

Advanced Manufacturing Plan for Argentina



THE POWER OF *transformation*

Advanced Manufacturing Plan for Argentina

March 2017



Table of contents

Introduction	
Executive Summary	<i>p. 6</i>
What is advanced manufacturing?	<i>p. 7</i>
What is the Advanced Manufacturing Plan?	<i>p. 9</i>
Strategic Priorities	<i>p. 10</i>
<hr/>	
Sectorial Axis	
Energy	<i>p. 12</i>
Agriculture	<i>p. 23</i>
Mining	<i>p. 28</i>
<hr/>	
Cross Axis	
Infrastructure & Transportartion	<i>p. 34</i>
Trade	<i>p. 40</i>
Innovation & Skills Development	<i>p. 47</i>
<hr/>	
Conclusions	<i>p. 52</i>



Introduction

Executive summary

The outlook in Argentina is bright and replete with opportunities to address some of the country's most pressing challenges.

As a result of Argentina's policies, the country has experienced robust economic growth since 2003 as it benefited from the effects of a major devaluation in 2002 and a favorable global economic environment, particularly high commodity prices. However, growth began to slow down in 2011.

The economic boom has benefited most sectors, including the agricultural and manufacturing sectors. The industrial sector accounts for 17 percent of GDP and approximately 17 percent of total registered employment. More than two-thirds of Argentina's exports include manufacturing and manufactured agricultural products, the remaining being agricultural products and energy.

A new dawn is on the horizon and Argentina's best days are ahead if the country adopts the right policies to harness the power of natural gas to fuel a manufacturing renaissance.

Argentina can once again rise to meet the challenge as it has continuously demonstrated throughout history to become a manufacturing powerhouse in the next great decade of growth in Argentina. Along that journey, **Dow** is a committed partner in helping Argentina's manufacturing sector grow and prosper to the benefit of its people and generations to come.

What is advanced manufacturing?

In recent years, governments have shown a renewed interest in the value of industrialization and its potential for driving development.

This renewed focus on manufacturing recognizes the shortcomings of the previous phase of industrialization while acknowledging that all cases of sustainable and inclusive growth around the world have been associated with pro-manufacturing, pro-growth development policies.¹



Manufacturing is a key indicator of economic strength and resilience. This is due not only to its inherent capacity of high-value career creation but also because it reduces vulnerability to price variations that affect growth cycles.

Studies show that the more advanced the type of manufacturing, the larger the multiplier effect for both manufactured inputs and the services sector.²

Industrial activities are integrated in increasingly rich and complex value chains, linking flagship corporations and small or medium enterprises (SMEs) across sectors and countries. In addition, the more a country's manufacturing sector relies on domestic supply chains, the greater the potential multiplier impact.

This multiplier effect can be seen at the national and regional level.

Economists have reported that, on average, USD 1 of manufacturing output creates USD 2.30 in total output for the economy, a higher economic multiplier than any other sector.³

In addition, the European Union estimates that each additional job in manufacturing creates 0.5-2 jobs in other sectors, nearly one in four private sector jobs is in industry. The economic importance of industrial activities is much greater than suggested by the share of manufacturing in GDP. Industry accounts for over 80% of Europe's exports and 80% of private research and innovation.

We can also see this multiplier effect as a chemical company that converts natural gas into innovative down-stream products. For every dollar Dow spends on natural gas as a raw material, we can create an additional USD 20 of gross output. Every job inside a petrochemical facility creates five jobs outside of it. That value chain alone creates tens of thousands of jobs.

¹ Ernesto Stein, Eduardo Fernández-Arias and Eduardo Arias, Rethinking Productive Development, Washington D.C., IADB (2014)

² See Keith Nosbusch and John Bernaden, "The Multiplier Effect," Manufacturing Executive (March 2012): 2-9.

³ Ibid.

Manufacturing also plays a significant role in investment flows. According to the World Investment Report 2016, of the **United Nations Conference on Trade and Development** (UNCTAD), the sector accounted for 27 percent of global Foreign Direct Investment (FDI) inward stock in 2014.

Therefore, the question is not whether countries seeking to develop should pursue active pro-manufacturing policies but what kind of active policies countries should introduce to create a path to sustainable growth.

The first step in this process is to link a country's development strategy to its competitive advantage, directing efforts to the country's most abundant resources in order to take advantage of its most robust sectors. When governments organize and prioritize policies in this way, the economy becomes more productive and competitive, and accumulates human and physical capital more quickly.

In this model, the state should act as a facilitator of the necessary structural change. For Argentina, those changes mean adding value to raw materials and natural resources as a way of avoiding a return to the simple production of primary goods, enriching the country's export profile, and avoiding losing high quality jobs to countries where those raw materials are processed.⁴

Along with spurring foreign direct investment in the country's manufacturing sector, the Argentine government must continue to open up its massive shale gas reserves to outside operators with the expertise to unlock the affordable energy that could launch a significant economic boom.

The path forward for Argentina is energy. It is the lifeblood of a strong economy. In the short-term, it will create thousands of jobs and revenue in oil and gas- producing territories. For example, there is evidence that the energy sector has a particularly high employment multiplier effect; the **World Economic Forum** (WEF) in 2012 reported that the energy sector was responsible for creating 9 percent of new jobs in the U.S. that year. This suggests that Argentina's unconventional energy sector could create powerful backward linkages and jobs as it supports a strong, growing manufacturing base.

It will also strengthen the country's trade surplus by reducing energy imports, allow the **Central Bank** to grow its international U.S. dollar reserves, and lift the current foreign exchange barriers.

Longer-term, a sound, sustainable energy policy will allow Argentina to fuel its economy and attract a vibrant and innovative manufacturing sector.

As Argentina works to build its manufacturing base, investments in the production of abundant, affordable natural gas is the key to creating a virtuous cycle.

Not only are jobs created, but with manufacturing operations comes research and innovation. Improved profitability encourages further investment in operations and in research, and tax revenue increases. Communities are strengthened and schools are improved by the prosperity and commitment of manufacturers. The workforce of the future is inspired and ready to innovate.

Manufacturing has substantially increased consumers' standard of living abroad, and it will in Argentina if thoughtful fiscal and energy policies are enacted. Strong productivity gains, rapid advances in innovation, and international competition have led to overall deflation in manufactured goods worldwide. High-tech manufacturing provides consumers with more goods at a lower cost, and is how developed

economies balance the flow of trade and meet the needs of its citizens. A vibrant manufacturing base should be Argentina's goal.

Dow is leading the way in developing and promoting an innovative model that promises to revolutionize Argentina's industrial approach. This alternative considers incorporating innovation from the private and public sector, and leveraging the country's rich natural resources.



What is the advanced manufacturing plan for Argentina?

Dow's Advanced Manufacturing Plan for Argentina outlines our views on how Argentina can build a stronger, more sustainable and more competitive economy through the development of a robust advanced manufacturing sector.

In particular, this plan focuses on the importance of creating and enabling environment for advanced manufacturing, which drives the production of high value-add goods, creates jobs and fosters overall economic growth when innovative concepts, processes and technologies are applied.

The key is to devise a plan that focuses manufacturing efforts on adding value to those natural resources in which Argentina is rich, thereby ensuring that Argentina benefits from its comparative advantages. This type of strategy requires joint efforts from the public, private and academic sector so as to identify the areas where innovative industrial policy solutions should be implemented.

Dow believes that Argentina should promote industries that make extensive use of the country's "abundance factor" (i.e. the primary factors with which it is best endowed, relative to other factors and compared to other countries).

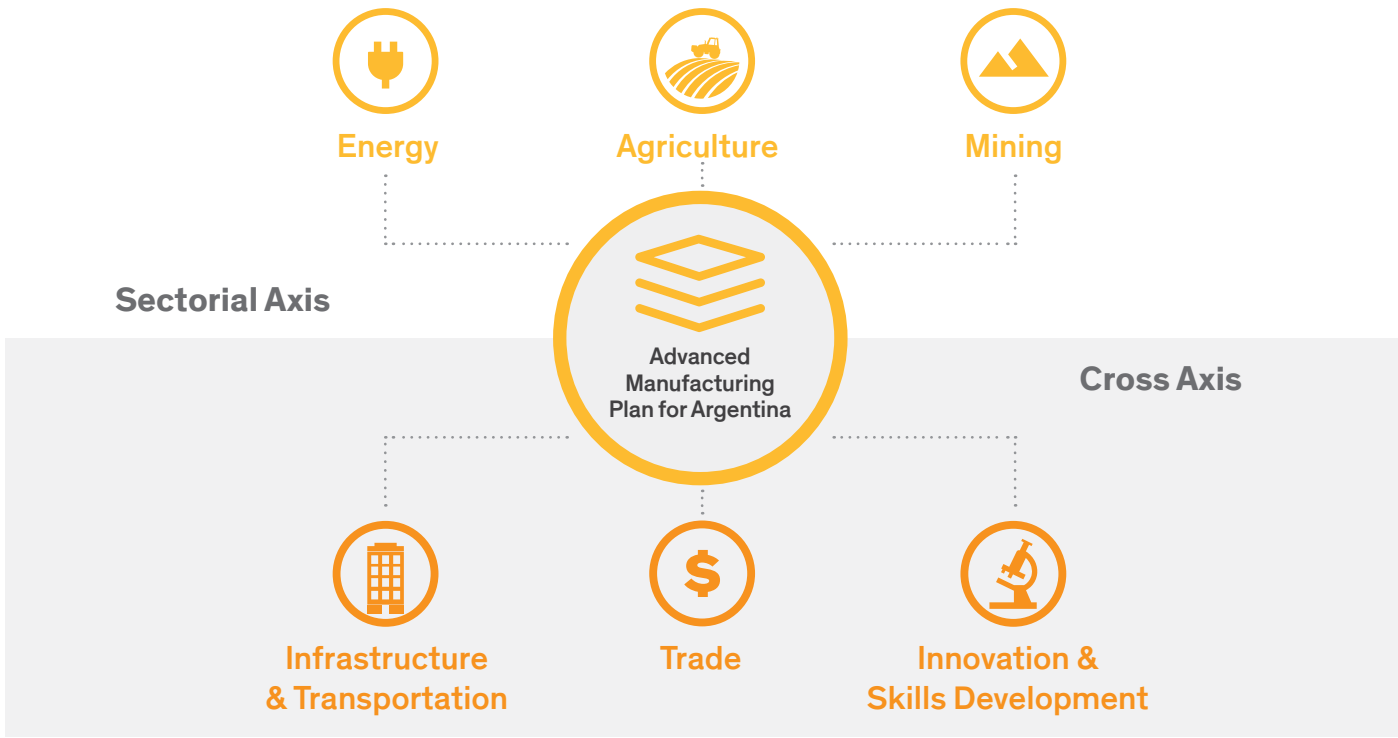
⁴ Justin Lin, op. cit.

