



Dow and The Olympic Movement

Using Technology and Collaboration
to Deliver a Low-Carbon Legacy

2018 CARBON REPORT

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**SCIENCE,
SPORT
AND BOLD
ACTIONS**
FOR A
BRIGHTER
FUTURE



“Many of these projects
also have delivered new
efficiencies and value
for participating
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value chains.”



An Introduction from Dow CEO Jim Fitterling

It is my pleasure to present this 2018 Dow Carbon Report, providing a progress update on the carbon programs and collaborations that have been launched as a result of our partnership with the Olympic Games and the International Olympic Committee (IOC). Climate change is a complex global challenge, and while insurmountable for single actors or governments, it brings businesses, communities and not-for-profit organizations like the IOC together to drive change in innovative ways. At the same time, these challenges are also business opportunities – to discover and create solutions that will help us define a path toward a more sustainable society and planet.

Dow's carbon mitigation program with the Olympic Movement started with the programs implemented by Dow and the Organizing Committees of the Olympic Games Sochi 2014 and Rio 2016. In late 2017, we built on the success of these programs and extended the reach and influence of our collaboration to a global scale with the appointment of Dow as the Official Carbon Partner of the IOC. Through all of these combined efforts, we have already delivered a reduction of 4.3 million metric tons of carbon dioxide equivalent (CO₂e). By 2026, the reductions from these programs are projected to exceed 6 million metric tons of CO₂e. Many of these projects also have delivered new efficiencies and value for participating businesses as well as reduced carbon footprints along industry value chains.

We see this platform as an opportunity to work with customers to share our expertise and help them gain competitive advantage by enhancing their sustainability expertise, and at the same time, making their processes more efficient.

Inside this report, you can read about the progress of our projects, Dow's Collaborative Blueprint for Carbon Reduction, and about the Dow Climate Solutions Framework that supports them. Just as we all share the consequences of climate change, we believe that it is crucial for us to share the knowledge, learnings and best practices in working together on developing and leading carbon-reduction programs. As countries are starting to define plans on how to lower their emissions, these projects constitute real life examples of viable greenhouse gas reduction options.

Sport and science are the starting point – our destination is a better future. As the Olympic Movement inspires us, we hope this collaboration will inspire you.

Sincerely,

A handwritten signature in black ink, which appears to read "Jim Fitterling". The signature is stylized with a large, sweeping initial "J" and a long, horizontal stroke extending to the right.

Jim Fitterling

Chief Executive Officer, Dow

BUILDING A LASTING LEGACY



“This report is
witness to the
power of
collaboration, the
determination and
continuity it takes to
deliver significant
results.”



Message from IOC President Thomas Bach

In December 2014, the Session of the International Olympic Committee (IOC) gave unanimous approval to Olympic Agenda 2020, the strategic roadmap for the future of the Olympic Movement. Sustainability is one of three pillars of Olympic Agenda 2020, and this focus marked a starting point of a new journey within the Olympic Movement to imbue sustainability into all aspects of the IOC daily operations, the organisation of the Olympic Games and the wider Olympic Movement.

Climate is a growing concern for the Olympic Movement as it is for our wider society. For this reason, the IOC has identified climate as one of our five focus areas of the IOC Sustainability Strategy. In addition, it is recognized as an area which spans across the remaining four. For the IOC as an organization, an objective for Olympic Agenda 2020 is to achieve operational carbon neutrality by reducing direct and indirect greenhouse gas (GHG) emissions, and by compensating unavoidable emissions.

This is why in 2017, the IOC collaborated with TOP Partner Dow, the Official Chemistry Company of the Olympic Movement, and appointed the Company as the Official Carbon Partner of the IOC to support our carbon neutrality goals. Dow has developed two successful carbon mitigation programs for the Olympic Winter Games Sochi 2014 and Olympic Games Rio 2016, delivering a low-carbon legacy for both Games. This new partnership allows Dow to bring their leading materials science and technology expertise, global customer relationships and track record in setting and achieving its own ambitious 10-year sustainability goals directly to the IOC.

This report is witness to the power of collaboration, the determination and continuity it takes to deliver significant results. It also shows that the goal has long evolved beyond balancing an event's direct carbon footprint to enabling a positive and lasting legacy in the journey towards a more sustainable future. Beyond delivering GHG reductions, Dow and the Olympic Movement have and will continue to fuel an ongoing dialog with stakeholders to help increase the adoption of energy efficient and low-carbon technologies across major sectors.

The IOC is committed to building a better world through sport and we join Dow in hoping that this report inspires others to forge new partnerships that serve humanity and its future prosperity.

Sincerely,

A handwritten signature in blue ink, reading "Thomas Bach". The signature is fluid and cursive, with the first name "Thomas" and last name "Bach" clearly visible.

Thomas Bach

President of the International Olympic Committee



UNLOCKING CARBON REDUCTIONS THROUGH COLLABORATION

A Letter from Dow Chief Sustainability Officer Neil Hawkins

Unleashing the value of a low-carbon economy requires unprecedented partnerships and moving beyond business as usual. As a global materials science company, Dow recognizes the role that science and business can play in developing new business models that achieve carbon reductions and actively contribute to the United Nations Sustainable Development Goals.

Two years ago, following a successful Olympic Games Rio 2016, we published our first carbon report, providing an overview of the carbon mitigation projects we had undertaken as the Official Carbon Partner of the Games. Since then, we have continued to make progress on several of these projects, delivering against our commitments and a positive legacy for the host geography. In addition, we had this report validated by a third party and have integrated an account of the work done for the Olympic Winter Games Sochi 2014.

Encouraged by the results achieved through this collaborative approach, Dow became the Official Carbon Partner of the International Olympic Committee (IOC) last year, taking what we have learned beyond host countries to a global stage.

In the same spirit as our 2025 Sustainability Goals, we are integrating science, technology and collaborations with others – our customers, industry partners, non-governmental institutions and academia – to develop societal blueprints and projects that will help transition to a more sustainable society. Through this partnership, Dow and the IOC have come together to use sports as a starting point to drive changes toward de-carbonizing specific value chains.

By sharing our progress and insights through this report, we hope to encourage others to join our efforts and follow our collaborative blueprint in their own initiatives. We welcome your feedback and questions.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Neil Hawkins'.

Neil C. Hawkins

Corporate Vice President and Chief Sustainability Officer

DOW'S PARTNERSHIP with the OLYMPIC MOVEMENT

Together, Dow and the IOC are working to demonstrate on a global stage how game-changing collaboration can help advance a low-carbon future.



WORLDWIDE PARTNER

**>35 YEARS
OF SUPPORT**



**Supplier to the Games
Since 1980**

SOCHI 2014 AND RIO 2016

Introduced
**low-carbon
solutions and
practices**
in key economic sectors



RIO 2016

Delivered verified GHG
emission reductions of

**>1.2MM tonnes
of CO₂e**

to balance the footprint for
hosting and staging the
Games and build a
low-carbon legacy*

SOCHI 2014

Delivered verified emission
reductions of

**>2.5MM tonnes
of CO₂e,**

exceeding 5 times Dow's
commitment as the
Official Carbon Partner of
the Games.*

DOW-IOC CARBON PARTNERSHIP

Launched in 2017

Extending reach of carbon
mitigation programs globally



DOW'S OLYMPIC CARBON PROGRAMS

projected to deliver reductions of

**>6MM tonnes
of CO₂e**

by 2026

*As of August 2018. Verified by Environmental Resources Management.



A Breakthrough Approach to Carbon Mitigation

“By helping drive the adoption of low-carbon innovations in business communities across the world, the benefits of these projects will be felt beyond the Games, beyond the host cities and host geographies, and will help lead to significant carbon reductions for years to come.”

Neil C. Hawkins
Dow Corporate Vice President
and Chief Sustainability Officer

Combining the Power of Sport and Science for a More Sustainable Future

Both sport and science have the power to bridge borders and cultures – to unite and inspire people and change lives. Through a game-changing collaboration, Dow and the International Olympic Committee (IOC) are using the platform of sport and the Olympic brand to catalyze action on climate change and help build a blueprint for a more sustainable future.

As the Official Chemistry Company of the Olympic Movement, Dow has partnered with the Organizing Committees of the Olympic Winter Games Sochi 2014 and Olympic Games Rio 2016 and now the IOC to develop tailor-made carbon mitigation programs that address the technology needs of the regions in which they are implemented. Dow is working with customers, value chain partners and non-governmental organizations (NGOs) to introduce innovative low-carbon technologies in the sectors of Buildings & Infrastructure, Food & Packaging, and Manufacturing & Energy. These

mitigation projects create high-quality emission reductions to help balance the carbon footprint of the partner while at the same time accelerating the adoption of more sustainable technologies across different sectors and value chains.

The carbon mitigation programs follow the principles outlined in Dow's Climate Solutions Framework, a framework purposely built for these partnerships by Dow scientists together with external carbon experts. The Climate Solutions Framework allows event owners and organizations, in collaboration with partners, to implement a structured yet flexible approach to quantify and mitigate carbon footprints while also leaving a positive social and economic legacy. These mitigation projects go beyond the physical boundaries of the events or the organization's direct control, extending climate action to a global playing field.

Through its carbon mitigation projects, Dow has already delivered to date 4.3 million tonnes of carbon dioxide equivalent (CO₂e).¹ By 2026, the reductions are projected to exceed 6 million tonnes of CO₂e.

Within this report, we describe Dow's efforts to build capacity, drive change and achieve the adoption of low-carbon technologies. We hope the lessons learned will provide actionable advice to organizations across sectors to help build effective collaborations and accelerate the introduction of more sustainable technologies globally.

A Journey of Collaboration

PARTNER	PROGRAM ACTIVITY PERIOD	EMISSION TYPE TO OFFSET/ MITIGATE	CARBON MITIGATION TARGET MT CO ₂ E	ADDITIONAL / NON-BINDING OBJECTIVE	END OF REPORTING PERIOD	RESULTS MT CO ₂ E
SOCHI 2014 ORGANIZING COMMITTEE	2012-2014	Partner-Owned Emissions	360,000		2024	2,591,803
	2013-2014	Associated Spectator Travel Emissions	161,000		2014	161,000
RIO 2016 ORGANIZING COMMITTEE	2014-2016	Partner-Owned Emissions	500,000		2026	500,000
	2014-2016	Associated Spectator Emissions		1,500,000 ²	2026	733,677
INTERNATIONAL OLYMPIC COMMITTEE	2017-2020	Partner-Owned Emissions	To be announced ³		2026	320,000
		Climate Positive Legacy				–
TOTAL DELIVERED AS OF AUGUST 15, 2018						4,306,480

¹As of August 2018. Verified by Environmental Resources Management.

²Dow/Rio 2016 non-binding aspirational goal.

³The first IOC carbon footprint report is due to be released in 2018.



Partnering for a Positive Legacy

“This report transparently highlights the results of our work and outlines our aspiration for a global and even more impactful program. It also demonstrates how value chain collaboration delivering leading solutions can increase knowledge, deliver significant results and help shape a more sustainable future.”

Dr. Nicoletta Piccolrovazzi
Global Technology
and Sustainability Director
Dow Olympic & Sports Solutions

Based on the Dow Climate Solutions Framework, each carbon partnership program is designed to push for innovation, move beyond business as usual and catalyze long-term changes in market practices. To make this happen, Dow teams worked on the ground before the Olympic Winter Games Sochi 2014 and Olympic Games Rio 2016 to start new dialogues, exchange knowledge and collaborate with industry leaders within the region to introduce low carbon technologies and educate stakeholders. They continue to nurture these relationships and gauge progress on projects years after the Games are over. The goal is to move above and beyond simply accounting for and balancing an organization's direct carbon footprint for an event and to deliver a positive, lasting legacy.

