WWW.IJRPR.COM

**International Journal of Research Publication and Reviews**

Journal homepage: www.ijrpr.com ISSN 2582-7421

# Compressed Air Car Based on Renewable Energy Resource

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**ABSTRACT :**

This paper presents the design and development of a compressed air powered vehicle, a sustainable and environmentally friendly transportation solution. The vehicle utilizes a compressed air engine, which converts the energy stored in compressed air into mechanical work. The system consists of a compressed air tank, pneumatic engine, and control system. The compressed air tank stores energy in the form of compressed air, while the pneumatic engine converts this energy into mechanical work. The control system regulates the flow of compressed air, controlling the vehicle's speed and torque. The compressed air car offers several benefits, including zero emissions, low operating costs, and simplicity. This technology has the potential to provide a sustainable and environmentally friendly solution for urban transportation.

**Keywords:** Compressed air car, sustainable transportation, pneumatic engine, zero emissions, low operating costs.

## I. INTRODUCTION:

The world is shifting towards sustainable and environmentally friendly transportation solutions to mitigate climate change and reduce dependence on fossil fuels. One promising technology is the compressed air car, which uses compressed air as a clean and efficient energy storage medium. When powered by renewable energy sources such as solar or wind energy, compressed air cars offer a truly sustainable transportation solution. This innovative approach reduces greenhouse gas emissions and operating costs, making it an attractive alternative to traditional fossil fuel-based vehicles. By harnessing the power of renewable energy and compressed air technology, we can create a cleaner, greener, and more sustainable transportation future

## 2. LITERATURE REVIEW

Compressed Air Vehicle Review: Saurabh Pathak et al. (2014) reviewed compressed air vehicles, highlighting their benefits, including zero emissions and low operating costs.

Air-Powered Engine Development: Prof. B.S. Patel et al. developed a compressed air engine by modifying a 4-stroke SI engine, achieving cost-effectiveness and efficiency.

- Compressed Air Energy Storage: Dr. Bharat Raj Singh and Dr. Onkar Singh conducted experiments on vaned air turbines, achieving efficiencies ranging from 72% to 97%.

- Vehicle Operating on Compressed Air: A.A. Keste et al. explored using an inversed slider crank mechanism to utilize compressed air, demonstrating its feasibility.

## 3. METHODOLOGY

T1. Design and Optimization: Design the system's components, optimizing for efficiency and performance.

2. Renewable Energy Generation: Generate electricity using solar panels or wind turbines.

3. Air Compression: Compress air using the generated electricity.

4. Compressed Air Storage: Store compressed air in tanks.

5. Pneumatic Engine: Convert compressed air energy into mechanical work.

6. Control and Regulation: Regulate air flow, controlling speed and torque.

7. Testing and Evaluation: Test the system's performance, efficiency, and emissions.

## 4. DESIGN AND FABRICATION

Mechanical Design:

1. Compressed Air Tank: Design and material selection for safe and efficient storage of compressed air.

2. Pneumatic Engine: Selection or design of a suitable pneumatic engine to convert compressed air energy into mechanical work.

3. Chassis and Body: Design of a lightweight and durable chassis and body to support the compressed air system.

4. Control System: Development of a control system to regulate air flow, speed, and torque.

### Fabrication Process

1. Material Selection: Selection of suitable materials for the compressed air tank, pneumatic engine, chassis, and body.

2. Tank Fabrication: Fabrication of the compressed air tank using techniques such as welding, machining, or composite material fabrication.

3. Engine Assembly: Assembly of the pneumatic engine, including components such as cylinders, pistons, and valves.

4. Chassis and Body Fabrication: Fabrication of the chassis and body using techniques such as welding, machining, or composite material fabrication.

5. System Integration: Integration of the compressed air tank, pneumatic engine, control system, and other componentsototype.

## 5. RESULTS AND DISCUSSION

Experimental results of air-compressed cars have shown promising outcomes. For instance, a study published in the journal Sustainability found that a compressed-air engine achieved a maximum power output of 1.92 kW, a maximum torque of 56.55 Nm, and a maximum efficiency of 25% 1. Another study published in the journal Energies compared the performance of a compressed air engine under different operation modes.

The results showed that the engine's power output, compressed-air consumption rate, and energy conversion efficiency varied significantly under different modes 2.

In terms of specific performance metrics, here are some experimental results:- Maximum power output: 1.92 kW 1- Maximum torque: 56.55 Nm 1- Maximum efficiency: 25% 1- Compressed-air consumption rate: varies under different operation modes 2- Energy conversion efficiency:

varies under different operation modes "These experimental results demonstrate the potential of air- compressed cars as a sustainable and environmentally friendly transportation option. However, further research is needed to optimize their performance and efficiency.