In particular, Argentina should focus on optimizing the value-add of three main resources: natural energy – particularly untapped gas reserves, mineral resources and its productive agricultural sector.

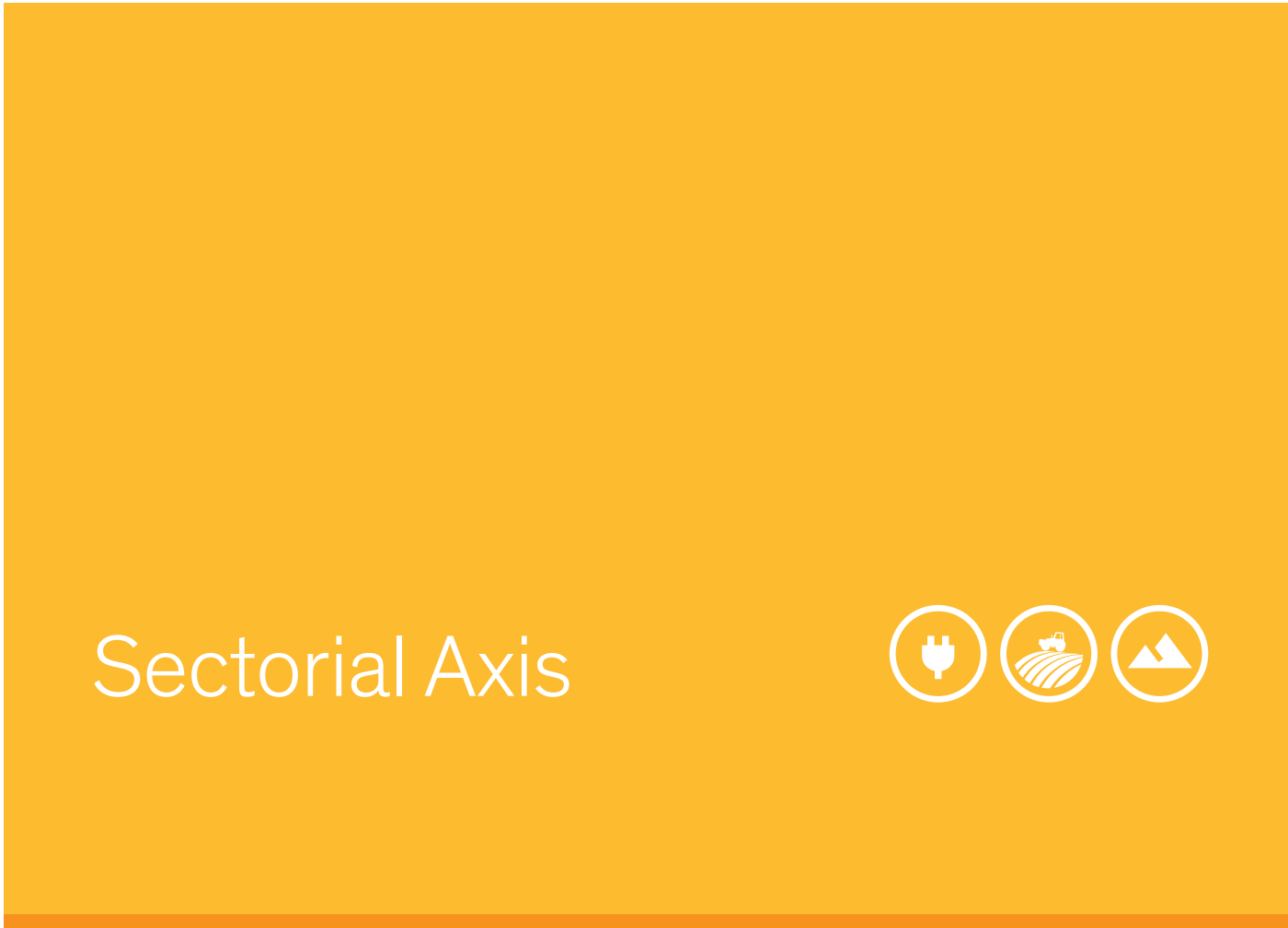
For this to happen, it is necessary to ensure an attractive fiscal and regulatory environment for local and foreign investment in key development areas.

In this sense, an appropriate framework could allow the country to move away from exporting raw materials to producing and exporting value-added products, diversifying the Argentine economic matrix. Therefore, this **AMP** centers on six strategic priorities that will be crucial to the development of an advanced manufacturing sector in Argentina. These priorities are distinguished according to their scope, in sectorial and cross axes, understanding the latter as those that cut across all sectors of the economy and therefore affect the systemic competitiveness.

Dow identified 6 strategic priorities



For each of these priorities, this **AMP** sets out a series of practical policy recommendations designed to advance a discussion among the public, private and economic sector aimed to develop a strategy to foster advanced manufacturing.





Overview

Energy is at the core of Argentina's long-term economic competitiveness. The policy decisions that are made now regarding its energy resources will have real and lasting effects on manufacturers and the economy. Argentina should capitalize on the abundance of energetic resources by developing a comprehensive energy plan that advances development and growth.

Advanced manufacturers such as **Dow** operate at the apex of energy and manufacturing. Therefore, a sound energy policy is essential to remain globally competitive. This is critical when defining a strategy that provides the long-term certainty that is needed to create an economic climate conducive to investment. For manufacturers, energy cost and availability are two basic elements that are analyzed when deciding on an investment.

At **Dow**, we believe the future of energy is connected to innovative technologies and materials from chemistry, and that energy policies at all levels of government should focus on four fundamental principles to transition to a sustainable energy future:

- 1 Conserve by aggressively pursuing energy efficiency
- 2 Optimize, increase, and diversify domestic hydrocarbon resources
- 3 Accelerate the development of cost-effective clean energy alternatives
- 4 Transition to a sustainable energy future

1 Conserve by aggressively pursuing energy efficiency

Energy efficiency enables us to do more with less, and is the easiest and most affordable way to conserve energy while also reducing carbon emissions. Numerous studies have made clear that the financial benefits of energy fuel savings far exceed the upfront investment costs of energy efficiency.

Dow is in a unique position to help accelerate the development and deployment of energy efficiency technology. Our products enable energy efficiency by making vehicles lighter, and by using less energy to keep buildings cooler in the summer and warmer in the winter.

In the last decade, companies and residential users lacked economic incentives to increase since low tariffs made the investment to reduce consumption unprofitable. The expected increase in energy tariffs could encourage the industry and the domestic sector to adopt energy efficiency measures. However, other incentives can be implemented in order to achieve this goal.

Building codes

Updated building codes do more than simply increase energy efficiency – they drive structural, electrical and mechanical improvements across all sectors of the construction industry that enhance safety and make buildings perform more effectively. Argentina should keep working on raising awareness on the importance of being energy efficient as well as provide information and train the value chain on the available technologies for sustainable construction. Moreover, governments should encourage the adoption of technologies such as insulation by offering different incentive schemes and accelerating the adoption and implementation of energy-efficient building codes.

Increasing energy productivity

Energy productivity gains have proved to be cost-effective and can be achieved without burdensome mandates or excessive government spending. Achieving large-scale energy productivity improvements would require investments throughout the economy, modernization of regulations and infrastructure, and working on the education and training of stakeholders on ways to drive energy productivity gains. Achieving material gains in this area means powering our daily lives – including our homes, transportation systems, and manufacturing facilities – using less energy. **Dow** is committed to increasing the energy productivity across our value chains by increasing the economic output from each unit of energy.

What Dow is doing

- Inspired by more than 60 years of building science, **Dow Building Solutions** delivers innovative technologies that enhance energy efficiency for a building's lifespan and significantly reduces their impact on the environment.
- **Dow**'s insulation products avert more than six times our own carbon dioxide emissions from operations on an annual basis.
- **Incorporating technologies such as polyurethanes, polyethylene, and special coatings when building can significantly reduce the energy consumption and increase the energy efficiency properties of the building.**
- **Dow** carries out several programs in its Latin-American operations to reduce the consumption of energy.

Recommendations

- Develop plans, programs, incentives and policies that will promote energy efficiency and preservation, thereby reducing waste throughout all economic sectors (electricity, transportation, residential and industrial consumption).
- Regularly update and implement building codes to ensure large-scale energy savings through efficiency in new building stock.
- Raise awareness on the importance and benefits of energy efficiency as well as the available technologies.
- Encourage the energy efficient building by lowering the cost of capital through grants, transferable investment tax credits, and low-cost loan programs.
- Work along with the construction value chain to train them on sustainable building.
- Introduce targeted incentives, tax credits, and rebates to encourage both homeowners and businesses to enhance the efficiency of their buildings.

2 Optimize, increase, and diversify domestic hydrocarbon resources

The key for Argentina to build a stronger, more sustainable and more competitive economy is to devise a plan that focuses manufacturing efforts on adding value to one of the natural resources in which it is rich: natural gas.