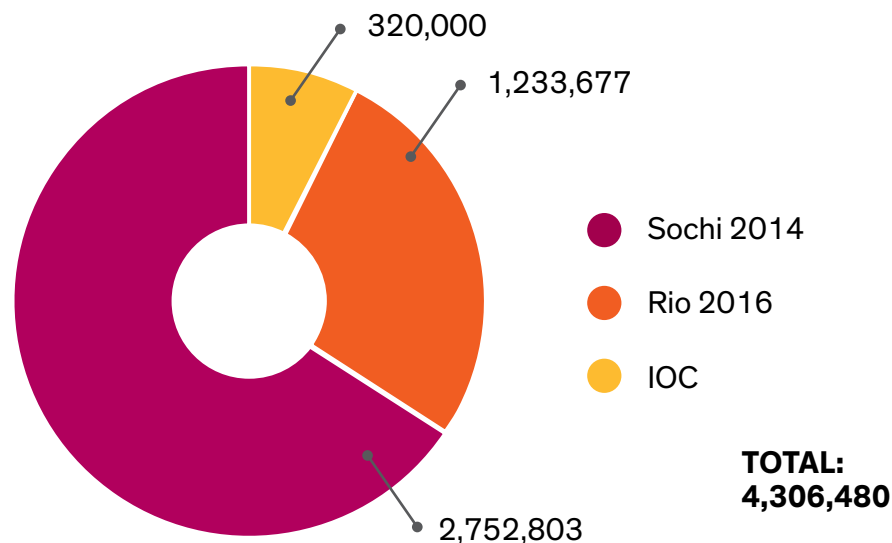
Through collaboration with customers and value chain partners, Dow with the Sochi 2014 and Rio 2016 has delivered significant third-party-verified GHG reductions and is expanding the program globally. Among the results:

- The Dow-Sochi Carbon Partnership resulted in third-party-verified climate benefits amounting to greater than 2.75 million tonnes of CO₂e, more than five times its commitment to Sochi 2014.
- The Dow-Rio Carbon Partnership has delivered more than 1.2 million tonnes of CO₂e to date – meeting Dow's commitment to balance the footprint of hosting and staging the Games, while also leaving a legacy of low-carbon technologies in Latin America.
- In this report, we also lay the foundation for the next-generation carbon mitigation program with the IOC.

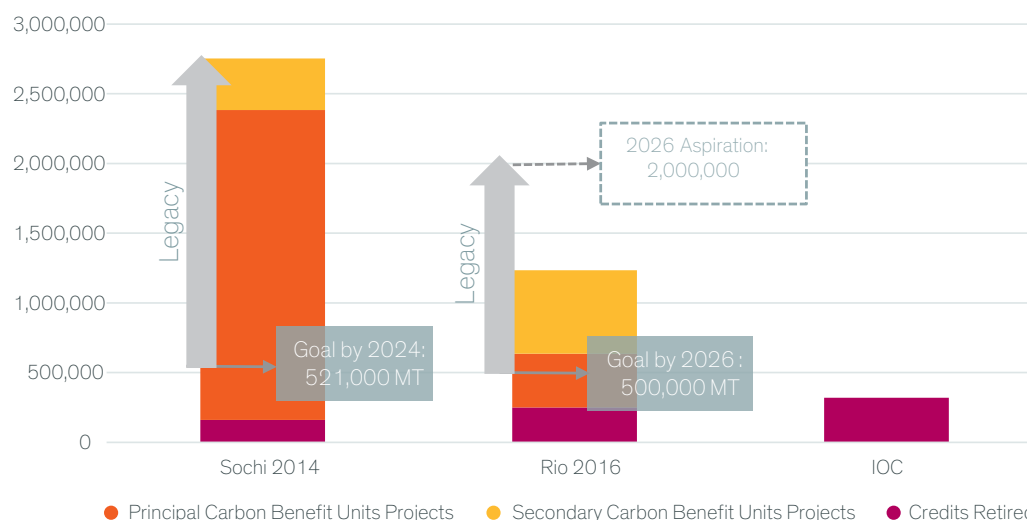
Environmental Resources Management (ERM) provided third-party validation of this report against the Dow Climate Solutions Framework and verified GHG emissions reductions toward mitigation projects.

dow.com

Results to Date by Carbon Partnership (tonnes of CO₂e)



Building a Legacy: Program Climate Benefits to Date (tonnes of CO₂e)



All results reported are as of August 15, 2018.

The Dow Climate Solutions Framework broadly identifies two climate benefit types: Principal Climate Benefit Units (PCBUs) and Societal Climate Benefit Units (SCBUs). PCBUs have a higher degree of accuracy and are the only benefits that can be used to mitigate Principal Climate Impacts. See the Glossary for further explanation.

Collaborating with Sochi 2014

Recognizing an opportunity to generate GHG savings for Sochi 2014 and long-lasting climate benefits for the host country, Dow partnered with the Organizing Committee of the Olympic Winter Games Sochi 2014 to create the groundbreaking Sustainable Future program. The objective of the program was to mitigate the direct carbon emissions of the Games and to introduce more sustainable business practices across industries in Russia.

The Sochi 2014 Organizing Committee worked with a team of Russian and international experts to measure the direct carbon footprint of the Sochi 2014 Games, estimated to be 360,000 tonnes of CO₂e emissions. The carbon footprint from flights of spectators and media representatives was estimated to be 161,000 tonnes of CO₂e emissions. Through this program developed and implemented by Dow, Sochi 2014 were the first Games where the direct carbon footprint of the Organizing Committee was mitigated before the opening ceremony.

In addition, Dow retired carbon credits to balance the emissions of spectators and media traveling to the Games. Dow continued project verification through the end of 2015 and exceeded its commitment made to the Games to balance 521,000 tonnes of CO₂e of emissions by a factor of five.

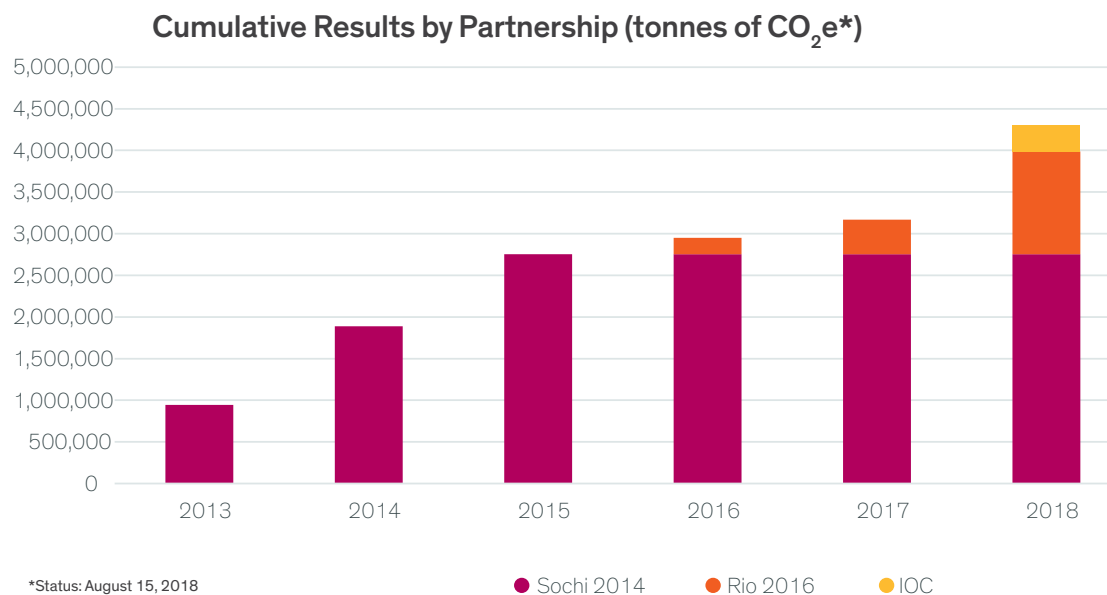
Collaborating with Rio 2016

As the Official Carbon Partner of Rio 2016, Dow developed the most comprehensive carbon mitigation program in the history of the Games to help fulfill the commitment of hosting the Olympic Games Rio 2016 with minimal carbon impact and build capacity for low-carbon technologies across Latin America.

Dow committed to delivering third-party-verified GHG emission reductions of 500,000 tonnes of CO₂e emissions by 2026 to balance the footprint of hosting and staging of the Rio 2016 Games, while also aspiring to generate an additional 1.5 million tonnes of climate benefits to address societal associated emissions, such as spectator travel. In conjunction with customers in Latin America, Dow implemented a variety of projects that enabled businesses to enhance productivity and conserve energy by switching from fossil to renewable energy sources, optimize resources in agriculture and livestock and build capacity for more energy-efficient infrastructure, leading to long-term changes in the market. While athletes, spectators and organizers are focused on the next Games, the team of Dow scientists and experts are continuing to verify the results from the partnership with Rio 2016 throughout the realization period of 2026.

Collaborating with the IOC

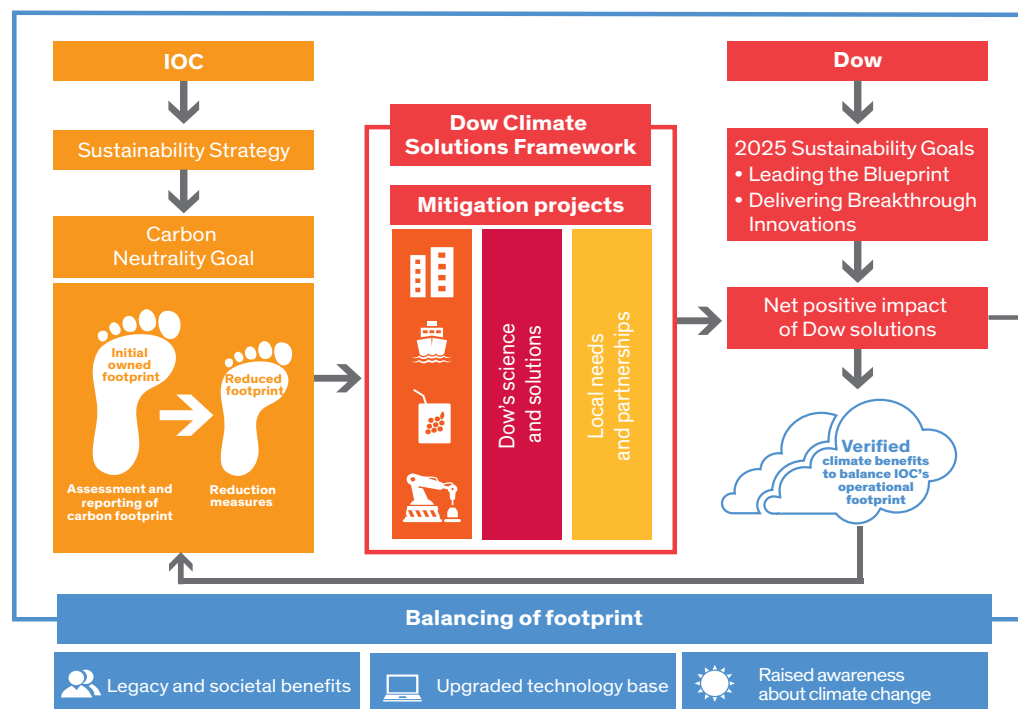
As the [Official Carbon Partner of the IOC](#), Dow is extending the carbon partnership program to a global stage. Dow is working with the IOC to use the Olympic brand to drive engagement and implement a series of impactful carbon mitigation projects. The resulting climate benefits will be verified by third-party experts and will be allocated to balance the IOC's operational footprint and support its carbon neutrality goal. The



ambition of the program is to generate more climate benefits than needed to offset the IOC's footprint, delivering a low-carbon legacy and demonstrating environmental leadership on a global level.

