separate routes for electric buses (public transport) can be integrated with long-distance, zone wise transportation.** Fuel efficiencies used in this analysis were as follows: diesel bus: **4.82 miles** per diesel gallon; diesel-hybrid bus: **5.84 miles** per diesel gallon; natural gas bus: **4.47 miles** per diesel gallon equivalent; and battery electric bus: **2.02 kWh per mile**, which accounts for a 90 % charging efficiency. Converting the fuel efficiency of the electric bus (i.e. 2.02 kWh per mile) into equivalent miles per diesel gallon gives an equivalent fuel efficiency of the battery-electric bus of 18.8 miles per diesel gallon equivalent<sup>[8]</sup>.
2. We can work on the **integration of e-commerce apps/websites** with delivery apps to provide exchanged delivery options at regional levels similar to paper & parcel (Mumbai based company). This will increase the efficiency of each delivery/pick up made in a particular region.
3. **Drone Delivery:** With the Ministry of Civil Aviation updating the Drone Rules 2021, efforts are to make India a global drone hub by 2030. By 2025, India is anticipated to be the world's third-largest drone market, according to the results. A company called Zipp Electric plans to start drone delivery operations in 5 cities. Similarly, many other drone companies will emerge over time which will highly sustainable last-mile delivery<sup>[9]</sup>.
4. **Dedicated expressways for logistics:** With a push towards developing logistics infrastructure, there is a possibility of the development of expressways/ multimodal logistics parks that will facilitate transportation<sup>[10]</sup>.
5. **River interlinking:** Interlinking of rivers will create a network of navigation channels. Water transport is cheaper, less-polluting compared to the road and railways. Further, the interlinking of rivers can ease the pressure on railways and roads also<sup>[11]</sup>.

6. App for LTL's driver connection: A unified app that will track the location of delivery agents to keep track of the availability of space with these agents.
7. **Efficiency run**  
Most of the drivers do not have adequate knowledge of the proper methods of driving and usage of accelerators, brakes etc. Companies should aim to provide a sort of training to the drivers handling the transport of goods in order to improve efficiency.

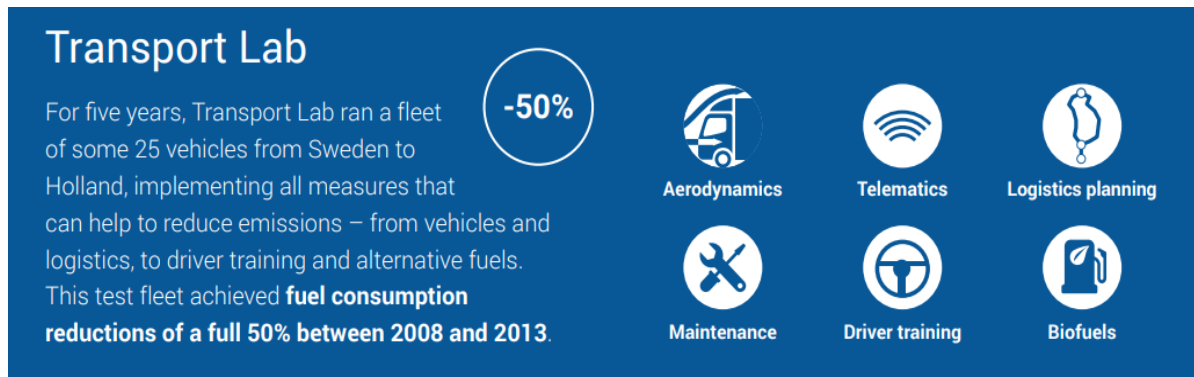


Fig. 4: Pilot Project for reducing carbon emissions in transportation

8. **Truck platooning**  
The above solution can be further optimised by linking self-driving trucks in a convoy using wi-fi or other means, enabling them to travel in sync. Platooning results in lower fuel consumption and increased safety, as the trucks drive closer together at a constant speed, with less braking and accelerating. Truck platooning has the potential to reduce CO<sub>2</sub> emissions by around 10%, in line with the vision of COP26<sup>[42]</sup>.

## PACKAGING

Packaging is a key component that surrounds the value chain of products and often multiplies in the supply chain in the form of returns or extra transportation cartons.

### **Major Problems:**

According to research conducted by the CIEL (Center for International Environmental Law), 3.5 kilogrammes of CO<sub>2</sub> are discharged into the environment in order to manufacture a kilogramme of plastic, which merely adds to the problem created by its sluggish breakdown.

Another study carried out by The Research Institute of Sweden in partnership with the European Association of Carton and Carton Board manufacturers has found that for every tonne of cartons manufactured by the carton packaging industry, a total of 326 kg of CO<sub>2</sub> is emitted generally.