Building a robust petrochemical sector requires access to reliable, efficient and cost-effective energy supplies, both for fuel and feedstock. Manufacturers take these raw materials and transform them into value-added products in critically important areas, such as agriculture, energy, water, and building solutions. Encourage supply. Enhance long-term demand. Provide seasonal balance through gas storage. Regionally integrate.

While Argentina has an abundant supply of natural gas in the ground, production fell 19% from 2006 to 2013 before beginning to recover. Low production levels have generated shortages for industrial production as the gas supply is usually interrupted to satisfy residential needs during winter. Electricity cost is also affected, since thermal generators (which represent more than 60% of the supply) are forced to replace natural gas which more expensive fuels such as gasoil or fuel oil.

The great opportunity for reversing this trend is by continuing to develop Argentina's shale resources (the country has the second largest shale gas resources in the world). The increase of gas production will not only result in more energy for domestic use but also, it will allow industries to access the rich components of natural gas and transform them into high value goods.

Argentina should foster the enhancement of its electricity production not only to respond to the increasing needs of industries and population but also to spur the demand of gas and the consequent investment in the development of these natural resources. The country needs to take a strategic design approach to natural gas demand growth with long-term infrastructure plans that provide broad residential access where it is not available today as well as plans for future residential and industrial development.

The increase of demand of natural gas will encourage new investments to develop unconventional resources in areas like Vaca Muerta. As well, it will drive capital into the manufacturing area since the increase of availability of liquid components of gas, which is the main productive input, provides the basis for the expansion of current petrochemical sites and the establishments of new ones.

To achieve true economic development, Argentina should incentivize local value-add and processing of energy resources in-country, not just raw state exports. Part of the country's shale strategy must be to add value to the local natural resources, transforming them into manufactured products and fostering job creation. For this to happen, the country should also upgrade the regulation in order to guarantee the availability of ethane and other natural gas liquids, prioritizing internal consumption for industrial use instead of favoring the export of the resource in its primary state, leaving it contained in the natural gas.

Finally, to leverage even more the potential of hydrocarbons, there should be a clear strategy to encourage gas storage initiatives. This way, seasonal swings could be better managed given that the excess of production that occurs during summer would be saved to supply the shortages that happen in winter, when domestic demand increases. This would make gas production even more competitive and would contribute to guarantee long term supply of gas to manufacturing facilities all year round. Additionally, it would bring operational efficiency to the industrial sector, which would no longer need to import LNG to cover the lack of gas.

By taking advantage of the potential of unconventional reserves, increasing the production of electricity and achieving a diversification of the matrix through renewable energies, Argentina has the capacity to meet its domestic energy demand, feed the regional energy market and produce the critical byproducts that are needed to attract foreign direct investment (FDI) in downstream manufacturing of derivatives.

Dow has made a long-term commitment to drive and promote industrial growth, relying on the huge potential of energy assets in Argentina and the abilities of its local human resources.

As shown, **Dow** can clearly be the driver and leader of a new era for petrochemical industry, which adds value to the use of energy generating supplies to over 20 industries and multiplying employment up to 8 times. Not only increasing its productive presence but also working in partnership with authorities to define effective and efficient public policies based on successful international experiences.

Many countries made the most out of their potential, adding industrial value to its natural resources and enabling the development of the manufacturing sector.



The four waves of investment and exporting value-added products

Argentina's natural resources represent a significant opportunity for economic growth, similar to the shale boom experienced by the United States, which meant the rebirth of its manufacturing industry. The country could attain energy self-sufficiency in the medium term if investments in energy exploration and production are encouraged.

To achieve true economic development, Argentina should establish policies that incentivize value-add processing and production of gas in-country. The multiplier effect of industrial resources added to the production of unconventional hydrocarbons may be represented by four waves of investment and industrialization that expand through the petrochemical production value chain.

1) Hydrocarbon production

The most basic instance of resource reutilization is shale gas extraction and production. This introduces large amounts of raw material into the system.

2) Petrochemical industry development

During the second stage, the extracted gas is used to maximize basic industries, such as the petrochemical, which benefits from the constant supply of raw materials used in production plants allowing it to generate supplies used by other industries.

3) Manufacturing byproducts

The third stage involves an extra step in resource industrialization by engaging companies that invest in new energy plants and manufacturers of byproducts in the primary sector, such as plastic transformers, container producers, and other manufacturers. This stage adds yet another layer of value to the raw material and contributes to the generation of products for mass consumption.

4) Research and development (R&D)

The fourth stage focuses on establishing and strengthening R&D centers that can continue to explore new technologies and provide workforce training. This stage will allow Argentina to achieve its full reindustrialization potential and make the most of raw materials to the benefit of the production chain as a whole.

Going through each of these four stages requires a coherent plan and policies that assure a continued gas supply and promote industrialization by assuring natural gas is used to catalyze deep industrial growth along while fulfilling the basic energy needs of Argentina.

The addition of value to natural resources will impact directly in the creation of employment, the increase of exports of manufactured goods, a more solid economic growth and the fostering of high technology industries.



Strategic energy development for MERCOSUR

When defining a long term energy plan for Argentina, the approach necessarily has to be regional. The potential that the country holds in terms of unconventional resources will be reached to the fullest only if the whole MERCOSUR enters the discussion. State members should get involved into a serious discussion to agree on the long-term energy strategy for the region, which would include the state to state linkage and the growth of interdependency across the bloc.

What Dow is doing

- **Dow** is working toward the reactivation of Argentina's energy matrix through a long-term plan that is built on three pillars, one of which is the increase of hydrocarbon production. The other two are the diversification of the matrix and the foster of energy efficiency.
- **Dow** signed an agreement with **YPF** in 2013 to develop a pilot program to produce shale gas in the area of El Orejano in Vaca Muerta to enable the development of unconventional shale gas resources.
- **Dow** renewed its commitment in 2015 by signing a commercial agreement with **YPF** through which both companies advance in a new phase of the massive development of "El Orejano" block, the first shale gas project in the country.
- Both companies committed to an investment of USD 500 million for 2016, which adds to the USD 350 million that was already invested jointly.
- For the full development of the block, the companies estimate that the investment could reach USD 2.5 billion for the perforation of more than 180 wells and the associated infrastructure works.
- "El Orejano" is today the largest shale gas production field in the world outside of North America.
- The increase of availability of natural gas opens a huge growth opportunity for the company in Argentina and could be a fundamental driver for the expansion of **Dow's** productive capacity in the country.

- As an energy solutions provider, **Dow** offers innovative chemistry and technologies for improved shale stabilization and well bore stability. In addition, **Dow Biocides** offers a wide range of products that will help meet the many different treatment conditions of water for oil and gas stimulation and in the antimicrobial protection of end-use oil, gas and their derivatives.
- Since 2001, **Dow** has worked with **YPF** and **Petrobras** as part of **Compañía Mega**, a gas separation joint venture that supplies feedstock to Bahía Blanca and many other industrial sectors downstream. Through this venture, **Dow** operates a plant dedicated to separating and fracturing natural gas from Loma La Lata in the Province of Neuquén.

Recommendations

- **Develop an all-encompassing energy plan that leverages Argentina's world-class natural resources to promote advanced manufacturing and offer long-term predictability and certainty to attract investments.**
- **Stabilize energy prices to achieve an economic return that will result in quality investments that are crucial to foster industrial production.**
- **Take full advantage of conventional and unconventional energy resources as a foundation to attract advantaged industrial production.**

- **Promote the development of an efficient supply chain in order to reduce cost of hydrocarbons' extraction.**
- **Incentivize and support the construction and improvement of energy infrastructure, including pipelines, storage caverns and roads, to efficiently move natural gas and natural gas liquids throughout the supply chain.**
- **Develop a strategic plan and adapt regulation to enable gas storage in order to better manage seasonal demand allowing the system to stabilize overtime, which would make the energy market more competitive and the manufacturing sector more efficient.**
- **Foster the enhancement of electricity production based on the availability of natural gas to feed thermal generation.**
- **Avoid adopting policies that move the country toward a single fuel source and excessive restrictions on natural gas supply or measures that accelerate demand in an artificial way.**
- **Upgrade regulation in order to guarantee the availability of ethane and other natural gas liquids, prioritizing internal consumption for industrial use instead of favoring the export of the resource in its primary state, leaving it contained in the natural gas.**
- **Regulation should foster that exports of gas liquids must be subject to interruption in order to prioritize domestic industrial demand.**
- **Lead MERCOSUR discussions on a long-term regional energy plan.**

3 Accelerate the development of cost-effective clean energy alternatives

Any comprehensive energy plan must recognize the critical role clean energy sources will play in a more sustainable energy future. A wide range of clean energy technology exists today, but the appropriate mix depends on geography, power needs and affordability.

Developing renewable energies would reduce reliance on hydrocarbons. This would allow the destination of these resources to the latest added-value processing. Besides, modernizing the nation's electricity grid is critical to maintaining the competitiveness of manufacturers. Grid failures that disrupt the power supply have a devastating effect on manufacturing operations. Investments in the grid to ensure efficiency and reliability will ultimately expand the opportunity for clean energy deployment and save customers money.

There are also emerging technologies that are offering solutions for diverting difficult-to-recycle plastics from landfills and "recycling" them into feedstocks and valuable energy resources. In the U.S., Dow has found great success in turning non-recycled plastics and effectively converting them into an energy resource, all through an existing waste management infrastructure.

Through a public-private partnership with local units of government and industry, Argentina could pursue programs to convert previously non-recycled plastics into a fuel source. Energy recovery is becoming another source of renewable energy and has the potential to significantly reduce waste that is sent to landfills.