The partnership program, announced in September 2017, goes beyond the Games, venues and host cities to provide a new type of blueprint for carbon collaboration. Facilitated by the Dow Climate Solutions Framework, Dow is sharing its technology and knowledge with its customers and other stakeholders to implement approximately 10 low-carbon technology projects around the world. These projects are tailored to country-specific needs and will mitigate GHG emissions in the area of infrastructure, transportation, packaging and manufacturing. Together, these projects are designed to go beyond business as usual in the regions where implemented, with the goal of helping build capacity for energy-efficient and lower-carbon technologies and reducing carbon footprints along industry value chains. Beyond the collaboration, the resulting changes in business decisions will create a positive low-carbon legacy globally.

Following through on the commitments made in Olympic Agenda 2020, the strategic roadmap for the future of the Olympic Movement, this program highlights the IOC's intent to become a role model in the field of sustainability and is complementary to the Games-specific carbon mitigation strategies.



SUSTAINABLE DEVELOPMENT GOALS



Achieving Short-Term Results and Long-Term Transformation

The primary objective of the Olympic Partnerships is to advance the adoption of better technologies and practices through new projects across different markets to deliver third-party-verified GHG reductions in the long term. All emission reduction projects in this report have required Dow to deploy significant resources and technical knowledge to obtain the third-party-validated documentation and verified results.

A carbon accounting period of up to 10 years was agreed for these partnerships to deliver on the emission reduction targets and on the vision to create a pivot for long-term market transformation (the carbon legacy). As an example, many seasons of lower-till farming or years of operating energy-efficient buildings are needed to generate significant GHG reductions. Project results were third-party verified and not converted into registered carbon credits. One exception was the Santa Vitória Cogeneration Project. Dow registered the credits according to the Verified Carbon Standard (VCS); once issued, the credits for the stated accounting period were retired for the benefit of the partnership with Rio 2016 Organizing Committee.

Carbon credits are readily available on the existing voluntary carbon market and added to complement the initiative, a well-known practice for the offsetting of carbon footprints of events. In specific cases carbon credits were purchased and retired from the voluntary market in order to supply GHG reduction early to the partnership or as a risk mitigation option. Retirement of existing carbon credits made up less than 20 percent of the GHG reductions achieved, clearly demonstrating Dow's emphasis on developing new projects.

A Collaborative Blueprint for Unlocking Carbon Reductions

In July 2018, Dow launched its Collaborative Blueprint for Unlocking Carbon Reductions. The collaborative blueprint is based on Dow's learnings and experience in successfully developing carbon-saving projects for Sochi 2014 and Rio 2016, and encompasses the Dow Climate Solutions Framework, the carbon reduction framework that is the foundation of the Dow-IOC Official Carbon Partnership.

The blueprint is one of Dow's contributions to help facilitate the advancement of local-level implementation of the Sustainable Development Goals. By sharing its approach with the broader community, Dow is hoping to enable others to undertake similar initiatives to help transition toward a low-carbon society. In addition to sharing its experiences, Dow is inviting customers and value chain partners to discuss applying the Collaborative Blueprint to their operation and value chains. The Dow Climate Solutions Framework, case studies and related materials can be downloaded from [Dow's Collaborative Blueprint website](#).

Carbon Mitigation Project Overview

To date, we have implemented 12 strategic carbon mitigation projects across six countries and a number of sectors.

	PROJECT NAME	CARBON PARTNER	CATEGORY	OPERATIONAL STARTING DATE
FOOD AND PACKAGING	Restoration of Pastureland to Improve Range Efficiency	Rio 2016	Recovery of pastureland and carbon sequestration in soil	November 2015
	Precision Agriculture Nitrogen Emission Management	Rio 2016	Agriculture productivity and optimization of fertilizer use	August 2015
	Reduction of Soil Erosion and GHG Emissions Through Minimal-Till Farming Practices	Sochi 2014	Minimal- or no-till farming practices	November 2013
	Microfoamed-core Flexible Packaging Production	Rio 2016	Raw material reduction	March 2016
MANUFACTURING AND ENERGY	Aratu Biomass Cogeneration	Rio 2016	Renewable energy	April 2014
	Santa Vitória Biomass Cogeneration	Rio 2016	Renewable energy	June 2015
BUILDINGS AND INFRASTRUCTURE	Customer-Formulated PU System for One-Component Insulating Foam Sealants	Sochi 2014	Carbon footprint reduction	April 2013
	PU Insulation in Construction	Rio 2016	Energy efficiency	November 2015
	PU Foam-Core Door Blowing Agent Conversion	Rio 2016	Energy efficiency and carbon footprint	June 2016
	PU Sandwich Panel Blowing Agent Conversion	Rio 2016	Energy efficient and carbon footprint reduction	November 2016
	High Performance Building Enclosures – Foam Air Sealing	Sochi 2014	Energy efficiency	December 2013
	Carbon-Fiber-Based Composites	Sochi 2014	Carbon footprint reduction	October 2013

PROGRAM	CREDITS	COUNTRY
SOCHI 2014	Florestal Santa Maria REDD Project	Brazil
	Argibem, São Sebastião and Vulcão Renewable Biomass Fuel Switching Project	Brazil
	Project Bikin Tiger Carbon Project	Russia
	The Hyundai Steel Waste Energy Recovery Cogeneration Project	South Korea
	Fundão-Santa Clara Energetic Complex Project	Brazil
	Dalton-Whitfield Landfill Project	USA
RIO 2016	BAESA Hydropower Plant 2008	Brazil
	Foz do Chapecó Hydropower Plant 2010	Brazil
	Pampeana and Terra Santa Small Hydropower Plants Project (2012-2013)	Brazil
	RMDLT Portel-Para REDD Projects (2009-2012)	Brazil
IOC	Reduction of GHG Emissions in Propylene Oxide Production at MTP HPPO Manufacturing CO. Ltd. (October 2011-May 2014)	Thailand



Championing Sustainable Development

“Dow’s partnership with the Olympics has provided us with a unique opportunity to start a new dialogue and collaborate with industry leaders to introduce low-carbon solutions that will benefit generations to come.”

Louis A. Vega
Dow Vice President of
Olympic & Sports Solutions

Partnering to Support Sustainability

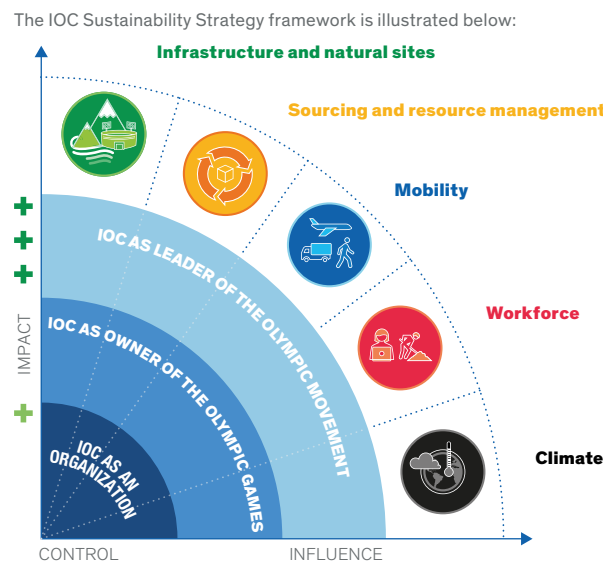
The United Nations (UN) General Assembly recognizes how all sectors of society, including sport and business, play an important role in supporting its 2030 Agenda for Sustainable Development and the 17 Sustainable Development Goals (SDGs). The SDGs provide a common framework for public and private actors to implement actions to contribute to sustainable development. Both Dow's 2025 Sustainability Goals and the IOC Sustainability Strategy reflect each organization's commitment to contribute to the 2030 Agenda and closely align to SDGs, including partnerships for sustainability (#17) and climate action (#13).

Through its 2025 Sustainability Goals, Dow is seeking to lead in developing societal blueprints that integrate public policy solutions, science and technology, value chain innovation and employee engagement to facilitate the transition to a more sustainable planet. The Dow-IOC Carbon Partnership represents a new model for sustainability collaboration that aligns to Dow's 2025 Sustainability Goals.

To respond to the sustainability recommendations from Olympic Agenda 2020, the IOC has developed an IOC Sustainability Strategy that identifies climate as one of its five focus areas. For the IOC, the objective for 2020 is to achieve carbon neutrality by reducing direct and indirect greenhouse gas emissions.

IOC Sustainability Strategy: Helping Build a Better World Through Sport

Based on the responsibility of the IOC as an organization, as the owner of the Olympic Games and as the leader of the Olympic Movement, the IOC Sustainability Strategy focuses on five areas: infrastructure and natural sites, sourcing and resource management, mobility, workforce, and climate. The fifth focus area, climate, is a cross-cutting theme. Several objectives within the first four focus areas will contribute to addressing the issue of climate change, but the IOC believes that climate change is of such critical importance, it requires special attention as a focus area in its own right.



Dow 2025 Sustainability Goals:

The Dow carbon partnership program is an example of actions that Dow is taking to meet specific 2025 Sustainability Goal targets, including:

- Dow will innovate to increase the positive net impact of products across all markets such that the benefit to global sustainable development exceeds burdens by 4X.
- Dow will be a leader in energy and greenhouse gas life cycle management by ensuring the ratio of benefits of our product portfolio to burdens is at 3:1.
- Dow will increase use of life cycle assessment to guide decision-making while meeting business and customer needs.

Leading the Blueprint

- Dow will develop blueprints on energy and climate, watershed management, resource efficiency, infrastructure and sustainable cities, quality education, and productive employment and economic growth.

World-Leading Operations Performance

- Though we will grow globally over the next 10 years, Dow's absolute greenhouse emissions goal is to not exceed our 2006 baseline.
- Dow's goal is to obtain 750 megawatts (MW) of its power demand from renewable sources by 2025.



A Framework for Climate Action

“Our responsibility has been to conduct an independent assessment, validating the project plans and verifying the reductions and conservative projections of the impacts throughout the realization period.”

Braulio Pikman
Technical Director at ERM

The carbon mitigation programs follow the principles outlined in Dow's [Climate Solutions Framework](#).

The Framework allows organizations, in collaboration with industry partners, to implement structured yet flexible approaches to offset the impacts of their activities while also leaving a positive legacy through the adoption of innovative low-carbon technologies. The Framework recognizes that such programs should be implemented only after all the possible opportunities to minimize an event's or organization's footprint have been identified and implemented.

The overarching purpose of the Framework is to:

- Provide events and organizations with opportunities for voluntarily offsetting their carbon impacts by implementing innovative GHG-mitigation projects beyond the physical boundaries of their operations or events.
- Enable businesses and institutional leaders to demonstrate leadership in the development of low GHG products and service solutions.
- Offer a methodology for accounting for an event's or operation's broader societal GHG impacts.
- Offer an innovative means to establish and communicate about carbon reduction projects that can be tailored to a region's needs, demonstrate a beyond-business-as-usual condition, and account for emission reductions in a conservative and economical manner.

The carbon mitigation projects created under the Framework deliver high-quality emission reductions that are allocated, via contract, to the organization. Although they may be registered, emission reductions created under the Framework are not tradable nor financial instruments.

The principles that shape Dow's Framework allow the programs to go beyond the restrictive borders of carbon trading schemes that are based on financial additionality. The Framework incorporates existing best practices in GHG measurement and reporting with a rigorous approach to the development of a portfolio of GHG mitigation projects.

The Nine Guiding Principles

The Framework is based on nine guiding principles.

