



## Game Changers

# Carbon Fiber Reinforcement Technology Contributes to Reduced Carbon Emissions



### **PROJECT**

Expand application of carbon fiber-based composites to offer a more sustainable alternative for renovation and new infrastructure projects in Russia

### **CHALLENGE**

Enable reduced greenhouse gas emissions with considerable advancements in structural integrity and construction quality for civil architecture

### **SOLUTION**

Locally produced, low-weight, high-strength composite materials for building reinforcement

### **COMPETITIVE EDGE**

Carbon fiber composites are high-performance, easy-to-supply solutions that substitute traditional energy-intensive reinforcement materials

New technology takes many shapes and sizes. That is literally the case with carbon fiber reinforced (CFR) composites enabled by Dow that will be used in many retrofit and new construction projects following the 2014 Olympic Winter Games in Sochi, Russia.

Customizable to fit nearly any design or application, CFR composites enable enhanced structural integrity and construction quality for many civil infrastructure projects. Substituting steel and concrete reinforcements with CFR composites can lead to significant greenhouse gas emissions savings.

CFR composites are most frequently applied to beams, columns, masonry, brick walls and concrete pipes to enhance strength, but they can be incorporated in many other types of structures as well. For example, the material can be used to extend the service life of roads and bridge decks – a significant benefit in Russia, where freeze-thaw cycles can compromise infrastructure over time.

The CFR project is part of the Sustainable Future Program and has been implemented in cooperation with DowAksa – one of the world's leading manufacturers of carbon

fibers – and Dow's strategic partners in Russia, including Holding Company Composite and RUSNANO. The project is accelerating the implementation of carbon-fiber based technologies and builds capacity on state-of-the-art, low-carbon infrastructure solutions. The project is expected to demonstrate GHG reductions from materials substitution of a minimum of 40,000 tons of CO<sub>2</sub> equivalent between 2014 and 2024 and represents a solution for the renovation of aged infrastructure in Russia.

A central component of this project was a symposium on advanced composite material applications, which included presentations on the market and the technology and targeted regional authorities, governors, mayors of big cities, major utility companies and academia. In addition, construction companies, design bureaus and decisions makers had the opportunity to experience first-hand practical demonstrations and case studies on the technical, environmental and economic benefits of carbon fiber composites for a variety of applications. Dow and its partners are continuing to build on the success of this event to ensure wide adoption of this technology on a countrywide basis.

The greenhouse gas emissions savings enabled by these joint efforts contributed to the mitigation of the Sochi 2014 Organizing Committee carbon footprint, which is estimated to be about 360,000 metric tons of CO<sub>2</sub> equivalent emissions.

### Good for the Old, Great for the New

Use of CFR composites in retrofit projects can extend the service life of aged infrastructure by as much as 50 to 75 years. That extended lifespan avoids costs for demolition and rebuilding, reduces particulates and debris from demolition and lowers demand for material transport, as well as noise pollution.

And for new construction projects, structures reinforced with CFR composites can carry heavier loads and offer better protection from aging, leading to stronger, longer-lasting and more cost-effective infrastructure.

### Expanding Opportunities

Additional CFR composites can be used in piping, automotive, marine and wind blade applications amongst others. Expansion of CFR composites in new industries and applications can also contribute to job creation and economic growth across Russia.

### Commitment to the Future

Dow helped Sochi 2014 meet its commitments to host Games with minimal impact on climate by supporting a more sustainable infrastructure with high-performance technology solutions. As the Official Chemistry Company of the Olympic Games, Dow contributes to sustainable and high-performing Games with unique innovations and solutions that generate a positive impact in day-to-day lives, on and off the playing field.



### Leaving a Lasting Legacy

As a world leader in chemistry with a growing presence in Russia, Dow implemented new technology that can reduce the country's greenhouse gas emissions in three key areas:

#### Infrastructure

**Objective:** Implement energy-efficient solutions for new construction and renovation to reduce the amount of energy used in heating and cooling.

#### Agriculture

**Objective:** Promote sustainable agricultural solutions and healthier lifestyles through proven practices that allow soil to retain carbon, minimizing the use of mechanical farming equipment, fertilizer and water.

#### Industry

**Objective:** Demonstrate carbon reduction possibilities by improving industrial processes and supply chain and construction processes.

#### To Learn More

Go to [www.dow.com/sochi2014](http://www.dow.com/sochi2014) to learn more about how Dow is working with the Sochi 2014 Organizing Committee to realize multiple benefits through building and infrastructure upgrades, continued implementation of sustainable practices and increased awareness of the importance of energy efficiency.

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