What Dow is doing

- **Dow** signed an agreement with **INVAP** to develop wind energy. The project consists of the establishment of a wind park in the Province of Río Negro, Patagonia. The investment could reach USD 180 million for the establishment of 30-40 wind turbines that will produce a total of 100 MW. **Dow's** manufacturing operations in the region will be partly powered by this renewable source.
- **Dow** has developed solutions for wind and solar energy. For instance, **Dow** provides solutions that enable the design, fabrication, and use of longer, lighter and stronger wind blades.

Recommendations

- Diversify the country's energy matrix by promoting the development of renewable energy technologies to ease the burden on hydrocarbons production.
- The government should partner with companies to create market-based incentives to develop and commercialize renewable technologies and develop the necessary infrastructure.

- Recognize the need for reliability, the need for cost competitiveness, and the fact that expansion of renewables requires complementary conventional, hydroelectric or nuclear alternatives that can deliver power reliably.

4 Transition to a sustainable energy future

Meeting the energy needs of a growing global population will be one of the greatest challenges facing humankind in the coming decades. Argentina should commit to playing its role by slowing, stopping, and eventually reversing the global growth of greenhouse gas (GHG) emissions while preserving economic growth. Emission pricing policies that are pursued independent of the global community can have a reverse effect of hurting the economy and increasing global GHG emissions.

Dow supports science and technology solutions to reduce global GHG emissions. Many of these solutions exist today, including energy-efficient building materials, energy-saving insulation and light weighting vehicle technology. To the extent that policymakers pursue mechanisms to reduce GHG emissions, **Dow** favors the most cost-effective market-based approaches, since such systems provide the most effective ways to drive innovation at the lowest economic cost.

Policymakers should support science and technology solutions to reduce emissions. At **Dow**, we are committed to growing our company without growing our GHG emissions.

Dow has already committed to maintaining all GHG emissions below 2006 levels and will use 400 megawatts of clean energy by 2025. Being a world leader in chemistry, we are also positioned to provide innovations that lead to energy alternatives and less carbon use.

Dow has prevented over 200 million metric tons of GHG emissions from entering the atmosphere since 1990. **Dow's** insulation products alone avert more than six times our own carbon dioxide emissions from operations on an annual basis.



2025 Sustainability goals

In April 2015 Dow launched its 2025 Sustainability Goals, a strategic set of commitments designed to redefine the role of business in society.

The Goals use a global lens to magnify the Company's impact around the world, driving unprecedented collaborations to develop a societal blueprint that will facilitate the transition to a sustainable planet and society.

Through harnessing **Dow's** innovation strengths, global reach, and dedicated employee population, the Company has set bold and aggressive sustainability targets designed to develop breakthrough product innovations, positively impact the lives of 1 billion people, and deliver \$ 1 billion in cost savings or new cash flow for the Company by valuing nature in business decisions.

Dow's 2025 Goals, the Company's third set of sustainability-related Goals since 1995, build upon its previous decade-long commitments. **Dow's 2005 Environment, Health & Safety Goals** resulted in \$ 5 billion in safety, waste, water and energy savings after a \$ 1 billion investment

Dow's 2015 Sustainability Goals provided more sustainable products and solutions addressing global challenges in food, energy, sustainable water supplies and improved personal health.

What Dow is doing

- At **Dow**, we are committed to growing our company but not our GHG emissions.
- **Dow** has already committed to maintaining all greenhouse gas emissions below 2006 levels and will use 750 megawatts of clean energy by 2025.
- **Dow** has prevented more than 200 million metric tons of greenhouse gas emissions from entering the atmosphere since 1990.
- Through collaboration and innovation, **Dow** products are delivering. For every ton of carbon **Dow** emits, our products reduce 3 tons in the broader economy.
- As just one example, **STYROFOAM™** Insulation is installed in over 20 million buildings worldwide, insulating more than 20 billion square feet and saving more energy than **Dow** uses.
- **Dow** has reduced 308 million metric tons of GHG from operations since 1990, including a 112 trillion Btu absolute energy reduction since 2005.
- **Dow** Automotive's structural adhesives help improve vehicle strength and durability while reducing weight and improving manufacturing efficiencies.

Recommendations

- Emissions reduction policies should be pursued jointly with the global community. The very real and negative impact of carbon leakage underlines the necessity for global cooperation in achieving policies related to curbing emissions
- Energy efficiency is the cheapest alternative toward achieving GHG reductions. Any policy targeting GHG reductions should consider the offsets that complimentary energy efficiency policy can provide.
- GHG reduction targets should be realistically set for all of the major economies, recognizing that no economy can afford to compromise growth. These policies need to account for the reality that developing countries need to pursue GHG reduction policies.
- Whenever carbon policies are pursued, coordinate all contributing factors including renewable, efficiency initiatives, and carbon policies into a single policy framework that focuses on driving tangible GHG benefits at the lowest possible cost to society.



Overview

The agricultural sector is crucially important to Argentina's economy, and should be one of the pillars on which the country builds its advanced manufacturing capacity.

While primary agricultural production represents only 5 percent of GDP, when taking into account agro industries, the country's sector GDP amounts to 20 percent. Despite past constraints, over the last decade the agricultural sector has become one of the most dynamic segments of Argentina's economy, partly due to an increase in international commodity prices. Farmers now sow about 32 million hectares of seed, 14% more than 10 years ago and 90% more than during the 1990s.

Total production of the country's principal crops amounted to 105 million tons in FY 2015, compared to 67 million tons in FY 2003. At present, Argentina is the world's largest per capita agricultural producer.

Another factor that contributed to the growth of the sector is the significant technological changes that companies have made in the way they do business. Argentina is the third largest producer of biotech crops in the world – covering 24.4 million hectares – and the leader in terms of total arable land.

All soybeans and more than 90 percent of corn produced in Argentina are genetically modified.⁵ In addition, about 90 percent of farmers use inoculants and no-till technology, while 60 percent use fertilizers. Recent technologies such as “silo bags” and precision agriculture, which Argentine companies played a significant role in developing, are used in more than 45 percent of farms. Moreover, many farms have incorporated modern managerial practices, evolving from self-production or ownership agriculture to contract based agricultural production.

This growth has reaffirmed the agricultural sector’s status as a key driver of exports. Between 2011 and 2015, primary agriculture products and agriculture-related manufacturing contributed an average of USD 43 billion per year to Argentina’s economy, or 59 percent of total exports. Soybeans and their byproducts represented more than 40% of these gains. In comparison, non agricultural manufactured products (for example, chemicals, automobiles, machinery) generated exports of USD 24 billion (34 percent of total export earnings), while energy earned USD 5 billion (7 percent). Furthermore, the agricultural and agro-industrial sectors are the only net provider of foreign currency, boasting a 13:1 ratio of exports to imports, while the trade balances of all other sectors continue to register deficits.

What more is needed?

Argentina has a population of 40 million, yet produces enough food for 400 million people. Despite its impressive growth – and partly because of its efficiency – the agricultural sector is not responsible for significant job creation. Agricultural producers employ approximately 350,000 people, a mere 5 percent of total registered workers; when agricultural related manufacturers are included, the total climbs up to 8 percent.⁶ As such, Argentina must find ways to add value to its agricultural production and therefore, increase job creation capacity of the sector.

Upstream, the country should continue to develop and employ modern input technologies. Argentina’s development of a dynamic local seed industry is an example of what can be achieved in the fields of biotechnology, agrochemicals and fertilizers

In fact, the agricultural sector has already begun to make some headway. A number of public and private organizations are in the process of developing genetically modified organisms (GMOs) especially adapted to Argentina’s needs. The fertilizer industry is a case in point: Argentina has untapped reserves of phosphate and potassium, yet continues to rely on imported fertilizer. Making fertilizer more affordable could help farmers improve the nutrient levels in their soil, thereby increasing productivity.

Downstream, Argentina needs to promote the development of related industries and the transformation of vegetable protein – such as that sourced from soybeans – into more high value products, including biofuels and elaborated food products. Soybeans and maize industrialization have gained traction over the last few years, but much more remains to be done. For instance, Argentina still exports about 60 percent of its corn production, much more than other agricultural powerhouses such as Brazil (50 percent) and the United States (14 percent).

One example of Argentina promoting the transformation of its raw resources into more high value products is the agricultural machinery cluster developed mainly in the provinces of Santa Fe and Córdoba. Since 2003, total sales of machinery generated by the cluster have grown from USD 562.2 to USD 1,017 million in 2015 exports have increased by an impressive 2,405 percent until 2012, and then declined (from USD 5.6 to USD 141,4 million in 2012, and 28,3 in 2015) and the number of total exporting companies has increased six-fold (from 15 to 94).

The cluster now directly and indirectly employs 80,000 people.

Argentina could focus on improving the added value of two additional industries: dairy production (which has a multiplier effect of 6.1) and beef production (with a multiplier effect of 5.5). In the first case, it must be noted that Argentina’s dairy sector is now going through a deep crisis caused by external factors (weak foreign demand and low prices) and internal ones, mainly currency appreciation and bad weather damages.

To achieve a growth path again for dairy production, it is necessary for Argentina to gain access to new markets. In the second case, the country exported only 7 percent of its total beef production in 2015, mainly driven by currency appreciation and trade beef restrictions. However, the country has managed to maintain its international reputation as a high-quality provider, and the re-opening of the US market is highly expected. This would create jobs in the animal feeding industry and the meat processing industry.



⁵ See http://www.isaaa.org/resources/publications/biotech_country_facts_and_trends/download/Facts%20and%20Trends%20-%20Argentina.pdf

⁶ Llach et. al. have estimated that taking into account both direct and indirect jobs, agricultural producers account for 18 percent of employment.