CATEGORY	PRINCIPLE	DESCRIPTION
QUALITY		
	Real	Measurable, conservative and not double-counted (unique)
	Beyond Business As Usual	Emission-reduction projects push innovation boundaries and are not part of normal business practices
	Confirmed	Third-party validated, verified and monitored
INNOVATION		
	Diverse	Employs a wide range of low-carbon solutions and applications across multiple industries and activities
	Holistic	Recognizes both the direct and broader societal GHG impacts of events and the associated mitigation activities
	Market-Driven	Utilizes the value from event exposure (marketing value) to drive mitigation activities and generate long-term benefits
LEGACY		
	Catalytic	Technology adoption is a key focus; recognizes that events can help promote more sustainable technologies that lead to market transformation
	Progressive	Integrates current best practices, guidance and methodologies into a flexible approach for event owners
	Focused	Enables projects in geographic and thematic areas that are tailored to the event, not constrained to a jurisdiction

Validation and Verification

For the mitigation projects presented in the report, Environmental Resources Management (ERM) or other appropriate third parties provided an independent validation⁴ of the project plans against the Dow Climate Solutions Framework and verification of the resulting GHG emission reductions. In addition, ERM determined the validity as a Principal or Societal Emission Reduction Project⁵ for each project. When required, ERM also assessed the forecasted GHG reduction results based on objective evidence.

Project plans were validated and implementation verified based on criteria that include:

- Clear demonstration of the Beyond Business As Usual condition. Barriers to adopting low-carbon technologies and materials can include higher initial costs, lack of consumer awareness of technologies and their potential, risk and a lack of incentives.
- Use of existing GHG accounting methodologies and/or protocols.
- Contractual conditions showing that the climate benefits generated by each of the projects during the crediting period will be attributed to the carbon partnerships of Dow and the individual Olympic Games Organizing Committees or the IOC and not traded as carbon credits.
- Detailed conservative calculations of baseline emissions and project emissions.
- Evidence of project implementation based on site visits, official production records, invoices for purchasing new equipment or machinery, and contractual agreements between Dow and its partners.

⁴Validation is the phase in which an external third party assesses the quantification approach and boundary selection detailed in the project plan and provides a reasonable level of assurance that the approach is a conservative estimation of GHG emission reductions. Verification is the phase in which an independent third party checks the project monitoring report to ensure that the implementation was completed as detailed in the project plan and that the emission reductions effectively occurred.

⁵Within the Dow Climate Solutions Framework, emissions sources have been divided into three categories: Scope 1, Scope 2 and Scope 3 (as prescribed by the GHG Protocol from WBCSD/WRI). Further guidance is given to identifying these GHG emissions and whether to classify them as part of the "Principal Sphere" or "Societal Sphere." Emissions within the Principal Sphere ultimately encompass the emissions that are under direct responsibility of the Organizing Committee of the Rio 2016 Olympic Games. The Societal Sphere contains only Scope 3 emissions that are not identified within the Principal Sphere.





Going Beyond in Alignment with the Paris Agreement

Nearly 200 countries have pledged their support to the landmark Paris Agreement, which aims to curb global carbon emissions and limit global warming to within 2 degrees Celsius above pre-industrial levels.

Dow's carbon partnerships support this ambition in the following ways:

Supporting National Climate Pledges



Progress toward this ambitious goal relies on the successful implementation of national climate pledges. Article 6 of the Paris Agreement provides a foundation for international cooperation through markets and describes the use of internationally transferred mitigation outcomes (ITMOs). This will provide a means to balance, without double counting, any carbon-based trade between NDCs that might take place.

Dow's carbon partnership programs are tailored to a region's needs and can support key areas of focus for reducing GHG emissions outlined by a country's NDC.

Cross-Sector Collaboration



We believe that cross-sector partnerships can play an important role in achieving and going beyond NDC targets while also helping businesses adapt and succeed in a rapidly changing world.

The Framework is well aligned with the Paris Agreement/Article 6⁶ on international cooperation as it represents a global approach to initiating low-carbon projects, while protecting environmental integrity and assuring conservative approaches to measure success.

Beyond Business As Usual



Under the Dow Climate Solutions Framework, any carbon mitigation project represents a voluntary GHG-mitigation initiative and must demonstrate that it goes beyond typical business practices ("beyond business as usual") and faces real barriers to its implementation. This ensures that these low carbon projects are not simply a byproduct of normal operations but rather are the result of innovation and change in the marketplace. Capacity-building and training are important components of the carbon projects implemented by Dow.

⁶https://unfccc.int/files/meetings/paris_nov_2015/.../paris_agreement_english_.pdf

KEY MILESTONES AND RECOGNITIONS

2013

MARCH

The Sochi 2014 carbon mitigation program is announced, with the goal to deliver 360,000 tonnes of greenhouse gas reductions by 2024.



OCTOBER

Dow announces the intention to offset the travel footprint for athletes, media and spectators, amounting to 160,000 tonnes of CO₂ equivalents.

NOVEMBER

The Dow Climate Solutions Framework is launched at the United Nations' COP 19/CMP 9 event in Warsaw, Poland, and made available for public reference and consultation on the UN's Global Compact website.



2014

FEBRUARY

Dow announces the mitigation of the Sochi 2014 Organizing



OFFICIAL CARBON PARTNER

Committee's carbon footprint and the emissions of spectators and media, three days before the Opening Ceremony of the Games.

SEPTEMBER

The Rio 2016 Organizing Committee names Dow as Official Carbon of the Olympic Games Rio 2016, with the goal to deliver 500,000 tonnes of CO₂e.

2015

DECEMBER

Dow participates in COP 21 in Paris as the headline partner of the Sustainable Innovation in Sports forum to draw attention to the opportunity to use sport to engage stakeholders in climate action.



2016

AUGUST

Rio 2016 and Dow announce their portfolio of projects delivered 100,000 tonnes of verified GHG emission reductions by the 2016 Summer Olympics and that projects can be expected to deliver more than 2 million tonnes of CO₂e by 2026.

Dow's initiatives through Rio 2016 carbon partnership also received numerous recognitions in Brazil:

Guia EXAME
Sustentabilidade



- Highlighted in the 2016 Exame Sustainability Guide (Guia Exame de Sustentabilidade) for the projects developed through the carbon partnership.
- Selected by the "Good Companies" (Empresas do Bem) survey as examples for other companies and government entities.
- Recognized for the 12th Brazil Environmental Award (Prêmio Brasil Ambiental) and 2016 Eco Ward (Prêmio Eco 2016) from the American Chamber of Commerce in Rio de Janeiro.



2017

JUNE

Dow receives the Environmental Innovator of the Year award from the Green Sports Alliance, which recognizes and celebrates the best in sports and sustainability.

**GREEN
SPORTS
ALLIANCE**

SEPTEMBER

Dow-IOC carbon partnership is announced.

2018

JULY

Dow launches a Collaborative Blueprint for Unlocking Carbon Reductions based on its learnings and experience in successfully developing carbon-saving projects for the Olympic Winter Games Sochi 2014 and Olympic Games Rio 2016.



**FOOD AND
PACKAGING:**
WORKING ACROSS
THE VALUE CHAIN
TO IMPLEMENT LESS
CARBON-INTENSIVE
PRACTICES





Studies predict that as diets change and as the world's population grows to 9 billion people by 2050, food production will need to increase by at least 60 percent to meet the global demand.⁷ This challenge, plus the need to address climate change, requires an urgent response to protect ecosystems, use land more productively and reduce food waste. By taking a holistic approach across agriculture, harvesting, distribution, storage and packaging, Dow can help create solutions to optimize steps along the entire value chain. Our ability to apply innovation and technology to food production, preservation and packaging, and our work in partnership with different value chain actors, can help us meet the challenges of increasing and securing food supplies, while conserving natural resources and lowering greenhouse gas (GHG) emissions.

⁷Source: Food and Agriculture Organization of the United Nations (FAO)

PROJECT AT A GLANCE

Encouraging the Recovery of Degraded Pastureland

Program: Rio 2016

Project Name: Restoration of Pastureland to Improve Range Efficiency

Location: Brazil

Project Description: Degraded pastureland restoration (soil organic carbon stock recovery)

Project Start: November 2015

Crediting Period: 5 years

Partner: The Roncador Group

Why Beyond Business As Usual: Often the cattle ranching practices in Brazil lead to degradation of pastureland and deforestation. Field observation and soil sampling carried out by technical experts determined that existing ranching practices have resulted in half of all pastureland within the project operating at low productivity and with a very low soil organic carbon (SOC) level. This project was designed to change ranching practices to increase the SOC stocks through the restoration of degraded land. The project also will generate emission reductions as cattle have more access to plentiful nutritious food, so they spend less time grazing and reach maturity faster.



PROJECT SUMMARY

Twenty-five farms are participating in the project, which is aimed at increasing the productivity of more than 50,000 hectares of degraded range and pasture and restoring the SOC of the pasture by managing invasive plants and introducing seed solutions to improve pasture capacity. These restoration activities are being carried out in coordination with enhanced cattle and herd management techniques, such as strategic herd rotation and management of herd genetics. Together, these activities are expected to lead to higher meat production, while reducing the overall carbon impact of cattle grazing. In turn, raising more cattle on less acreage helps to alleviate the pressure for deforestation in Brazil.

Dow Brazil has partnered with Roncador Group – a Brazilian company with more than 30 years of experience in agriculture, livestock and mining – to provide expertise and technologies to farmers in the state of Mato Grosso. In addition, Roncador is operating a model farm through 2020 that is serving as a “living lab” to demonstrate to other farmers the environmental and productivity benefits of restoring pastureland.

Dow and Roncador are introducing participating farmers to carbon-tracking methodology to quantify emission reductions.

The project leverages a partnership with Embrapa, Brazil’s leading agricultural research institute, to quantify carbon sequestration under different soil and herd management conditions.

Dow is working with the World Resources Institute (WRI) to increase adoption of a tool from the Greenhouse Gas Protocol that helps ranchers measure, manage and report GHG emissions. The [Agriculture Guidance](#) is available for download.

Project Learnings

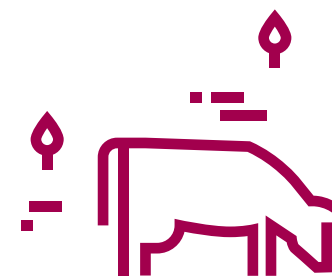
Yearly inventories by project managers have shown a substantial reduction of GHG emissions from participating farms. In addition, workshops at the model farm have attracted up to 150 farmers at one time. Through the workshops, farmers are learning how it is possible to obtain more productive pastures with shorter production cycles, while also increasing carbon sequestration and storage in soil and lowering GHG emissions. This outreach has proven to be important in accelerating the adoption of sustainable agricultural activities across the region.

Project Status: Implementation completed; verification ongoing.

Modeling the Future

To the ranchers seated in rows under open-air shelters of the model farm in Mato Grosso, the math sounds enticing. Experts share how interventions to improve the ecological function of degraded pasture can improve its capacity to support more cattle per hectare – up to three times more cattle per hectare. Ranchers also can walk the range to see how seeding a mixture of grasses has led to improvement in pasture quality. They learn that the restored soil has increased its carbon stock, which has resulted in substantial reductions in the life-cycle GHG emissions.

When adopting new technologies, ranchers often face knowledge and technical barriers, and have insufficient incentive to assume the risk that a change in agricultural practices may incur. By talking with experts and seeing results firsthand at model farms, ranchers can better see the links between productivity and sustainability – helping to accelerate positive change.



PROJECT AT A GLANCE

Improving Agricultural Productivity Through Precision Farming

Program: Rio 2016

Project Name: Precision Agriculture Nitrogen Emission Management Project

Location: Mato Grosso region in Brazil

Project Description: Optimization of fertilizer use

Project Start: August 2015

Crediting Period: 5 years

Partner: Farmers Edge International

Why Beyond Business As Usual: Prior to the implementation of the project, commercial farming operations in the region were utilizing conventional approaches to fertilizer management, including fixed-rate fertilizer applications. Dow has partnered with a leading precision agronomy consulting firm to provide precision agriculture and variable-rate technology and expertise to farmers in Mato Grosso. The aim of the project is to optimize use of synthetic fertilizer to reduce nitrous oxide (N_2O) emission per unit of crop when compared to other commercial farming operations in the region. The emission reductions are expected to result from reduced nitrogen application per unit of crop when compared to the baseline period.





