

1

adani Business Excellence

Presentation Flow

- adani Brief on Adani Road Transport Ltd
- Project Brief, Trigger, Uniqueness, Milestones
- Tangible Benefits & Intangible Benefits
- Replication Potential
- Challenges & Resolution
- Achieving Global Benchmarks, Priority Plans, Best Practices
- Major Learnings

Adani Road Transport Ltd.

adani

2

Brief on Adani Road Transport Ltd



Adani Road Transport Ltd. is the Road Division of RMRW business under parent company Adani Enterprise Limited, AEL is focused on incubating successful businesses to address the Country's growing appetite for Infrastructure. In line with our vision to contribute towards Nation Building, company wants to tap the opportunity in the Road, Metro & Rail sector by developing National Highways, Expressways, Tunnels, Metro-Rail, Rail, etc. Adani group is confident of positioning itself as dominant player in the Road, Metro and Rail sector. ARTL has **14 projects** with more than **5,000+ lane kms** and asset value exceeding **INR 40,000+ Cr** spread over 10 states in India i.e., Chhattisgarh, Telangana, Andhra Pradesh, Madhya Pradesh, Kerala, Gujarat, West Bengal, Odisha, Uttar Pradesh, and Maharashtra. The portfolio consists of HAM (Hybrid Annuity Mode), TOT (Toll - Operate - Transfer), BOT (Build - Operate - Transfer) type assets & Maharashtra Border Check Post Network Ltd.



Bagged OHSSAI OH&S Award in Gold Category



ARTL has come up as one of the largest highway developers in India within a short span of 5 years.

Adani Road Transport Ltd.



Our Vision



Organization Vision

To be a world class leader in businesses that enrich lives and contribute to nations in building infrastructure through sustainable value creation.

ESG Vision

To adhere to the highest sustainability/ ESG standards and create economic, environmental, and social returns for our stakeholders, communities, and the country.



Management vision is cascaded down the line which drives the initiatives

Adani Road Transport Ltd.

Project Brief-Title & Trigger

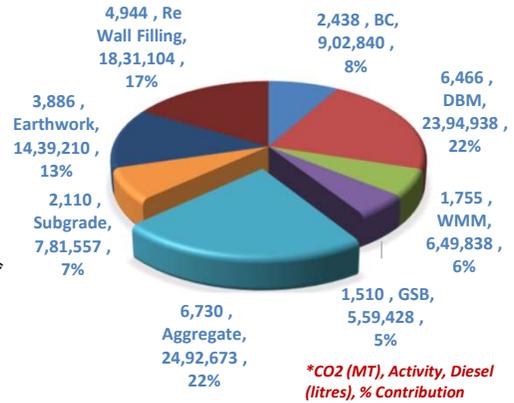


Project Title-Waste Management & Resource Conservation in Road Construction

Road construction works are resource & energy intensive large volume works. Waste Utilization & Resource Optimization are key to success in such projects.

Trigger-Asphalt works, Aggregates and RE Wall filling works are major areas where diesel is consumed & major contributor for CO₂ emissions in road pavement construction works. Hence the means to reduce energy in these areas are key to reduce diesel consumption.

Diesel Requirement Activity Wise



*BC-Bituminous Concrete, DBM-Dense Bituminous Macadam, WMM-Wet Mix Macadam, GSB-Granular Subbase, SFRC-Steel Fiber Reinforced Concrete NH-National Highway

Project is triggered by Management vision to sustainability through resource conservation, waste utilization & energy conservation
Adani Road Transport Ltd.

Uniqueness



Composite pavements in main carriageway of NH, 1st of its kind (50% reduction in Asphalt wrt conventional pavements)



Approx. 10% of Pond Ash/Flyash consumed with respect to the overall road construction sector (30% increase in productivity)



Implementation of Common Data Environment in Road Construction 1st time in collaboration with Dassault Systems (100% reliable data)



DGPS based machine control (45% increase in productivity) systems implemented in construction machineries



Shredded Waste Plastic Being Used for replacing Bitumen in Road Works (6% Bitumen reduction)



SFRC 1st of its kind (33% reduction in steel) implemented in boundary wall works in NH project



Green Power & Energy Efficient Highway Lighting (43% ROI)