What Dow is doing

- Dow's agribusiness unit – **Dow AgroSciences** – is the third most important player in the Argentine market.
- It provides solutions to customers to improve productivity up to the highest sustainable levels, in order to satisfy the needs of a growing world population.
- The company produces and commercializes products that assist with the growth of Argentina's agricultural sector, such as biotechnological events, crop protectors, seeds and healthy oils.
- **Dow has developed innovative solutions to produce silobags, which are elaborated as from special polyethylene resins designed by Dow. Its Performance & Specialty Plastics Unit provides 100% of the polyethylene resins perfectly aligned to consumers' needs. Resins such as DowLex, responsible for the bags mechanic resistance, were generated as from a Solution technology registered and developed by Dow.**
- **Dow has developed a weed control system called Enlist, a new technology rooted in biotech events of tolerance to herbicides and Conkesta (Tolerance to herbicides + Bt products) that will trigger a real revolution in Argentina's productive model. The new technology could prevent the loss of 2.8 million tons of production and USD 930 million in revenue.**

- **Dow** expect to launch a wide variety of new Seeds, herbicides and insecticides molecules and products in the short and medium term for controlling weeds, insects and diseases, helping growers get the most out of their land, considering the most major standards for preserve the quality of land, water and air, and producing real impact in employment generation.

Recommendations

- **Review and update current legal framework on seeds and phytogetic innovations in order to adjust it to the requirements of a more modern technological industry, protecting intellectual property and boosting the development of biotech.**
- Promote an alliance with Brazil and other MERCOSUR members to transform the region into a global center for food and sustainable energy production. An alliance of this sort would improve the region's negotiating capacity with its current and future trade partners, while at the same time helping to promote industrialization of the country's agricultural production.
- Promote investments in R&D in the agricultural sector, especially those related to biotechnology, agrochemicals, seeds and fertilizers. This involves forging stronger collaboration between universities, the private sector and national research institutions, as well as improving the regulatory framework for intellectual property.

- Foster the local development of GMOs, taking into account local agronomic conditions and ensuring access to all agricultural producers (including small farmers). Establish fiscal incentives to the use of controlled seeds.

- **Improve the implementation of current agricultural biotechnology regulatory framework in order to promote the synchronicity approvals with buyers (i.e.; China, E.U., Russia, etc.).**

- Strengthen the seeds cluster, a public-private initiative that includes **INTA**, **INASE** and **ASA** along with the Cities of Venado Tuerto and Pergamino. The objective is to grow the volume of the seeds industry.
- Establish a framework that facilitates hiring temporary workers and that improves their labor conditions.

- Create tax incentives and subsidies for entrepreneurs in agro-industries, small and medium enterprises and start-ups.

- Promote the preservation of Argentina's natural resources and the adoption of agricultural best practices. Elaborate an active public-private policy aimed to communicate and educate on seeds, vegetable improvement, biotechnology, among other topics. Furthermore, promote an adequate standard for a more balanced crop rotation, fundamentally in summer crops.

- Promote a clear mechanism of control to guarantee the payment of new technologies for autogamous crops.
- These measures will foster R&D investment in the area, with the consequent job creation, greater added value and increase in farming production.
- Promote field practices, such as the system of integrated management of insects and weeds or proper crop rotation. This action must be necessarily carried out between the State, the industry and growers.
- Proper product management for crop protection. To promote cooperation between the private and the public sector for training all agrochemical users as regards best practices.



Mining

Overview

The mining sector has been one of the fastest growing in the last decade. It is estimated that mine production has shown an increase of 53% between 2005 and 2015. However, beyond the growth of the sector, the share of mining in Argentina's GDP is still around 0.6%, well below other countries in the region, such as Chile, where it represents 11.2% of the product.

The share in terms of foreign trade is more important: total exports of minerals reached USD 3,750 million in 2015, representing 5.8% of total foreign sales. This makes the mining complex the fourth largest exporter in the country, even surpassing traditional activities such as the bovine chain.

As a whole, mining companies employ more than 25,000 people directly, and another 15,500 contractors working at the mines.

Metalliferous mining is concentrated in three regions (Patagonia, Northwest and Cuyo), where it constitutes one of the major drivers of activity, and has an important role in employment. Considering both payroll and contractors, the sector employs over 16% of workers in the private sector registered in the province of Santa Cruz, about 9% in Catamarca and San Juan, and almost 5% in Jujuy.

Metalliferous mining is developed by large companies operating internationally, which have extensive experience in the sector and allocate their entire production to foreign markets.

Among the main products exploited stands gold, and secondly silver and copper. In addition, there is great potential for the exploitation of lithium in the north of the country, but so far, this metal represents a small proportion of exports.

The sector still has great potential to develop thanks to the abundance of high-grade ore reserves and the existence of important first level projects already in advanced exploration stage.

Argentina has many untapped resources. It is one of the countries with the largest mineral reserves globally: Argentina ranks fourth in lithium reserves (6.5%), seventh in silver reserves (6.8%) and copper (3.8%), and ninth in gold (7.4%). The mining tradition represents to some extent an advantage, because while other countries must turn to the exploitation of increasingly less profitable projects, in Argentina deposits that have a high mineral concentration remain to be exploited.

A particular case is that of lithium, a strategic activity for its use in the manufacture of rechargeable batteries, due to its high efficiency for energy storage beyond its generating source. Lithium has a great potential of growth with demand projected to double to 400 thousand tons by 2025, driven by the manufacture of batteries for automobiles and electronics. Additionally, currently there are investment projects in advanced exploration stage in the sector by USD 20 billion.

There are several attractive projects from the geological point of view, whose exploitation would boost exports and value mining resources. In turn, the country has shown a renewed interest to promote the sector. In this regard, the regulatory and macroeconomic changes implemented in 2016, aimed at exploiting comparative advantages by directing efforts toward the most abundant resources, offers new opportunities for activity takeoff:

- The new trade policy facilitates the import of capital goods needed for the development of new projects, while profit remission restrictions were removed.
- The elimination of export taxes and exchange rate stability offer better predictability for the development of the sector -attracting new investment- and reduce the risk of unemployment in a sector punished by international low prices. In particular, the elimination of export taxes has been an important step to restore the profitability of the sector compared to the rest of the region (Chile, Peru and Colombia) and in attracting investments, which have been falling since its peak in 2012.

What more is needed?

Despite improvements evidenced last year, there are still opportunities to improve. In particular, various regulatory barriers persist, especially from environmental and provincial regulations that must be properly designed to promote both economic development and environmental care. The lack of unified criteria, changes in the rules and delays when regulating legal decisions increase the uncertainty for investors and undermine the development of the activity.

In environmental matters, Argentina has made progress in protecting its glaciers with the enactment of Law 26,639 in 2010, which determines budgets to preserve them and limit economic activities such as mining in the surrounding areas. However, as the inventory of glaciers has not been yet finalized, the law is still not regulated. This creates great uncertainty about the exclusion areas, affecting large projects.

Meanwhile, there are large differences in the mining regulation at the provincial level. In fact, opencast mining is banned in seven provinces (Mendoza, San Luis, La Pampa, Tucumán, Córdoba, Chubut and Tierra del Fuego). In this regard, although the provinces are autonomous on their natural resources and therefore have the power to authorize or not the realization of the activity, the lack of clear and uniform regulation on environmental impact assessment for the authorization of mining operations adds a level of uncertainty about the time of implementation of the projects.

Constant changes in the regulations by some jurisdictions (both in tax matters as regards authorizations to operate) also hinders the development of the sector.

In the future, the challenge is to create legislation that balance environmental protection and the possibility of exploiting natural resources to achieve economic development.

Both the national and provincial governments agree on the need to raise standards of mining to the levels of the developed countries, which would increase productivity in the sector with certain responsibility to the environment and society.

What Dow is doing

• **From increasing cost pressures, to more stringent environmental and safety regulations, to declining ore grades, the mining industry faces numerous challenges impacting profitability. Dow is helping to address these challenges through the ORE approach:**

Operational efficiency, Recovery enhancement, and Environmental protection.

• In this sense, **Dow** has developed the most innovative technologies, a wide range of products and expertise to address a broad spectrum of mining and mineral processing needs while maintaining and improving the environmental footprint of these operations.

• **Dow** provides a range of choices to help our customers tackle their dust emission challenges. From dust suppressants to soil stabilization solutions, Dow technology can help control dust emission from mine roads, tailings, impoundments, waste rock dumps, stock piles and other exposed surfaces.

• Efficient and effective separation of metals and minerals is essential in recovering the most value from mining operations. **Dow** provides a wide range of solutions to help our customers optimize their grinding and milling processes.

• **Dow** provides a wide range of solutions to help our customers optimize slurry management, including acrylic polymers that disperse and stabilize mineral slurries, and biocides that protect against microbial induced corrosion (MIC).

• **Dow** enables highly sophisticated hydrometallurgy operations and processes – from in-situ leaching (ISL) to selective recovery and purification. Through the development of metal selective media and ion exchange (IX) process expertise, **Dow** products and technologies have helped the mining industry recover valuable metals in the most efficient and environmentally sustainable manner for decades.

• **Mining is ranked as the second largest industrial use of water globally, and managing this use is critical to sustainable operation. Dow is the largest global supplier of advanced water treatment components, providing integrated solutions designed to deliver the right water quality from any natural water source that is locally available. Dow's water treatment technology helps ensure a secure, safe and reliable water supply and enables beneficial water reuse to local mining operations.**

• Proper treating of mine tailings and waste streams enables miners to meet more stringent discharge requirements and to recover water and additional metals. **Dow** technologies provide the ability to selectively remove suspended solids, precipitated salts, heavy metals and metal oxides. This enables miners around the world to choose the right solutions to meet their local treatment needs.

• Acid mine drainage (AMD) waters with high contamination can be cost-effectively treated with tailored nanofiltration (NF) membranes, optimized operation protocols and appropriate system designs.

Dow's membrane technology has intrinsic advantages versus alternative separation technologies to meet broader purification and separation challenges for these drainage waters. **Dow** technologies deliver a reduced sulfate, manganese, heavy metal and fluorine concentration to generate permeate flows that meet local regulatory levels for disposal and/or reuse.