PROJECT SUMMARY

Precision farming aims to lessen farm environmental impacts by adjusting production inputs, such as fertilizer, to specific conditions within each area of a field. Participating farmers have access to technologies such as satellite imagery, precise harvest and profit maps, soil sampling, weather monitoring, and detailed review of cropping plans and goals with variable-rate technology experts. That information is used to generate site-specific maps of the soil nutrient properties, which in turn helps farmers determine the rates at which to apply the fertilizer for optimal nutrient results. Improved fertilizer management leads to a reduction in nitrous oxide emissions and lower fertilizer runoff or nitrate leaching into groundwater per tonne of crop. Nitrous oxide is a greenhouse gas that is generated as fertilizer decomposes.

Dow also has offered seeds and crop protection solutions to farmers to optimize production and increase yields. Project implementation started in August 2015 and spanned 25,000 hectares across seven farms to cover two crop seasons – one summer crop (soy) and one winter crop (corn, cotton or sunflowers). Carbon emission reductions were tracked based on productivity increase and the use of fertilizers and fuel. The objectives were to help farmers to increase yield through advanced and more sustainable agricultural practices, while reducing GHGs.

Project Learnings

Although the project was implemented as planned, project results were mixed. Farmers benefited from an increase in productivity, but the GHG savings were less than anticipated. Previously, project partners had successfully implemented variable-rate technologies in colder climates, including in Russia for the Sustainable Future partnership, and the assumption was that anticipated GHG savings would be replicated in Brazil's tropical climate. However, operational hurdles interfered. These included a rainy and wet 2016 growing season. Nitrogen fertilizer can be lost from fields with moderate to high rainfall. In turn, farmers, out of an abundance of caution, may decide to increase fertilizer use to ensure the plants are not undernourished. Several farmers continue to use precision agriculture methods because they were satisfied in their effectiveness in boosting productivity.

Project Status: Implementation completed; verification closed. The project activities have been completed. Early verification results showed lower than anticipated GHG reductions. Further quantification will not be undertaken as the carbon commitments with Rio 2016 are covered through other projects. It can be anticipated that as farmers get comfortable with precision agriculture methods, they might optimize fertilizer amounts, which would lead to lower GHG emissions.

PROJECT AT A GLANCE

Benefiting Farmers and the Land with Reduced-Till Practices

Program: Sochi 2014

Project Name: Reduction of Soil Erosion and GHG Emissions
Through Minimal-Till Farming Practices

Location: Russia (Volgograd, Lipetsk and Kaliningrad regions)

Project Description: Carbon sequestration, reduction of fuel
and fertilizer through more sustainable cropping systems

Project Start: November 2013

Crediting Period: 5 years

Partner: Farmers Edge International

Why Beyond Business As Usual: While other geographies
had already adopted zero or reduced tillage and 4R nutrient
management practices, these techniques were not adopted in
Russia.





PROJECT SUMMARY

The project was implemented on five large Russian farms encompassing more than 200,000 hectares. The objectives were to assist the farms in adopting state-of-the-art precision agriculture practices and provide the advanced expertise necessary to optimize productivity. Several workshops were held to provide information on various aspects of the project to participating farms. In addition to the project partners and project farm agronomists and managers, the workshops were attended by representatives from several other agricultural organizations including university, government and other farms. Following the workshop phase, the project team worked with the agronomists and farm managers to help transition to more environmentally sustainable practices, such as reduced tillage, optimized use of nutrients and variable rate application of fertilizer. By summer 2015, one of the project farms had converted to zero tillage.

Project Learnings

The farms initially enrolled in the program were generally cautious about adopting direct seeding methods. Just two of the farms had equipment to shift to zero tillage and band nitrogen placement. The agronomists were largely risk averse. Workshops also revealed that further work was needed to create sustainability awareness among the participating farms. Getting active support and approval for sustainable practices from senior management proved key to adoption on the farm. Thus, the main objective in the short-term (years 1-3) was to create awareness and buy-in among the participating farms and demonstrate ways in which they can reduce their risk during conversion from their current tillage and fertilizer management practices to zero tillage and 4R practices. The project has led to the introduction of new methods and capacity-building in the region.

Project Status: Implementation completed; verification closed. In spite of the completion of project activities, adoption of low-till farming practices is still limited. Because the Sochi 2014 carbon commitments are fully covered through other projects, quantification of GHG reductions will not be undertaken with this project.

PROJECT AT A GLANCE

Introducing New Materials-Reduction Technologies into Flexible Packaging

Program: Rio 2016

Project Name: Microfoamed-Core Flexible Packaging Production

Location: Brazil, Argentina, Colombia, Mexico and Guatemala

Project Description: Materials reduction

Project Start: March 2016

Crediting Period: 10 years

Partner: Film manufacturers Valfilm, Petropack, Folmex and Plastilene as well as equipment manufacturer and technology license holder MuCell Extrusion.

Why Beyond Business As Usual: The project is the first of its kind in the Americas. Microfoaming is a patented Dow technology for flexible packaging production. Despite its clear advantages over incumbent technologies, its market adoption is currently limited, with no plastic converters in South, Central and North American regions using the microfoaming equipment. Identified barriers were the economic costs of conversion and perceived risks associated with adoption of this new technology.



PROJECT SUMMARY

Microfoaming is a licensed technology developed by Dow to meet market demands for solutions that reduce weight and increase efficiency of plastic films and flexible packages. The technology enables density reduction, or lightweighting, in coextruded films through a physical foaming process. This new physical foaming process uses gas injection to create bubbles in the middle layer of a multilayer film, reducing the amount of resin used while maintaining the thickness and mechanical properties of the packaging film. As a result, the packaging film, although lighter weight, still meets the desired physical and processing requirements.

Dow has partnered with strategic customers in Brazil (Valfilm), Argentina (Petropack), Mexico (Folmex), Colombia and Guatemala (Plastilene), as well as MuCell Extrusion LLC, an equipment manufacturer for extrusion solutions and Dow's exclusive partner for the foamed film technology. This collaboration will ensure broad application of the technology throughout Latin America.

The lack of market history behind microfoaming, the financial risk of changing the equipment, and a negative perception of film-foaming processes based on past experiences with chemical foaming in plastics created a significant barrier to introducing this advanced technology. In light of these facts, and considering the lack of market

penetration, the adoption of microfoaming under this project can be considered as first of its kind for the region.

GHG-emissions savings would be based on the reduction of material required to produce functionally equivalent packaging film. MuCell would play an ongoing role in monitoring project activities for each plant to support the monitoring of avoided GHG emissions.

Project Learnings

This project required buy-in across the value chain – from the equipment manufacturer to the film producer to the brand owner. Equipment enabling the new technology has been installed, and packaging films of commercial quality are being produced. Some packaging is being sold in Brazil, Colombia and Mexico.

Qualification of the packaging by brand owners is a long process, so the ramp-up and commercialization of the new technology are still ongoing and the scale of the GHG savings is being monitored.

Project Status: Implementation completed; verification ongoing.





**MANUFACTURING
AND ENERGY:
PROMOTING
LOW-CARBON AND
RESOURCE-EFFICIENT
PATHWAYS TO
PRODUCTION**





When consumers walk the aisles of stores, they often don't think about how a product was manufactured. Yet every new clothing item made, cell phone produced and packaged good purchased results in tangible energy and materials spent. Improving industrial processes can not only save on energy and materials spent, but also on greenhouse gas (GHG) emissions produced.

For example, lighter-weight packaging uses less material in manufacturing and saves on fuel in transport, resulting in a reduced carbon footprint per packaged product. In addition, less material results in less waste at end of life. At the same time, cultivating clean, renewable energy sources to power our factories also reduces the carbon intensity of manufacturing while fostering long-term competitive advantage.

While also being critical drivers of economic growth, industry and energy production together contribute more than 50 percent of the man-made GHGs.⁸ By investing in new, efficient low-GHG technologies and cleaner energy sources, we can substantially impact an environmentally and economically sustainable future.

⁸Source: EPA, "Global Emissions by Economic Sector," www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data

PROJECT AT A GLANCE

Pioneering Biomass Energy Technologies in the Chemical Sector

Program: Rio 2016

Project Name: Aratu Biomass Cogeneration

Location: Brazil

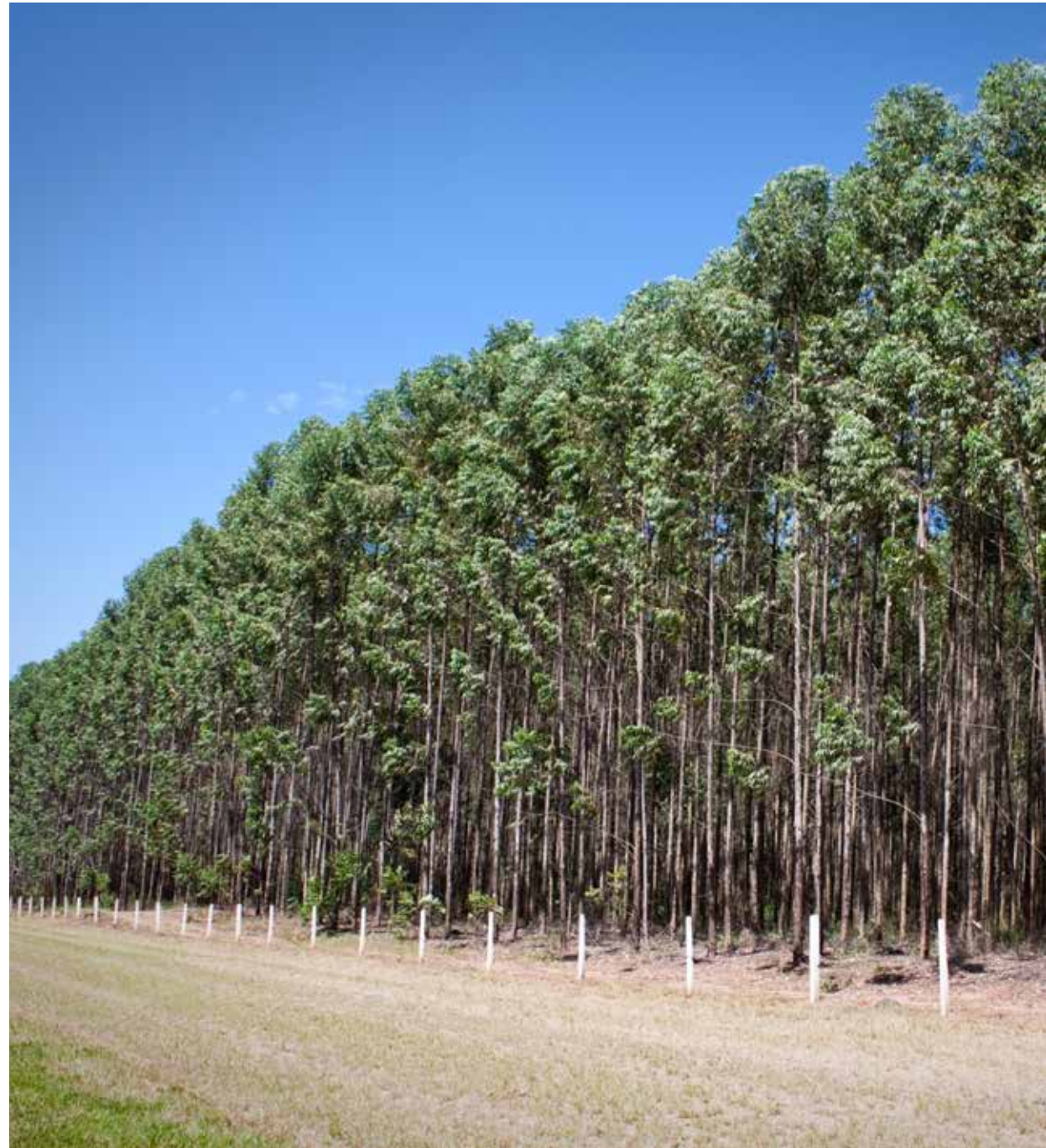
Project Description: Renewable electricity and steam generation from eucalyptus biomass

Project Start: April 2014

Crediting Period: 10 years

Partner: Energias Renovaveis do Brasil Ltda. (ERB)

Why Beyond Business As Usual: The project activity reduces GHG emissions by avoiding electricity and steam generation from fossil fuel sources and the accompanying CO₂ emissions. The project uses biomass provided by dedicated farmlands or purchased from sustainable sources, which helps decrease impact on deforestation. Producing biomass for use at a continuous cogeneration plant is not a common practice in Brazil. To maintain a continuous supply of steam to the Dow petrochemical plant, a unique boiler technology was implemented that is the first of its kind in the region. Because the majority of the energy partner plantations are on lands that were in an abandoned state prior to the project activities, there is a beneficial land use change associated with the project. Reforestation of these lands results in carbon sequestration and restoration of degraded soils.