Project drives unique waste utilization & resource conservation practices in structured way reaping maximum benefits coherently wrt conventional practices

adani Business Excellence

Project Brief-Milestones



Pond Ash Arrested in RE Wall Fill

- Change in design parameters based on available pond ash material properties (angle of friction, etc)
- Robust Transport system
- Multiple Pond Ash sources
- Ensuring required pond ash parameters as per design is achieved

Pond Ash Based RE Wall Fill

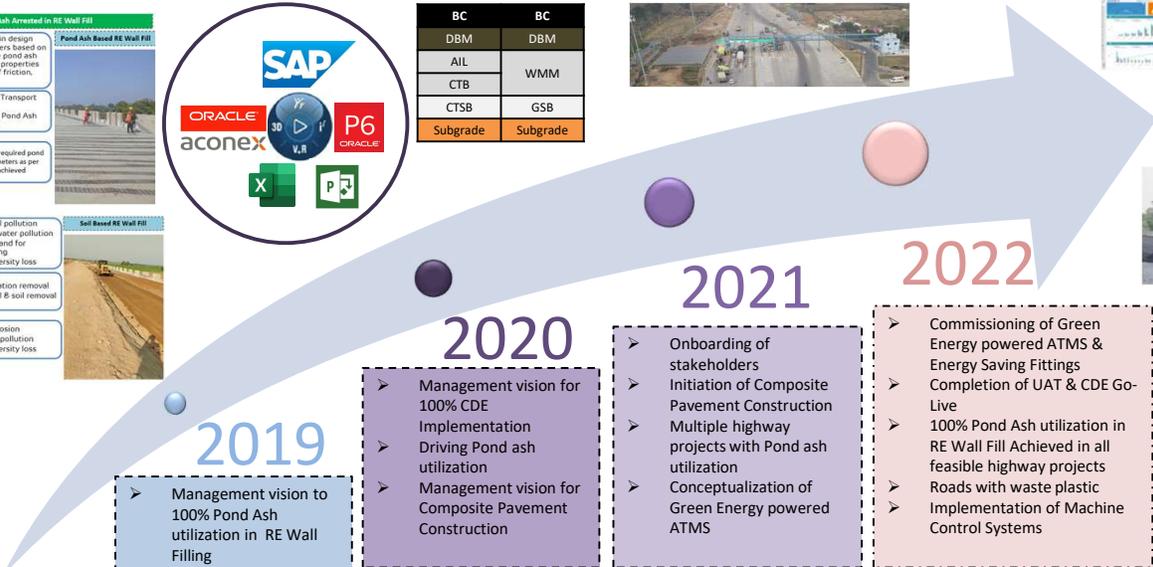
Soil Based RE Wall Fill

- Topsoil pollution
- Air & water pollution
- Add. land for stocking
- Biodiversity loss
- Vegetation removal
- Topsoil & soil removal
- Soil Erosion
- Water pollution
- Biodiversity loss



BC	BC
DBM	DBM
AIL	WMM
CTB	GSB
Subgrade	Subgrade



2019

- Management vision to 100% Pond Ash utilization in RE Wall Filling

2020

- Management vision for 100% CDE Implementation
- Driving Pond ash utilization
- Management vision for Composite Pavement Construction

2021

- Onboarding of stakeholders
- Initiation of Composite Pavement Construction
- Multiple highway projects with Pond ash utilization
- Conceptualization of Green Energy powered ATMS

2022

- Commissioning of Green Energy powered ATMS & Energy Saving Fittings
- Completion of UAT & CDE Go-Live
- 100% Pond Ash utilization in RE Wall Fill Achieved in all feasible highway projects
- Roads with waste plastic
- Implementation of Machine Control Systems

*UAT-User Acceptance Testing, ATMS- Advanced Traffic Management System, CDE- Common Data Environment
Milestones are achieved as per the targeted timelines

adani

adani Business Excellence

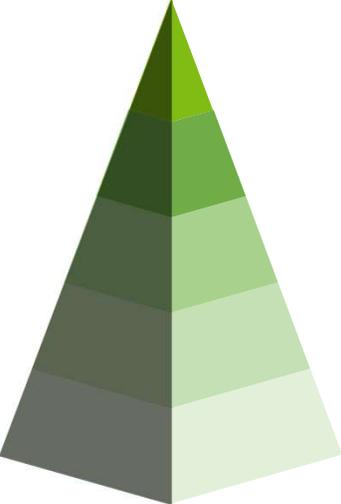
Challenges & Resolution



"Every adversity contains, at the same time, a seed of equivalent opportunity!" -Napoleon Hill