• Elastomers are suitable for both manufacturing components and providing wear protection. In mining applications, **Dow's** **DIPRANE™** and **HYPERLAST™** polyurethane systems have been proven to extend the life of metal components by providing a durable, protective coating. Using a polyurethane coating has the added benefit of reducing noise in the working environment.

Recommendations

• Ensure greater legal certainty and the compliance of fiscal stability agreements in force.

• Seek agreements between provinces with respect to environmental legislation setting a minimum level of environmental standards and transparent processes for evaluating impact.

• Ensure compliance with the rules by strengthening the role of the Ministry of Environment and Sustainable Development in coordination with the provinces.

• Regulate at the national level the Glaciers National Law ("*Ley Nacional de Glaciares*") passed in 2010. To that end, it will be necessary to complete the inventory of glaciers.

Cross Axis





Infrastructure & Transportation

Overview

Infrastructure is a critical element for encouraging manufacturing investment, both by ensuring the efficient and sustainable movement of products and by guaranteeing a sufficient and reliable supply of energy to industry.

Argentina has a well-developed transport infrastructure compared to its neighbors. According to the World Bank, the country ranks second in South America in 2015, after Brazil. More specifically, one-third of Argentina's roads are paved, as opposed to 23 percent in Chile and only 13 percent in Brazil.

Despite the existing investments being made in infrastructure, the road network needs significant investment, particularly given that approximately 90 percent of all cargo is transported by trucks.

The significant use of trucks as transportation – partly due to an inadequate rail network – has put a strain on the country's roads, leaving them in poor condition. Carrying out improvements could cost up to USD 1.5 billion per year, according to a recent estimate by the Inter-American Development Bank (IDB). While expensive, upgrades are necessary to help support the economy, increase competitiveness and provide the necessary logistical support for manufacturing

In addition, an efficient, modern and integrated rail system is imperative for ensuring the competitiveness of manufacturers.

Argentina has an extensive network compared to others in Latin America, comprising 37,000 kilometer of rail lines throughout the country, more than two-thirds of which is broad gauge. Like the country's road system, years of neglect have left the country's railroads in a poor state. The current state of the rail network, along with the fact that a considerable part of Argentina's most productive lands are located fairly close (i.e. less than 400 kilometers) to the country's ports promote the use of trucks as the most efficient means of transport for many products.

Manufacturers also rely on marine transport for imports and exports. Therefore, a country's port capacity can help lower costs and significantly contribute to attracting foreign investment.

Argentina has a number of key ports, including Buenos Aires, Bahía Blanca, La Plata, Rosario, Quequén and Zárate. The latter is one of the country's leading grain export sites and is undergoing a series of works to adapt itself to the expansion of the Panama Canal, which is expected to help Argentine exports in the medium-term. Similar to its South American neighbors, Argentina's ports have recently struggled with the increasing size of container ships.

Argentine authorities must ensure that they have a long-term modernization plan to correct the mismatch between vessel sizes and port capacity.

Moreover, opportunities lie in the promotion of regional integration. Connectivity with Chile through the Andes would create a critically important transport corridor from Brazil through Argentina to Chile's ports on the Pacific Ocean, helping boost regional trade. Projects to achieve this connection remain in their early stages.

In terms of energy infrastructure, Argentina has a well-developed gas transportation system, which includes over 18,000 miles of natural gas pipelines. These connect production in Argentina's west and south regions with Buenos Aires and other hubs, as well as Brazil, Uruguay and Chile. They are also used to inject foreign natural gas into the network. The pipelines serve to supply both domestic consumption and industrial demand without being at their full capacity.

A key connection in the existing network is between the Neuquina and Austral basins, and Bahía Blanca City. Bahia Blanca City is one of the most important petrochemical export hubs in Latin-America, given its proximity to the main deep-water port of the region as well as the developed infrastructure and high-level technical universities that surround it.

What more is needed?

Argentina has underdeveloped infrastructure in both the energy and transportation sectors, which affects industrial consumers. According to accountancy and consultancy firm **PricewaterhouseCoopers**, Argentina will need to invest USD 290 billion over the next 10 years in order to finance the myriad large-scale infrastructure projects the country needs to promote advanced manufacturing.

Accessing international credit markets is a traditional source of financing for infrastructure projects made difficult by the current business climate, however recent successes point to the positive impact of these foreign markets.⁷

Another positive trend is towards private financing of public works. These private-sector led infrastructure projects are a necessary development given the current economic and financial environment where traditional funding sources like governments and banks are unwilling or unable to provide the capital necessary for these long-term, expensive projects.

In addition to the attraction of foreign state and private capital, a comprehensive plan should be designed to direct those investments into key areas for the country's development. For instance, regarding the current transport scenario, a plan should be designed focused on both the freight rail system and the country's network of roads. A well balanced, efficient transportation infrastructure system will allow a more efficient raw material and finished goods transport.

Expanding and modernizing the country's ports would also help increase the amount of goods that can move in and out of the country.

The most significant energy infrastructure issue is long-term maintenance of the network, not necessarily its expansion. An adequate tariff scheme is needed for companies to cover the costs of proper maintenance of the pipelines. In a scenario of increased gas production, taking into account the potential of Vaca Muerta, the network will need to be operational at its full capacity, making proper pipeline maintenance essential.

Finally, it is a well-known fact that a growing economy needs infrastructure that boosts country's potential. However, Argentina should take into account other social demands that arise from a flourishing economy. For instance, there is a need to consult with towns and cities to make sure they are ready to hold a growing population by providing housing and proper services to assure sustainable social development.

In Argentina, the situation is challenging. According to **Habitat for Humanity**, the country's housing deficit has reached about 3 million homes and increases at a rate of approximately 36,000 homes per year. In addition, out of the 12,200,000 households, 16% are rental units; this is equivalent to housing for 2 million families.



Migratory movements, limited scope of social housing programs and mortgage credit shortage are factors that influence the problem of housing shortage in Argentina, which is compounded by the significant increase in land prices in recent years. Without access to safe land, communities that self-constructed their homes as part of the social production of a habitat are forced to populate the few lots they have, creating great density in emerging neighborhoods and transforming them into urban spaces that will be difficult to legalize in the future.

Understanding the importance of the access to safe land for housing construction, and suitable neighborhoods is very important.⁸ In addition, it brings new business opportunities to the private sector since the housing situation challenges companies to supply innovative solutions.

What Dow is doing

• Dow is committed to make the world's infrastructure both sustainable and durable. With the world's largest and broadest supply of raw materials across all categories, Dow lives by a steadfast commitment to constant R&D that ultimately developments robust and dependable infrastructures that stand the test of time.

• Business units such as **Dow Coatings Materials** have come up with solutions for infrastructure through the development of the largest portfolio of technologies and services for formulators of industrial coatings. The industrial offering helps provide excellent adhesion to substrates and exceptional resistance, along with waterborne solutions for reduced environmental impact. Among its applications we can mention the maintenance and protection of rails and bridges, concrete and metal finishing among others.

• Answering the growing demand for energy-efficient roofs Dow Construction Chemicals has developed a variety of roof coating binders which were specifically designed to enhance the performance properties critical for a long lasting roof coating: high elasticity, reliable adhesion, durability, UV resistance and dirt-pick up resistance. Besides, Dow has created different technologies based on polyurethanes and polyethylene to be applied in construction to improve the energetic efficiency of buildings reducing consumption and carbon emissions.

⁷ <http://www.bloomberg.com/news/2014-07-18/xi-flies-to-argentina-with-7-5-billion-in-tow.html>

⁸ Habitat for Humanity: <http://www.habitat.org/where-we-build/argentina>

- Innovation towards the update of the original **FastTrack™** road marking technology was introduced recently. **FastTrack** HD 21A Binder produces an even brighter, reflective line on roads while leaving a smaller environmental footprint.
- **Dow** along with **Ferrosur Roca, Celsur Logística, Terminales Río de la Plata** and the **Port General Administration Office** established a cargo transference center in Abbott, Province of Buenos Aires where goods that come from the Bahía Blanca productive hub by train are separated into those that are destined to the local market (transported in trucks) and those aimed for export (that continue their path to the Port of Buenos Aires). This public-private initiative allowed a 4% growth in the total volume of the port with the entering of 20,000 extra containers without increasing the road traffic and with a reduction of 6,000 tons of carbon dioxide
- In Venado Tuerto, Province of Santa Fe, **Dow** has partnered up with **Cooperativa de Obras Sanitarias of Venado Tuerto** and **Men-Tec SRL** to develop new modules in the local Water Plant. The modules include the new membrane **Dow Film-Tec** which allow the separation of the arsenic that comes with the water maintaining the salts needed for human consumption. This technological innovation improves processes productivity and timings reducing the amount of water discarded and the electrical energy required by the plant to work.

- **Dow is working with different players in the value chain to develop solutions for the housing deficit through the incorporation of technology that allows faster, more economic and more sustainable construction. This includes, for instance, the development of the sandwich panel market. Metal panels insulated with Dow VORATHERM™ polyisocyanurate and VORACOR™ polyurethane systems for insulated panels and boards bring excellent performance and light weight properties that can meet the most demanding industry requirements, improve longevity and increase energy efficiency**

- **Dow** and **Habitat for Humanity** recognize that affordable housing is one of the world's most pressing challenges, and together have been building comfortable, affordable homes and changing lives together. A partner since 1983, **Dow** has supported the construction of more than 45,000 homes – helping families live in decent, affordable housing in 30 countries worldwide including Africa, Latin America, Asia, the Middle East and Europe, as well as North America.