PROJECT SUMMARY

This project increases the amount of renewable power that is being consumed by Dow operations by replacing natural gas with a renewable, biogenic source. Steam generated from a cogeneration system that uses biomass chips from a sustainably managed eucalyptus forest plantation helps to displace part of the natural gas load in five existing boilers at the Aratu Industrial Complex. GHG emissions are reduced and a clean source of electricity is fed back to the grid from Dow's energy partner's power plant.

The project processes eucalyptus biomass provided by dedicated farmlands owned by ERB or maintained by the company in partnership with rural producers on the northern coast of Bahia. Each of these farms meets the sustainability criteria set forth in the Timber Standard for Heat and Electricity. In addition, an excess of 12 megawatts (MW) of renewable electricity is fed back to the distribution grid.

Project Learnings

A major challenge with this project was to find a commercially viable means of continuously producing an alternative energy source on a large scale. In order to maintain a continuous supply of steam to the Dow plant, bubbling fluidized bed (BFB) technology was selected as the boiler technology for the project. The energy partner modified the design to accommodate the size of its operation and to maintain continuous operations, making it the first of its kind for the State of Bahia.

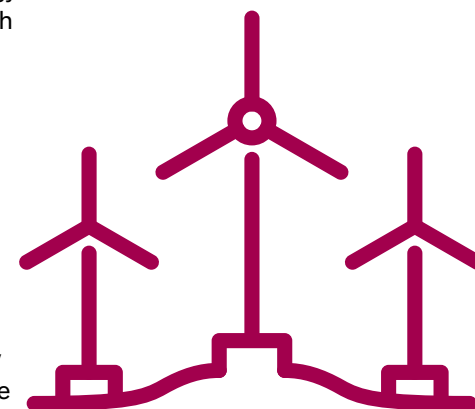
Project Status: Implementation completed; verification ongoing.

The Business Case for Renewable Energy

To increase competitiveness and reduce carbon emissions, more manufacturers like Dow are turning to renewable energy sources. In fact, Dow has become one of the largest industrial buyers of renewable energy – a move it sees as having both environmental and economic advantages.

In Brazil, cogeneration plants powered by sustainably harvested eucalyptus and sugarcane biomass provide steam and electricity for two Dow manufacturing sites. These pioneering projects also create benefits for the local economy and community. In Texas, Dow has agreed to purchase wind output from wind farms to help power its Freeport site. As part of its World-Leading Operations Performance sustainability goal, the company is seeking to achieve a renewable energy target of 750 MW, or enough electricity to annually supply more than 100,000 U.S. homes, by 2025. In 2017, Dow had contracts for 698 MW of clean energy, and will continue to pursue clean energy opportunities where the resources are available and the requirements of Dow can be met using these resources.

In addition to reducing the carbon impact of Dow's production, renewable sources of power also provide more certainty over future energy costs. The use of renewable energy is not able to entirely displace the volumes of natural gas that Dow consumes for chemical manufacturing. However, these purchase agreements provide a cushion against natural gas price volatility and structural price increases at a cost and duration that is unavailable through natural gas trade.



PROJECT AT A GLANCE

Pioneering Biomass Energy Technologies in the Chemical Sector

Program: Rio 2016

Project Name: Santa Vitória Biomass Cogeneration Project

Location: Brazil

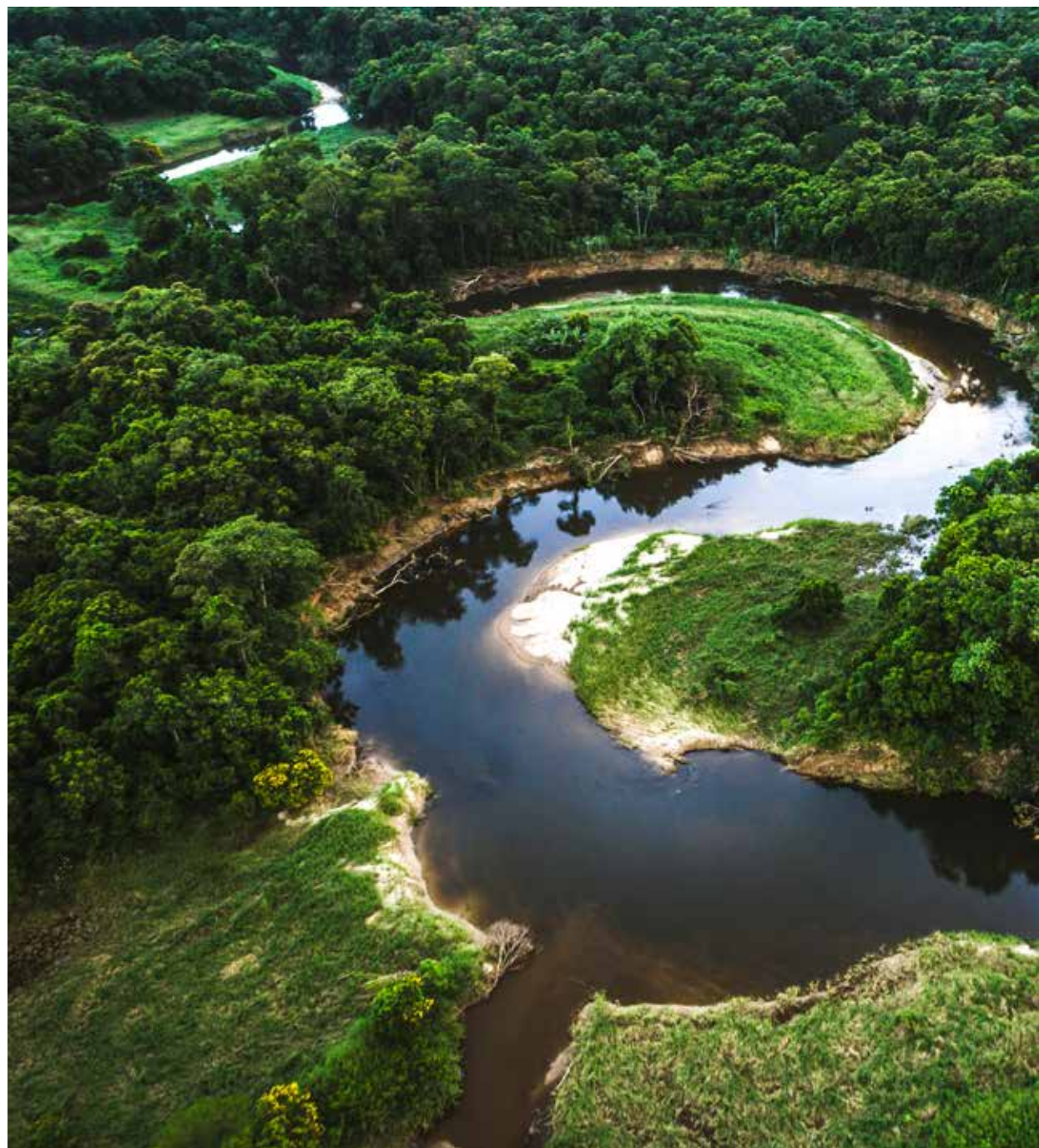
Project Description: Renewable electricity and steam generation from sugarcane bagasse biomass

Project Start: July 2015

Crediting Period: 10 years

Partner: Energias Renovaveis do Brasil Ltda. (ERB)

Why Beyond Business As Usual: Residual biomass is used to generate steam for the industrial process. In addition, a turbine produces electric energy in excess of what is needed to supply the industrial process and hence a large part of the electricity generated is exported to the grid.





PROJECT SUMMARY

A power plant located near the city of Santa Vitória produces steam and energy from sugarcane bagasse, generating clean, renewable energy for Dow's sugarcane-to-ethanol operations. The plant produces 38 MW of power, meeting all the energy needs for Dow's operations in Santa Vitória and producing excess energy for exporting to the power grid. The plant also operates a large nursery supporting sugarcane species and local reforestation, producing an average of 500,000 seedlings per year.

This is a first-of-its-kind project in Brazil. Typically, ethanol production companies own the utility plant and generate electricity internally as a byproduct from ethanol and sugar production, their core business. In the case of Santa Vitória cogeneration, the energy partner uses sugarcane bagasse to efficiently generate clean, renewable energy for an ethanol plant – making the production of electricity the core business and introducing a new business model in Brazil. The installation of a condenser independent from the ethanol plant operations and a highly efficient boiler contributes to the project's efficient performance. Emission reductions are calculated from multiple sources, including biomass processing, reforestation and cogeneration.

Project Learnings

The Santa Vitória site is on the border between two critically endangered biomes: the Cerrado and the Atlantic Forest. It also is in the heart of Brazil's agricultural region, where less than 20 percent of natural vegetation remains, and what is left is highly fragmented and poorly protected. Dow piloted a program with The Nature Conservancy focused on identifying ways that the site can expand agricultural production while simultaneously adhering to environmental legislation and promoting conservation in this biologically and economically significant region.

This pilot demonstrated that better economic and ecosystem benefits can be achieved when a landscape-level approach is applied as compared to a parcel-by-parcel approach. Agricultural producers can expand production and minimize cost of compliance with Brazil's Forest Code while protecting more species, storing more carbon and improving water quality. Overall, the research suggested that – through land use that balances economic and environmental objectives at a landscape scale – Brazil's agricultural sector could expand its production and meet regulatory requirements in a way that could further benefit conservation, local people and business. The collaboration also developed a land-use planning tool called LegalGeo that is publicly available and downloadable.

Project Status: Implementation completed; verification ongoing.



**BUILDINGS AND
INFRASTRUCTURE:
CONSTRUCTING
STRATEGIES FOR
A LOWER-CARBON
FUTURE**





As urbanization increases, so does the need for new infrastructure solutions. Decisions made in cities today about infrastructure and the built environment impact society's ability to achieve emission reductions and adapt to climate change well into the future.

Globally, buildings are the largest energy-consuming sector in the world, and account for more than one-third of total final energy consumption. As a result, they also are responsible for approximately one-third of global carbon emissions.⁹ Because buildings have an average life span of 40 years, the choice of materials in the design phase is particularly important as it can influence both the embodied carbon footprint as well as the energy efficiency and operational footprint throughout the building's life span. Installing high-performance energy-saving materials can have the immediate effect of reducing energy bills while also improving the comfort and well-being of building users.

In addition, low-carbon, climate-resilient urban infrastructure can help create more sustainable and livable cities. Science is helping address the challenges of design, construction and maintenance of structures with lower environmental impact and more energy efficiency, while also helping increase the safety and durability of structures. For example, modeling tools can guide builders and architects by calculating the long-term impact of construction decisions and determine the most cost-effective technical solutions for reducing the use of energy, water and the embodied energy in construction materials.