Challenge

- Design Challenges in Composite Pavements
- Administrative Challenges in Composite Pavements
- Execution Challenges in Composite Pavements
- Design Challenges in Pond Ash
- Administrative Challenges in Pond Ash Sourcing



Resolution

- Collaboration with competent design consultant & design resources
- Deliberations with IE/NHAI officials
- Modifications in plant and daily monitoring plan
- Design changes to match the available pondash parameters
- Deliberations with TPP's & NHAI officials to expedite MoU

Challenges are faced in various facades during conception, implementation and maintaining the change from conventional practices which are resolved on time bound manner

adani



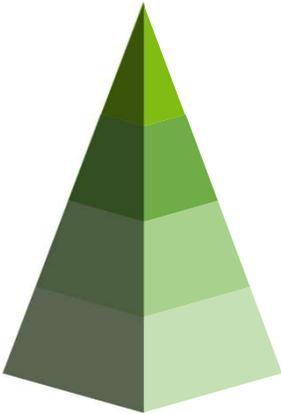
Challenges & Resolution



“Every adversity contains, at the same time, a seed of equivalent opportunity!” -Napoleon Hill

Challenge

- Logistics Challenges in Pond Ash
- Design Challenges in CDE
- Implementation Challenges in CDE
- Maintaining Initiatives



Resolution

- Robust transportation system and multiple sources
- Design workshops & UAT
- Stakeholder engagement
- Knowledge sharing session and PDCA continual improvement process established

Challenges are faced in various facades during conception, implementation and maintaining the change from conventional practices which are resolved on time bound manner

Adani Road Transport Ltd.

9 



Tangible Benefits-Waste Utilisation and Resource Conservation



Sl. No	Waste Material Utilised	UoM	Quantity	Resource Conserved/Saved	UoM	Quantity
1		MT	7,155,300	Topsoil	MT	440,326
				Soil suitable for RE Wall	MT	8,806,523
				Financial	in Lakhs Rs	4,403
				Diesel	Litres	2,764,783
2		MT	70,659	Cement	MT	70,659
				Financial	in Lakhs Rs	2,932
				Embodied Energy	MJ	283,695,825
3		MT	0.25	Bitumen	MT	0.21
				Embodied Energy	MJ	9387

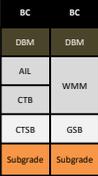
Tangible benefits reaped out of waste utilization from other industries & consequent savings/conservation of resources which would have utilized in conventional practices are enumerated above.

Adani Road Transport Ltd.

10 

Tangible Benefits-Resource & Material Conservation through Alternate Technology



Sl. No.	Alternate Technology Used	Resource Conserved/Saved	UoM	Quantity
1	 Composite Pavements	Aggregates	MT	165,382
		Diesel	Litres	1,455,753
		Bitumen	MT	8,550
		Financial	in Lakhs Rs	5,781
		Embodied Energy	MJ	298,203,859
2	 SFRC	TMT	MT	115
		Financial	in Lakhs Rs	183
3	 Green Energy & Energy Efficient Fittings	Energy Savings	MJ	13,401,749
		Financial	in Lakhs Rs/yr	427
4	 Semi Autonomous CM	Diesel	Litres	47,009
		Financial	in Lakhs Rs	45
5	 Common Data Environment	Diesel	Litres	552,579
		Financial	in Lakhs Rs	530

Tangible benefits reaped out of alternate technology & consequent savings/conservation of resources which would have utilized in conventional practices are enumerated above.

*SFRC-Steel Fiber Reinforced Concrete, CM-Construction Machinery

Adani Road Transport Ltd.