Recommendations

- Establish a prioritization process for infrastructure projects based on their return on investment to the economy, particularly those that support the energy sector and manufacturing projects identified as having a comparative advantage.
- Search for external financing for large investment projects, which requires guaranteeing good returns on investments.
- Encourage improvement of existing and development of new transport networks, especially railroads, which would increase efficiency of industrial sector, especially if they lead to better access to ports, which would increase productivity in the foreign commerce.
- Develop a trustworthy fluvial corridor with barges for containers that links Buenos Aires with Paraguay in order to balance the current pure-road logistic network.
- Incorporate state of the art technology to develop sustainable infrastructure.
- Increase the number of public-private partnerships to ensure the availability of adequate funds and the implementation of innovative solutions.
- Continue investing in expanding Argentina's ports in order to increase capacity and modernize operations.
- Continue with the proper maintenance of pipelines and prepare them to be used at their full capacity considering a potential increase in national gas production.



Trade

Overview

Trade, the ability to access necessary imported inputs and to export to consumers around the world, is a critical element of Argentina's growth strategy.

A strategic long term external commerce policy that guarantees access to markets is essential to the development of advanced manufacturing. Driving investment and exports, the ability to tap into regional and global supply chains and sell products into larger markets beyond just domestic consumers is essential. Working to ensure a closely linked and efficient trade-related regulatory system will create a more investor-friendly environment.

Although exports are down 1.6 percent through 2016, Argentina posted a \$ 361 million trade surplus in September due in part to an almost ten percent drop in imports on the year.

The trade surplus has been growing in 2016 as a result of a rise in exports of the soybean complex and a drop in imports.⁹

Argentina's benchmark trade agreement is Mercosur, which currently accounts for 23 percent of the country's imports and exports. In the last years, defining an agenda that would ensure effective enforcement of existing commitments and meaningful proactive negotiations has been difficult.



However, there are signs of progress in the integration into the world economy after the renewal of authorities in the two main partners of the bloc, including recent renewal of discussions with the EU (with new exchanges of offers in this more than decade-old negotiation) and the fact that Argentina became an observer party of Pacific Alliance, formed by Chile, Peru, Colombia and Mexico in 2011.

In fact, Mercosur is facing increasing competition for proactive economic reform and trade liberalization across Latin America. The Pacific Alliance is experiencing faster economic growth with more open economies and market-friendly policies that have bolstered foreign investment, so it seems possible that both Argentina and Brazil seek to move in this direction in the coming years.

A number of the Pacific Alliance countries (Chile, Peru and Mexico) are also involved in the Transpacific Partnership (TPP) negotiations, which would create preferential trade alliances with Asia.

Finally, Argentina has been an active partner in different international commerce forums such as the G-20, WTO, United Nations Food and Agriculture Organization, United Nations Industrial Development Organization, World Intellectual Property Organization, United Nations Conference on Trade and Development, among others such as the Organization for Economic Co-operation and Development.¹⁰

⁹ ABECEB.

¹⁰ Argentina's Ministry of External Relations and Cult – www.mrecic.gov.ar

Trade partners



Currently, Argentina is heavily reliant on Brazil as a market for its products, making up 15.1 percent of its accumulated 2016 exports. The consulting firm ABECEB noted that “the economic recession in both countries” were the primary factors in explaining the 7.5 percent drop in bilateral trade in September 2016 (year over year), with Argentina recording a \$ 3.7 billion deficit.



In recent years, China consolidated its position as the second foreign market for Argentinean exports with 9%, from purchases of staple foods such as soya and cereals. The Asian country surpassed the United States, which currently ranks third (7%), and then appear India and Vietnam (both with 4%). The remaining countries represent 60% of total exports.

China has become a highly relevant partner for Argentina in the last decade. As of September 2016, total trade amounted to \$ 12 billion, explained by \$ 8 billion of imports from Argentina and \$ 4 billion of exports to China. Trade deficit has grown in recent years, and there is a qualitative imbalance since China's exports are concentrated in industrial products with high added value, while Argentine external sales are almost all commodities, with a very high concentration in soybeans. Moreover, the importance of the Asian countries has increased as it financed major public projects.



Bilateral goods trade between the U.S. and Argentina summed to \$ 8 billion in the first nine months of 2016 (\$ 5 billion in U.S. exports to Argentina, \$ 3 billion in Argentine exports to the U.S.), and has been roughly flat since 2011 (\$14.5 billion). Combined goods and services bilateral trade totaled \$ 22.4 billion in 2015 (latest figures on services trade available). U.S. exports to Argentina include machinery, oil, organic chemicals, and plastic. U.S. imports from Argentina include mineral fuel and oil, aluminum, wine, iron and steel products, and preserved foods. The two countries have signed a bilateral investment treaty, and more than 500 U.S. companies are among the top investors in the country with nearly \$ 20 billion invested in Argentina as of 2013.

Meanwhile, trade with the EU totaled \$ 16.6 billion (exports to the EU of \$ 6.3 billion and imports of \$ 7.3 billion), showing greater balance. The composition of trade also reflects the pattern of exports concentrated in commodities and imports of industrial nature, although the disparity is lower and Argentinean sales are more diversified and higher value-added. However, trade dynamics has not been significant in recent years.

The countries with which trade has shown the greatest dynamism have been China, its neighbors in Asia Pacific and India, although industrial competitiveness gaps with them limit possibilities to take greater commercial integration.

Foreign direct investment

Foreign direct investment in Argentina is divided nearly evenly between manufacturing (36%), natural resources (34%), and services (30%). The chemical and plastics sector (10%) and the automotive sector (6%) lead foreign investment in local manufacturing; oil and gas (22%) and mining (5%), in natural resources; telecommunications (6%), finance (5%), and retail trade (4%), in services.

Spain was the leading source of foreign direct investment in Argentina, accounting for US\$ 22 billion (28%) in 2009; the U.S. was the second leading source, with \$ 13 billion (17%).

U.S. direct investment in Argentina is mostly in industry/agriculture, natural resources, finance, and services. In 2007, the U.S. and Argentina modernized a bilateral civil aviation agreement to update safety and security and provide for more-frequent flights between the two countries, allowing for increased volumes of tourism and business travel.

What more is needed?

A comprehensive international trade policy should be based on Argentina's comparative advantages and it should consider a balance between the diversification of relationships, reestablishing dialogue with the USA and Europe, without losing focus on key markets, like Brazil or China, as well as on working on opening new ones. In other words, Argentina should work towards strengthening relationships with its most valuable commercial partners, boosting, for instance, MERCOSUR's potential, without relying on a single ally. Diversification should be considered in a long term foreign commerce policy.

Having said that, Argentina must take advantage of the opportunities provided by regional blocs. Greater regional cooperation with neighbors is an important component in maintaining and developing Argentina's position as a regional hub. It can be a catalyst for greater regional growth and economic prosperity, as well as create enhanced access to regional markets for Argentinean goods.

By advocating greater cooperation among the region, Argentina can be a leader in creating greater efficiencies and attracting investment.

Argentina have already clearly prioritized global engagement, market access and trade as critical elements of the country's growth program. Aggressively seeking new markets through trade agreements is a positive step in the right direction and will help unlock Argentina's manufacturing potential in the future.

To date, the government has:

- Secured observer status with the Pacific Alliance
- Re-engaged with the EU-Mercosur negotiations including developing new offers
- Established a strategic partnership with the US, including regulatory dialogues to promote greater efficiency and growth
- Submitted their category A commitments to implement the WTO Trade Facilitation Agreement (TFA)

Increasing the alignment of business and government is a critical element to ensure a proactive and strategic path forward on trade liberalization. For example, business can provide critical expertise in the establishment of the TFA national action plan.

In this context, the government must avoid drastic measures towards either liberalization or protectionism but instead, create a balanced environment that encourages profitable local production without excessive barriers to trade.

On the one hand, the government should adopt sensible measures that allow companies to access the required supplies without forcing an uneven competition with foreign products. Moreover, the destination of the final products should be addressed. The success of locally producing added value goods is directly linked not only to the satisfaction of domestic demand but also to the possibility of allocating competitively production surplus into other countries. This will result in an increase of the production, employment, fiscal contributions and exports of manufactured goods, injecting foreign currency into the country.

A commercial strategy based on the export of added value goods instead of primary materials allows a long-term industrialization plan since the economy becomes less vulnerable to the fluctuations of international prices. Therefore, the government should provide a clear, stable trustworthy regulatory framework which enables local production and guarantees the allocation of the industrialized goods. Creating a business friendly environment is fundamental to make Argentina an appealing destination for national and foreign investments.

Other factors to consider are controlling macroeconomic instability, which is an endemic feature of Argentina, guiding resources obtained by external investment or borrowing to increase and improve of the country's reproductive infrastructure.

Finally, by aligning with Argentina's growth markets and local producers, the government can incentivize efforts on regulatory cooperation. At a horizontal level, regulatory cooperation promotes business engagement in reviewing and commenting on draft regulation; ensures transparency of the regulatory process and enables public-private sector consultation to ensure effective, sound regulation. At a sector level, regulatory cooperation can highlight critical elements of industry regulation and encourage dialogue with major trading partners to prevent costly or inefficient regulatory divergences.

For the chemical industry, this approach is one where government regulators could meet the high standards of protecting health and human safety but also move more efficiently to approve chemical products, bring innovative chemical inputs to market and encourage growth in downstream manufacturing.

What Dow is doing

- As key industrial partner of Argentina and leader of the petrochemical industry, **Dow** is deeply committed into participating in different public-private forums to collaborate in the definition of a business environment that would boost Argentina's potential.
- As one of the 20 most important exporters, in 2015 **Dow Argentina** exported goods for over U\$S 400 million including specialty plastics, polyurethanes, crop protection products, seeds and technologies for the oil and gas and mining industry, among others.
- Currently, **Dow Argentina** keeps strong commercial relationships with Brazil, main export destination. However, it holds a diversified strategy with markets that include the United States, Asia, Chile, Paraguay, Peru, Uruguay, among others.
- The untapped potential in non-conventional gas could be the key to the rebirth of Argentina manufacturing industry and opens the possibility for the country to become an industrial hub, increasing the sourcing for value chains throughout Latin America and even the world, especially considering South-North and South-South relationships.
- **Dow** is a key chemical player in Argentina, and a thought leader in the chemical industry. In that role, we are actively working with **ICCA**, which includes our Argentinian partners, as well as Peru, Mexico, and Brazil to bring together a sectoral approach to regulatory cooperation. This would be based on sound science, risk assessment and transparency in the regulatory decision making process.