By focusing on technologies that help balance economic progress with sustainability, we can build a bridge to a low-carbon future.

⁹Source: "Transition to Sustainable Buildings: Strategies and Opportunities to 2050," International Energy Agency, 2013.

PROJECT AT A GLANCE

Promoting Energy-Saving Building Technologies Across the Construction Value Chain

Program: Rio 2016

Project Name: Polyurethane Insulation in Construction

Location: Brazil and Argentina

Project Description: Energy efficiency

Project Start: November 2015 (Brazil); February 2016 (Argentina)

Crediting Period: 10 years

Partner: Danica-Zipco, Isoeste and MBP-Isoblock in Brazil; Acerolatina, Plaquimet and Sipanel in Argentina

Why Beyond Business As Usual: Using polyurethane foam core construction panels in the commercial markets of Brazil and Argentina is not the typical building practice. It has very low market penetration. Thus stakeholders who choose this energy-saving technology are early adopters. By engaging stakeholders in discussions about the economic and environmental benefits of energy-efficient insulation at levels beyond regulated minimum standards, the project aimed to overcome barriers for adoption across the value chain.





PROJECT SUMMARY

More than 80 percent of the energy use of buildings throughout their life cycle comes from operating them.¹⁰ Designing buildings with better insulation reduces the buildings' energy consumption and associated GHG emissions. Dow engaged the entire construction value chain on the importance of integrating energy efficiency into their decision-making as an essential way to lower GHG emissions and help property owners lower their energy costs.

In November 2015, Dow launched an educational campaign to promote energy-saving building technologies in partnership with the largest producers of polyurethane insulation panels in Brazil – Danica-Zipco, Isoeste and MBP-Isoblock. Dow polyurethane and polyisocyanurate technologies are used in the manufacturing of insulated panels. Rigid polyurethane insulation panels can help minimize the heat transfer between indoor and outdoor environments, helping to optimize energy efficiency and limit GHG emissions from heating and cooling. The panels are used on warehouses, supermarkets, commercial buildings and airports.

Dow carried out a number of project activities to increase the voluntary adoption of these panels and other energy-efficient measures. Starting two years before the Games and continuing until the end of the Games, these activities consisted of interactive workshops and seminars in the four key construction markets of Recife, Rio de Janeiro, São Paulo and Belo Horizonte. The program was expanded to Argentina with producers Acerolatina, Plaquimet and Sipanel in the first half of 2017. Technical articles were published in specialized magazines, and a website was created to share relevant examples and case studies on energy-saving projects.

Project Learnings

The long-term goal is for the energy-efficient insulated panels to become the preferred choice over traditional methods of construction, but market penetration of the insulation in the target construction market remains low. As a result, the decision to use PU-insulated panels remains beyond business as usual.

Project Status: Implementation completed; verification ongoing.

¹⁰Source: "Buildings and Climate Change: Summary for Decision-Makers," UNEP Sustainable Building and Climate Initiative, 2009.

PROJECT AT A GLANCE

Addressing Aging Infrastructure with Low-Weight, Carbon Fiber-Based Composites

Program: Sochi 2014

Project Name: Carbon Fiber-Based Composites

Location: Russia

Project Description: Carbon footprint reduction through structural reinforcement and refurbishment of buildings and bridges

Project Start: October 2013

Crediting Period: 10 years

Partner: Holding Company Composite (HCC)

Why Beyond Business As Usual: Presented as a solution for aging infrastructure, the low-weight and high-strength carbon fiber-reinforced (CFR) composite materials can substitute traditional reinforcement materials in engineering projects. Due to the innovative nature of the technology, the project aimed at expanding technical knowledge among regional stakeholders to increase relatively low market adoption for civil engineering applications.



Taking a Life-Cycle View of Our Built Environment

What are the environmental costs of traffic congestion caused by a construction project? And how does this congestion impact the sustainability of a construction project? By looking beyond the carbon impact of a construction project and examining the whole life cycle of our infrastructure, it is possible to get a more holistic view of a project's environmental impact. Dow contracted with the University of Michigan to perform a life-cycle analysis of a bridge constructed with a carbon fiber reinforced polymer (CFR) system compared with a conventional system. The study found that the CFR system resulted in net savings of both energy and CO₂ emissions when social costs related to construction-related congestion were taken into account. Fewer days of construction needed with the CFR system contributed to a 40 percent reduction in total energy consumption and a significant savings in the total global warming potential over the bridge's 60-year life cycle.





PROJECT SUMMARY

Throughout the developed world, infrastructure is aging, resulting in a need for innovative and cost-effective technologies to replace and repair a variety of civil projects, from beams to bridge decks. Customizable to fit nearly any application, carbon fiber-reinforced (CFR) composites facilitated by carbon fiber materials from DowAksa can enhance structural integrity for many civil infrastructure projects.

CFR composites are most frequently applied to beams, columns, masonry, brick walls and concrete pipes to enhance strength and extend the service life of roads and bridge decks. This is a significant benefit in Russia, where freeze-thaw cycles can compromise infrastructure over time. Use of CFR composites in retrofit projects can extend the service life of aged infrastructure by more than 50 years and avoids the costs of demolition and rebuilding. For newly built projects, structures reinforced with CFR can carry heavier loads and offer better protection from aging, leading to longer-lasting and more cost-effective infrastructure.

Project activities were led by DowAksa, a joint venture of Dow; and a local partner, Holding Company Composite (HCC). To accelerate adoption, a symposium on advanced composite material applications was held for regional authorities, governors, big-city mayors, major utility companies and academia. In addition, construction companies, design bureaus and project decision-makers were given the opportunity to participate in hands-on demonstrations and informed of case studies demonstrating the technical, environmental and economic benefits of carbon fiber composites for a variety of applications. The capacity-building part was followed by a life-cycle assessment of three real-world case studies in Russia, where the CFR composites were used for infrastructure rehabilitation.

Project Learnings

Comparison between the two infrastructure refurbishment methods indicates that the carbon fiber-epoxy structural reinforcement system is generally more GHG intensive than the conventional (steel). The GHG benefits of the carbon fiber reinforcement are due to avoiding scenarios of demolition and rebuilding of structures. In case of bridges, avoidance of traffic congestion and shorter timelines of refurbishment can lead to even higher GHG emission reductions. Even though not quantified in the context of this project, this should reduce the economic disruption and thus further reduce the carbon footprint.

The financial analysis comparing costs of rehabilitation using conventional methods and carbon fiber composite shows significant economic benefits in all the three case studies under consideration. Cost benefits are mainly due to reduced material, installation and labor costs. Because the Sochi 2014 target for climate benefit was far exceeded, Dow has completed its project work in Russia. However, further project activities have been pursued by HCC. The initial capacity-building phase of the project has created a pathway for accelerated implementation in civil infrastructure sectors and a positive legacy from the Dow–Sochi 2014 Carbon Partnership.

Project Status: Implementation completed; verification closed.

PROJECT AT A GLANCE

Reducing the Carbon Footprint of Construction Materials

Over the last several decades, Dow has worked with many polyurethane (PU) insulating foam manufacturers globally to help them reformulate and change blowing agents to meet regulations, and in some cases – by partnering with motivated customers – reformulate well in advance of regulations. By actively promoting the development and adoption of more sustainable alternatives, Dow has helped insulation foam manufacturers overcome technical and economic barriers to changing their foaming or blowing agent. Three blowing replacement projects were part of our carbon mitigation efforts in support of Sochi 2014 and Rio 2016. Although the project specifics differ, the general aims of these projects are similar. This report combines the projects and calls out some of the differences in the table below.

PROJECT NAME	Customer-Formulated Polyurethane System for One-Component Insulating Foam Sealants	Polyurethane (PU) Foam-Core Door Blowing Agent Conversion	Polyurethane Sandwich Panel Blowing Agent Conversion
PROGRAM	Russia 2014	Rio 2016	Rio 2016
PROJECT LOCATION	Russia	Mexico	Argentina
PROJECT DESCRIPTION	HCFC replacement with a hydrofluorocarbon/dimethyl ether blend	HCFC replacement with water	HCFC replacement with cyclopentane
PROJECT START	April 2013	June 2016	November 2016
CREDITING PERIOD	33 months	10 years	10 years
VALUE CHAIN PARTNER	Profflex	Termo Puertas	Friostar
PROJECT STATUS	Completed	Closed	Closed

Why Beyond Business As Usual: The goal of these carbon mitigation projects is to minimize hydrochlorofluorocarbon (HCFC) in manufacturing of the foam product and to convert to a lower global warming potential (GWP) blowing agent well ahead of regulatory requirements. The conversion is not without risk to the quality of the foam product.





PROJECT SUMMARY

Hydrochlorofluorocarbons (HCFCs) as blowing agents are being phased out via Montreal Protocol requirements on ozone-depleting molecules. Several Dow customers made the commitment to convert their formulation ahead of regulatory requirements to a more environmentally sustainable blowing agent. The goal is to substitute these compounds for blowing agents that have zero ozone depletion potential (ODP) and lower global warming potential (GWP) values. However, substituting the alternate compounds like-for-like is rarely, if ever, successful. Solubility differences may render the formulation difficult to mix, which could require changing the mixing conditions (time, pressure, temperature), or reformulating with more soluble reactants. In addition, vapor pressure differences can affect how blowing agents volatilize when being expelled from the can and how the reacting mixture froths and expands. Additionally, flammable hazards associated with the blowing agents can affect both process and product safety, and the addition of fire retardant additives may be required. The conversion is not without risk to the quality of the foam product and can yield. To address this, Dow worked with customers to produce a specifically tailored PU system to enable the switch from high GWP gases to much lower GWP gases while maintaining excellent foam properties.

Project Learnings

The new formulation option with lower GWP was developed and its commercialization is, depending on the project, in different phases of implementation.

In the Russian project, ERM has verified the Principal Climate Benefit Units (PCBUs) to a reasonable level of assurance throughout the crediting period, and verification is closed. It is reasonable to assume this project continues to deliver lower-carbon spray foam to the Russian market.

For the other projects, implementation has been delayed and the project reporting is closed. These customers are well-positioned to deploy the lower GWP formulation know-how and to readily adjust their production as the business climate improves or the regulatory requirements in their country change.

PROJECT AT A GLANCE

Air Sealing Apartments for Increased Energy Efficiency

Program: Sochi 2014

Project Name: High Performance Building Enclosures – Foam Air Sealing

Location: Russia

Project Description: A campaign to incentivize replacement of obsolete windows

Project Start: December 2013

Crediting Period: 10 years

Partner: Profflex

Why Beyond Business As Usual: For Russia's aging apartment stock, replacement of an obsolete window is usually the most effective measure to reduce air infiltration and keep the heat inside, which leads to overall improved GHG performance. The project incentivized homeowners to invest in replacing old windows with more energy-efficient ones by providing the air sealing foam free of charge.



PROJECT SUMMARY

Dow worked in 2013 with Profflex to implement a project that enhanced the energy efficiency of many houses and apartments while educating homeowners about energy conservation and climate change. To accelerate the energy savings and emission reductions, homeowners replacing windows with more energy-efficient windows received a corresponding amount of insulating foam sealant free of charge.

Project participants also received a package of information that outlined further measures to enhance energy efficiency and to reduce energy bills, while explaining the importance of energy conservation for addressing climate change.

Project Learnings

The project succeeded in connecting the entire value chain from the polyurethane system producer (Dowlzolan) to spray can manufacturer to window companies and finally to homeowners. More than 130 window companies in all regions of Russia participated in the program, and 100,000 cans of insulating foam sealant were distributed during the promotion period. This project was a demonstration of how individual decisions to improve a home's energy efficiency can be both economically viable and environmentally impactful.