11 

11

Intangible Benefits-Waste Utilisation & Resource Conservation



Areas	Benefits
Social Benefit	New employment opportunities to under privileged, Clean Water, Fertile topsoil, Clean air, Prevention of soil erosion, Prevention of Landslides, Flooding, etc
Motivation	Employees are motivated to identify & deploy cross functional technology to get maximum value additions
Aesthetics	Creation & Preservation of biodiversity creates aesthetic appeal to highway & adjoining areas
Skill Upgradation	Cross functional knowledge sharing helps in job enrichment
GHG Emissions Reduction inline with COP21*, Paris Agreement	Large scale implementation of the initiatives largely reduces CO ₂ emission (including embodied emissions) as resources are no longer required to be consumed thereby cutting of the entire chain of CO ₂ emissions
Shaping Business Landscape	Inculcating importance of nature preservation through sustainable accelerated growth value creation by large scale structured implementation of initiatives

Intangible benefits reaped out of waste utilization & conservation of resources which would have utilized in conventional practices are enumerated above.

*COP21-UN Climate Change Conference

Adani Road Transport Ltd.

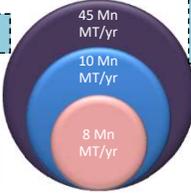


12

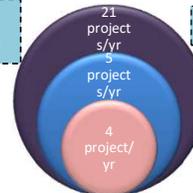
Replication Potential



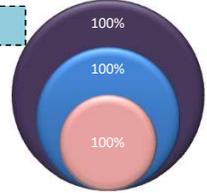
Pond Ash, Composite pavements & CDE is used on large scale in the highway projects thereby providing an example for replication in large scale infrastructure projects with same methodology.



Composite Pavements



CDE



Before



After



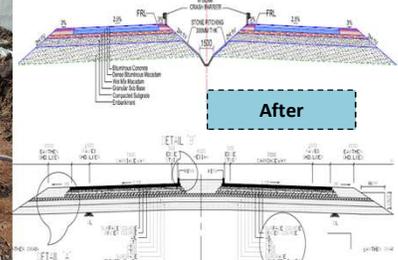
Before



After



Before



Implementation photos in various road projects are provided above for pond ash filling, SFRC, composite pavements. This could be replicated and scaled up within the sector, inter group & sector.

Adani Road Transport Ltd.



Replication Potential



We are sharing the best practices in various forums :

- Internally through share point, whatsapp groups, MS Teams meetings, Conferences, Knowledge Sharing Workshops, Quality Connect, Best Practices Competitions, etc. These ideas are further extended & used for other businesses like airports, ports, buildings where large volume of soil filling need to be done, composite pavements in airfield pavements & access roads, etc.
- Externally through forums, meetings, conferences, social media, etc
- Engaged with technical institutes and research organizations for funding research projects for further exploring new avenues with these theme



In order to achieve the targeted replication potentials, we are driving internally & externally through various forums as above.

Adani Road Transport Ltd.



Achieving Global Benchmarks



Sl. No.	Benchmarks	Achievement
1	Preservation of Biodiversity 	1. Vegetation, Topsoil & Soil preservation. 2. Preventing contamination of air, water & soil by Pond Ash by permanently locking the same. 3. Creation & Preservation of water bodies
2	Conservation of Resources through CDE 	1. Rework is reduced, Human Resource & Diesel is conserved.
3	Reduction in Consumption without compromising output 	1. Aggregate, Bitumen & Diesel is conserved. 2. Approx. 10% consumption of Pond Ash in Road Sector Achieved which is one of the highest in the sector.
4	Social Benefits 	1. Improved employment opportunities to under privileged.

Continual improvement drive through waste utilization & resource conservation thereby achieving the UN SDG benchmarks

Adani Road Transport Ltd.

15

15

Priority Plans With Resource



Priority Plans	Resource
Introduction of high modulus asphalt for reducing energy consumption & emissions (30% reduction in crust)	Sourcing of High Modulus Bitumen
Extending application of SFRC from boundary walls to RE Wall panels (33% reduction in steel)	Design & its clearance from Authority
Bamboo crash barriers for phasing out MBCB & Concrete Crash Barriers (Approx. 9MT/km steel could be saved)	Standardization, Design & its clearance from Authority
Centralized plastic shredding facility for facilitating standardized plastic waste for bitumen replacement (Approx. 6% Bitumen could be saved)	Sourcing of Waste Plastic, Shredding Unit
Centralized precast facilities (Approx. 1% concrete waste could be avoided) to cater to growing precast requirement	Sourcing of Automated Precast Facility

Apart from the existing waste utilization & resource conservation drive with pond ash, CDE, composite pavements, SFRC there are other avenues as above being pursued for next two years for large scale implementation.

Adani Road Transport Ltd.