**Elements of packaging sustainability:** The three basic parts of packaging sustainability are decreasing packaging leakage into the environment, increasing recyclability and utilisation of recycled content in packaging, and lowering the carbon footprint of packaging.



### Leakage into the environment

Minimize harm from nonrecycled material leaking into the environment<sup>1</sup>



### Greenhouse-gas (GHG) emissions across the value chain

Assess GHG emissions per packaging material through a holistic approach, taking into account full life cycle



### Circularity—recyclability and recycled content

Save energy and reduce pressure on natural resources

Improve the overall sustainability performance of packaging

Fig 5: Elements of packaging sustainability [\[13\]](#)

- The CPG (Consumer Packaged Goods) market is expected to grow at an annual average rate of 5.3%. GHG (greenhouse gas) emissions from CPG firms totalled over 33 gigatons of CO<sub>2</sub> equivalent in 2015. To attain the 2050 targets, this industry must cut its GHG emissions by more than half. The goal is to reduce global GHG emissions by enough to keep the earth from warming by more than 2°C.

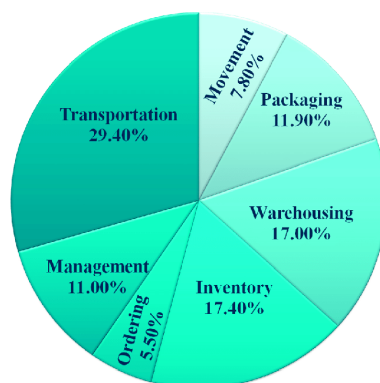


Fig 6 : The above chart shows that 11.90% of Carbon Footprint comes from packaging alone

- In 2019, the global e-commerce industry used about 2.1 billion pounds of plastic packaging. Plastic packaging used in e-commerce is expected to increase further in the coming years, reaching an estimated 4.5 billion pounds by 2025. In 2019, the global e-commerce plastic packaging waste was estimated to be more than 1 billion kg.



## **Solutions:**

### **1. Sustainable inks for eco-friendly packaging: Soy/Vegetable-based inks:**

Advantages:

- 4 times more biodegradable than petroleum-based inks.
- They are more stable, allowing you to improve the speed of imprint while minimising losses. On a broad scale, this can even be a financial benefit.
- They spontaneously decay, allowing for a reduction in the consumption of VOCs (Volatile Organic Compounds). In comparison to petroleum-based inks, this ink emits less than 20% of VOCs.
- Easily recycled as compared to petroleum ink.
- Soy ink can be used on napkins, wrappers, cartons as well. Pure soy ink (which is completely free from petroleum) is not harmful even if it comes in contact with the food<sup>[14]</sup>.

### **2. Cushioning Paper:** One of the many advantages of Cushioning Paper is that **32 rolls, or 9600 metres**, may be stored on a single pallet. This is due to its one-of-a-kind pre-folded design, which makes it more compact, stable, and manageable. It has a great possibility of reducing carbon emissions.



- ### **3. Save resources by studying closely the packaging's dimensions:** The size of the cardboard container, as well as the weight of the materials in the folding cartons, labels, and leaflets, are all considered when designing the packaging, with the goal of optimising the space available without compromising the basic features that provide information and protect the product. Packaging that fits the product minimises not only the carbon footprint associated with packaging but also the production and transportation expenses.
- ### **4. Choose sustainable raw materials:** Plastic, paper, and cardboard are the most common packing materials. Choosing certified raw materials helps to reduce packing carbon footprints by favouring environmentally conscious suppliers.

## **Examples:**

### **1. AMAZON INDIA:**

- Sometime back, the firm announced the usage of paper cushions to replace plastic dunnage such as air pillows and bubble wraps across its fulfilment centres (FCs).
- Along with the shift in packing material, Amazon India is ensuring that it incorporates as many recycled materials as possible. According to an earlier announcement by Amazon, the plastic now used in packing mailers and bubble bags contains 20% recycled content and is recyclable.
- In 2008, Amazon introduced **Frustration-Free Packaging (FFP)** to assist manufacturers in reducing packaging waste and developing sustainable online fulfilment alternatives. Their FFP programmes encourage 100% recyclable packaging that is ready to ship to clients without the use of additional Amazon boxes.
- Since 2015, they have lowered the weight of outgoing packaging by more than 36% and eliminated approximately 1 million tonnes of packaging material, as of June 2021.

### **2. The consumers must be incentivized to reuse and recycle packaging materials.**

- Dell has reduced its package sizes by around **10%** and developed bamboo cushioning to replace foam, as well as beginning to make packaging with wheat straw, which is made from agricultural waste and mushrooms.

- RePack, a small Finnish business, works with various clothing retailers to offer a scheme in which online consumers pay a small deposit and are reimbursed if the bag or box is returned to the company via any European post office, with a **95%** return rate.

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