Project Status: Implementation and verification completed.

Educating the Value Chain

Moving the construction industry to a lower-carbon path will require an acceleration of the adoption of resource-efficient building options. However, market barriers in the building sector are complex and can be difficult to overcome, which is why educating the value chain is an important component in inspiring change.

Barriers to adopting low-carbon technologies and materials can include higher initial costs, lack of consumer awareness of technologies and their potential, and split incentives. Adding to the complexity is the fact that no one-size-fits-all solution exists: Energy trends in the building sector can vary significantly from country to country, depending on factors ranging from climate, population, income, economic development and household sizes.

Educating a diverse set of stakeholders, including policy makers, builders, manufacturers, financial institutions, businesses and household consumers, has been an essential component to implementing our projects. For example, in Russia, contractors were taught how to communicate the benefits of air-sealing to consumers. In Latin America, builders, architects and other stakeholders were invited to workshops to learn about the advantages of adopting energy-efficient insulation panels and other beneficial construction methods.



OTHER CREDITS UNDER THE DOW CLIMATE SOLUTIONS FRAMEWORK

In addition to the emission reductions realized from technology projects developed by Dow under the Framework, carbon offsets are a recognized instrument under the Framework and can be retired to accelerate results and to address specific footprints. These offset credits count as Principal Climate Benefit Units (see Glossary, p. 54) under the Framework and comply with the international best practices outlined by the International Carbon Offset and Reduction Alliance standard – a benchmark in the global offset market and a program within the International Emissions Trading Association.

Dow retired carbon credits sourced from a portfolio of projects that focused on renewable energy, energy efficiency, and the protection of vulnerable ecosystems. In addition:

- For the Sochi 2014 carbon mitigation partnership, Dow also deployed a portion of its own verified offsets from the Dalton-Whitfield Landfill Project in Georgia. The project is a landfill gas-to-energy project that provides a source of energy to local industry and minimizes greenhouse gas emissions.



- One of the projects Dow developed at its subsidiary, Santa Vitória Açúcar e Alcool Ltda., was registered as an offset project using the Verified Carbon Standard (VCS). Verified offsets from this project were retired after issuance for the benefit of the carbon partnership with Rio 2016. The project is reported on p. 40 of this report.
- In addition, a new process installation at an SCG-Dow Group production facility for propylene oxide (PO) in Map Ta Phut, Thailand, was certified under the VCS. Verified offsets from this project have been retired for the benefit of the Dow-IOC Carbon Partnership Program. The PO plant uses innovative hydrogen peroxide to propylene oxide (HPPO) technology instead of the conventional chlorohydrin process. A joint study by Dow and BASF found the HPPO process reduces wastewater by 70 to 80 percent and energy use by approximately 35 percent, compared with the incumbent process. This reduced energy and wastewater consumption results in lower GHG emissions. In addition, PO plants using the HPPO technology require up to 25 percent less capital to build than conventional technologies, as they have reduced infrastructure, a smaller physical footprint and simpler raw materials integration. This novel process was recognized with a U.S. EPA Presidential Green Chemistry Challenge Award for combining economic success with improved environmental performance.



PROGRAM	CREDITS	COUNTRY	PROJECT TYPE	STANDARD	AMOUNT (METRIC TONS OF CO ₂ E)
SOCHI 2014	Florestal Santa Maria REDD Project	Brazil	Reduced Emissions from Deforestation and Degradation (REDD)	VCS	161,000
	Argibem, São Sebastião and Vulcão Renewable Biomass Fuel Switching Project (Brazil)	Brazil	Renewable Energy	VCS plus Social Carbon	
	Project Bikin Tiger Carbon Project	Russia	LULUCF	JI	
	The Hyundai Steel Waste Energy Recovery Cogeneration Project	South Korea	Energy Efficiency	VCS	
	Fundão-Santa Clara Energetic Complex Project	Brazil	Renewable Energy	VCS	
	Dalton-Whitfield Landfill Project	USA	LFG	CAR	
RIO 2016	BAESA Hydropower Plant 2008	Brazil	Renewable Energy	VCS	250,000
	Foz do Chapecó Hydropower Plant 2010	Brazil	Renewable Energy	VCS	
	Pampeana and Terra Santa Small Hydropower Plants Project (2012-2013)	Brazil	Renewable Energy	VCS	
	RMDLT Portel-Para REDD Projects (2009-2012)	Brazil	REDD	VCS	
IOC	Reduction of GHG Emissions In Propylene Oxide Production at MTP HPPO Manufacturing CO. Ltd. (October 2011-May 2014)	Thailand	Energy Efficiency (Industrial Process)	VCS	320,000
TOTAL					731,000

Baseline: A scenario that represents the GHG emissions that would occur in the absence of the proposed project activity.

Beyond Business As Usual (BBAU): Ensures that low-GHG initiatives are not simply the byproduct of normal operations, but rather the result of innovation and change. To qualify, organizations must demonstrate they have implemented voluntary GHG-mitigating initiatives that faced real or perceived barriers and resulted in net GHG-emission reductions beyond comparable existing and expected market practices. See the [Dow Climate Solutions Framework](#) for more information.

Carbon Offset: A financial instrument that represents the reduction of one tonne of carbon dioxide equivalent from the atmosphere.

Climate Benefit: A term that refers to the reduction of GHG emissions due to specific initiatives undertaken by an organization.

Climate Impact: GHG emissions that fall under the responsibility of an organization, as well as those that are impacted by the actions of an organization.

Conservative: Where there are uncertainties in monitored data, the values used to quantify GHG reductions should err on the side of underestimating GHG reductions.

Counted Once: An organization has exclusive right to the legal and commercial benefit of the environmental attribute. A carbon offset cannot be generated for emission reductions that exist as part of another program.

Double Counting: Two or more reporting entities take ownership of the same emissions or reductions.

Event: A planned occasion that results in a net increase in GHG emissions beyond the GHG emissions that would have occurred had the occasion not taken place.

Global Warming Potential (GWP): A measure of how much energy the emissions of one ton of a gas will absorb over a given period of time, relative to the emissions of one ton of carbon dioxide. The larger the GWP, the more that a given gas warms the Earth compared to carbon dioxide over that time period.

Greenhouse Gas (GHG): Emissions of greenhouse gases expressed in tonnes of carbon dioxide equivalent (“tCO₂e”).

The Greenhouse Gas Protocol: A widely used international accounting standard for businesses to understand, quantify and manage GHG emissions. The GHG Protocol is a partnership between the World Resources Institute and the World Business Council for Sustainable Development.

Legacy: Taking responsibility for the GHG emissions of an event builds on the legacy of past large events. Applying emissions reductions against the societal GHG impacts of an event builds on this legacy.

Mitigation Projects: Events that are run through the Dow Climate Solutions Framework to create cost-effective, low-carbon projects that mitigate the event footprint and allow the adoption of local, ongoing lower-carbon technologies. See the Dow Climate Solutions Framework for more information.

Principal Climate Benefit Units (PCBUs): Any unit that can be applied to impacts in both the Principal and Societal Spheres. There are two sources: 1) carbon offsets and 2) Principal Emission Reduction Programs. See the Dow Climate Solutions Framework for more information.

Principal Emission Reduction Program (PERP): An event owner or partner voluntarily implements a program with the intention of reducing GHGs through demonstrable and measurable climate initiatives. See the Dow Climate Solutions Framework for more information.

Principal Sphere: This sphere contains Scope 1 and Scope 2 emissions and the Scope 3 emissions that are identified as measurable and under the control of an event owner or partner. This ultimately encompasses the emissions that must be reported and taken into account for any carbon neutrality program. See the Dow Climate Solutions Framework for more information.

Project / Program Legacy: The tangible and intangible long-term impacts and benefits initiated or accelerated by the project or program. (Similar to the IOC's definition of Olympic Legacy: "Olympic legacy is the result of a vision. It encompasses all the tangible and intangible long-term benefits initiated or accelerated by the hosting of the Olympic Games/sport events for people, cities/territories and the Olympic Movement.")

Project Plans: Forward-looking documents that are subject to review during the validation phase.

Scope 1: Direct GHG emissions from sources that are owned or operated by the entity. As part of the Framework, these GHG emissions are within the Principal Sphere.

Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat and/or cooling. As part of the Framework, these GHG emissions are within the Principal Sphere.

Scope 3: Other significant indirect GHG emissions. Within the Framework, further guidance is given to identifying these GHG emissions and classifying them as part of the "Principal Sphere" or "Societal Sphere."

Societal Climate Benefit Unit (SCBU): Emission-reducing activities that fall under Scope 3 emissions (Societal Sphere) but that are not quantifiable at the level required to become a carbon offset within the Principal Sphere. There

are two types: 1) Societal Emission Reduction Programs, and 2) Emission Reductions from Product Comparisons (ERPC). See the Dow Climate Solutions Framework for more information.

Societal Emission Reduction Program (SERP): An emission reduction program where the uncertainty associated with the emissions reductions precludes it from producing Principal Sphere emissions reductions.

Societal Sphere: This sphere contains the Scope 3 emissions that are identified as excluded or optional for inclusion in the Principal Sphere in the Scope 3 Decision Tree. This ultimately encompasses the emissions that are not necessary to report or to take into account for any carbon neutrality program. See the Dow Climate Solutions Framework for more information.

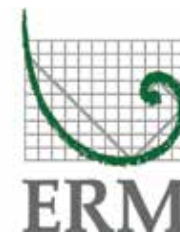
Validation: The phase in which an external third party assesses the approach detailed in the Project Plan and provides a level of assurance that the approach will not lead to an overstatement of the GHG emission reductions.

Verifiable: To ensure that all the criteria have been met, carbon-offset projects need to be audited by an independent third party at both the validation and verification phases of project development.

Verification: The phase in which an independent third party checks the Project Report to ensure that the approach was completed as detailed in the Project Plan and that no qualitative or quantitative errors occurred.

Verified Carbon Standard (VCS): A greenhouse gas accounting program used by projects around the world to verify and issue carbon credits in voluntary markets.

August 13, 2018
Michael Mazor
The Dow Chemical Company
2030 Dow Center
Midland, MI 48647



RE: Dow 2018 Carbon Report covering Dow's Olympic Initiatives

Dear Mr. Michael Mazor:

Environmental Resources Management, Inc. ("ERM") has conducted an independent assessment of Dow's 2018 Carbon Report covering Dow's Olympic Initiatives to determine whether the report is fit for purpose in relation to its stated objectives and areas of application and has represented the verified projects appropriately in alignment with the Climate Solutions Framework.

ERM's review focused on the following aspects:

1. Level of inclusion of all reliant elements;
2. Level of relevance of all elements;
3. Proper definition and articulation of all elements;
4. Correctness of the combination of elements into the overall construct.

Scope and Limitations of the Assessment

The scope of the assessment was limited to the 2018 Carbon Report specifically:

- The representation of the results from verified mitigation projects are not overstated and aligned with Dow Climate Solutions Framework: A Greenhouse Gas Mitigation Framework for Events.
- Data and statements in the report are presented in an accurate, complete, consistent, transparent manner.

Conclusion

After careful review, ERM was unable to identify any flaws in the 2018 Carbon Report that covers Dow's Olympic Initiatives. To the best of our current knowledge, we have determined that all relevant elements are properly articulated, defined, and included in the report and that verified credits do not overstate the benefits and are verified using the Dow Climate Solutions Framework: A Greenhouse Gas Mitigation Frameworks for Events.

Note on Independence of ERM

ERM is a leading global provider of environmental, health, safety, risk, social consulting services and sustainability related services. ERM has not played a role in the development of the 2018 Carbon Report that covers Dow's Olympic Initiatives and is not economically dependent on The Dow Company.

Sincerely,



Braulio Pikman

Technical Director

Environmental Resources Management, Inc.