16

Top Best Practices



Preserving biodiversity by utilizing pond ash (8 Million MT/yr consumption targeted)



Water conservation by creating water storage structures (1.6 Million Litres) & promoting groundwater recharge



DGPS based Construction Machinery driving increasing productivity & further diesel consumption



Automated progress reporting reducing manual intervention in data handling & reporting



Digitally driven reduction in waste by having proper information & exercising control at right time



Utilization of modified bitumen for long term service life



Road safety awareness campaigns with schools, local public/communities, etc



Automated reconciliation between different software platforms



Promoting Biodiversity through Green Belts and Median Plantations (Approx. 257,166 nos. planted)



Curing concrete with most efficient drip system for conserving water in construction



Geocells filled with fertile soil and Vetiver grass/ready made green carpet used for slope protection/prevent soil erosion



Geocomposite drains as replacement to aggregate filter media

Best practices which are being followed and further continue to be our core operations

Adani Road Transport Ltd.

Major Learnings



Areas	Learnings
Job Enrichment/Talent Development	<ol style="list-style-type: none"> 1) Understanding stake holders' interests & aligning them to solve bigger and common challenges 2) Cross functional technology identification & deployment
Common Data for all Stakeholders & Congruent Communication-Consented Decision	<ol style="list-style-type: none"> 1) Understanding data requirements from each stakeholders & customizing dashboards suiting for the requirement to facilitate automated real time reporting 2) Saving time for data handling & rehandling based on stakeholder requirements by automating process 3) Avoid errors due to data reworks
Value Drivers	<ol style="list-style-type: none"> 1) Identifying new value drivers like timely implementation of environment sustainable initiatives thereby conserving resources & creating financial savings 2) Sustainable accelerated growth through implementation in large scale
Ambience	<ol style="list-style-type: none"> 1) Preservation & creation of biodiversity beautifies the highway project surrounding
Lean	<ol style="list-style-type: none"> 1) Reducing waste/non-value adding activities

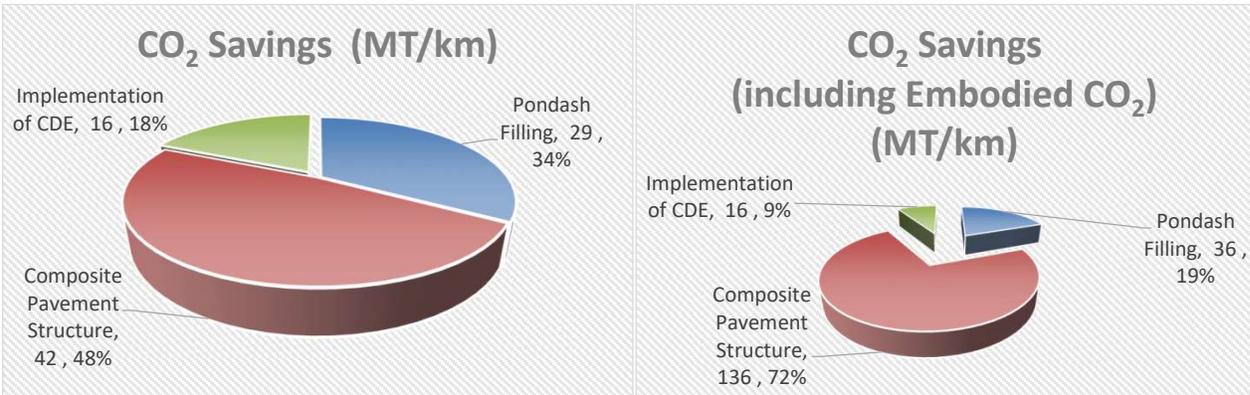
Major learnings are enumerated above which has resulted in organization enrichment and will further seed continual improvement process.

Adani Road Transport Ltd.

Complementary CO₂ Saving Summary



Approx. 27% (87 MT/km) of the CO₂(317 MT/km) emissions in road construction is saved.
 Approx. 16% (187 MT/km) of the CO₂(1,168 MT/km) emissions in road construction is saved.



Apart from direct benefits on resource conservation, the comprehensive major CO₂ savings are represented as above in terms of MT/ 2 lane km of road. These complementary benefits help us to achieve UN SDG 13 in reducing GHG emission.
 Adani Road Transport Ltd.