Recommendations

- Establish a proactive, strategic trade agenda aligned with industry priorities to ensure effective access to necessary imports and to build export markets.
- Work with private sector input to advance trade liberalization efforts with Mercosur (especially the bilateral negotiation with the EU); engage the Pacific Alliance; and make meaningful progress in the US-Argentina strategic commercial dialogue. Establish effective national implementation plan for the WTO Trade Facilitation Agreement, prioritizing customs inefficiencies and de facto trade barriers.
- Promote adoption of new technologies; including bio-technology for Argentina's extensive farming community; and ensure effective market access with major trading partners such as China.
- Advocate for regulatory cooperation in Latin America, at horizontal and sectoral level; with chemical regulation based on sound science and risk as a priority.



Innovation & Skills Development

Overview

Innovation and skills development, two interrelated and mutually supporting elements, are crucial to improve a country's productivity and economic growth. More specifically, both are essential for a robust and sustainable manufacturing base, and therefore the development of a successful advanced manufacturing sector.

Similar to other countries with economies based on traditionally low-tech extractive industries, Argentina has low levels of investment in R&D, often viewed as an indicator of a country's capacity for innovation. However, while low compared to the developed world, Argentina's R&D as a share of GDP ranks second highest in South America and is trending upwards. Spending rose to 0.59 percent of GDP in 2014 and the total number of personnel devoted to R&D increase 37% over the period 2008-2014, to almost 110 thousands in 2014.

Argentina has recently sought to develop a number of strategies to help diversify its economy and mobilize innovation in order to improve its competitiveness, move up the global value chain and escape the so-called "middle income trap". More significantly, in 2007, the government created the Ministry of Science, Technology and Productive Innovation (MINCYT) to act as the coordinator of the National Innovation System as well as the technology efforts of other ministries. This Ministry was maintain in Cabinet by current government.

In addition, the government has developed a number of specific programs and funds to support innovation. One of the most successful of these programs is **RAICES** (“Roots”), which targets Argentina’s diaspora by allowing for the re-expatriation of scientists who are working overseas due to the lack of professional opportunities in the country. The program – which also promotes links between scientists abroad and offers information about local job opportunities – has resulted in the return of more than 1,000 scientists to Argentina and an increased supply of younger researchers.

Despite the country’s efforts to count with highly educated specialists, a comprehensive plan is needed not only to develop talent but also to allocate it to key areas aligned to the pillars of the industrialization strategy aimed to economic development. R&D energies should be focused on areas in which the country has a comparative advantage: engineers in oil and gas, civil engineers, agricultural engineers, biotechnology scientists (for plants and medicines) and electronic and mechanical engineers for nanotechnology and satellites

To do so, the country will need to improve the quality of education in mathematics and science at both the primary and secondary level, promote college and tertiary education, offer incentives to start-ups, promote local suppliers of capital goods and encourage collaboration between universities, private sector and research institutions. Argentina ranks among the biggest investors in education in Latin America, allocating more than 6 percent of GDP to education, according to a recent report by the **Economic Commission for Latin American and the Caribbean**.

The main challenge for the educational system, despite high graduation rates at the primary level, is to improve student learning at both the elementary and high school level.¹¹ Rising inequality in Argentina’s educational system has also led to major disparities between public schools in different regions especially across the urban-rural divide.¹² Imbalances in the quality of education at schools across the country should be addressed to improve educational outcomes, and for the country to experience the downstream benefits that come with a more highly educated workforce, such as innovation.

Though Argentina has made progress in recent years, many systematic challenges remain, however there exists real opportunity to make meaningful advances given the foundation of high literacy rates, high graduation rates in primary education, and a legal framework that must now be properly implemented.

What more is needed?

Wide-ranging improvements in education as well as a strategy that highlights the importance of STEM education and careers will be critical if Argentina is ever to establish a robust manufacturing economy.

Argentina needs to produce and support the development of a larger pool of engineers and scientists – as well as build expertise in data analytics and product design – in order to face new economic challenges and advance its budding shale industry.

The basis of competition in most manufacturing sectors is shifting and access to diverse talent pools is critically important. To capitalize on its human resources, Argentina must focus on addressing rising inequality in its educational system, which has led to major disparities, especially between the urban and the rural population. Imbalances in the quality of education at schools across the country should be addressed to improve educational outcomes and for Argentina to enjoy the downstream benefits that come from a more highly educated workforce.

What Dow is doing

- **Dow** has developed a series of programs to increase community interest in science and technology and improve the engineering talent pipeline. The multi-award winning *Buen Trabajo* (Good Job) Program, introduced in 2007, delivers training to unemployed young men and women in Argentina. The program addresses the nation-wide issue of youth unemployment by giving young people skills related to the industrial service market, such as welding, scaffolding, industrial painting and pipe maintenance.

- In order to help develop Argentina’s base of qualified engineers, **Dow** offers a joint course at the **Bahía Blanca Regional Faculty in the National Technological University** (*Universidad Tecnológica Nacional*) called *Cátedra Dow* (*Dow Chair*). The program aims to help undergraduates gain technological and professional skills that assist with their rapid integration into the workforce.

- **Dow** takes a solutions-oriented approach to innovation, working alongside with customers in key end-markets to address their product challenges and enhance productivity. As a result, in 2014 CNBC named Dow one of the top 50 innovation companies in the United States, particularly based on its ability to increase revenue from R&D. This recognition reflects **Dow’s** “*Human Element at Work*” advertising campaign, which highlights how **Dow** employees work together to develop advanced solutions based in science and improve the human condition.

¹¹ <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=37331863>

¹² <http://www.argentinaindependent.com/socialissues/development/argentinas-education-dilemma-the-best-educated-with-the-weakest-system>

- **Dow** has developed a series of “technology connection” conferences together with certain pre-selected universities, including the **University of Buenos Aires, National University of Mar del Plata, the National University of the Littoral and the Buenos Aires Institute of Technology.**

- At **Dow’s** request, **Fundación Leer** designed a program to foster training in sciences among teachers of the General Basic Education (EGB) level while stimulating scientific thinking among children through experiments and related lectures. The program teaches 1,000 students each year across 10 schools.

- In the context of the 2011 International Year of Chemistry, **Dow Argentina** supported the production of the book *Química Hasta en la Sopa (Chemistry Even in Soup)*. The book, which demonstrates how chemistry is present in everyday life, was presented in 2012 at the 38th **International Book Festival of Buenos Aires** where 90 children participated in science workshops.

- **Dow** provides support to the **National University of the South** and the **National Technological University (Bahía Blanca Regional Faculty)** to contribute to the training of engineers through master degrees and doctorates.

- **Dow** participates in *Cadena Productiva (Productive Chain)*, an educational program run by all the corporate members of the **Chamber of Commerce, Industry and Services of San Lorenzo and the surrounding region**, to educate primary students about the importance of the industrial belt and its value to the community.

- **Dow** works together with **Pescar Foundation** in an educational program aimed to prepare teenagers to enter the working world by developing their employability skills and strengthening their personal abilities. The program takes place in Venado Tuerto, Province of Santa Fe, where **Dow** has one of its agribusiness plants. Over 300 children have already been through the program.

- **Dow** leads a joint initiative with the **National Technological University and the National University of the South** as well as **CONICET** called *Dow Education Movement* with the objective of developing two technical undergraduate courses, one in *Maintenance and the other in Industrial Process*. Both courses look for the generation of highly educated talent in technical areas.

Recommendations

- Continue efforts to improve public education, particularly in the teaching of STEM subjects.

- Improve teacher’s development, training and evaluation, as well as the quality education materials, and increase the hours of instruction.

- Generate mechanisms to ensure a minimum “knowledge basis” for mathematics and science, and create coordination schemes between the federal government and the provinces in order to reduce educational inequalities across the country.

- Work together with the industry and educational institutions to ensure that skills learned in school fit the needs of employers. This could be achieved through cooperation between companies and universities in the definition of the study programs and creating internship programs in advanced manufacturing and high-tech companies for promising students.

- Strengthen the links between government, industry and academia, partly by improving the connection and continuous collaboration between the local research system and manufacturing companies.

- Create tax incentives for the development of technology companies in sectors in which Argentina has a comparative advantage, such as oil and gas, biotechnology and nanotechnology.

- Grant tax reductions to companies that rely on local providers of high-tech inputs.

- Improve incentives for students that choose engineering and science degrees.

- Promote educational exchanges and scholarships for students willing to specialize in those areas that are key to the country’s development.

- Establish measures to develop service industries to support productive clusters



Conclusions

Dow is convinced that Argentina faces an historical opportunity to redefine its long term development strategy by taking advantage of advanced manufacturing industries. Argentina can achieve its maximum potential if thoughtful, long-term policies are enacted to support smart natural resource use and downstream, value-adding advanced manufacturing.



In order to do this, cooperation between public, private and academic sectors is crucial to identify and agree on the areas where the adoption of innovative policies could help to improve competitiveness and attain sustainable development.

This **AMP** sought to provide guidelines on the areas that **Dow** believe are the best opportunities on which to build a new advanced manufacturing economy:

- **Energy:** driven by the reactivation of the hydrocarbons market, both conventional and non-conventional, boosted by the rebirth of the petrochemical industry through the four waves of development.
- **Infrastructure & Transportation:** key to foster new investments and allow efficient and profitable operations.
- **Trade:** opening markets and enabling the free flow of goods across borders.
- **Innovation & Skills Development:** essential to guarantee a sustainable talent pipeline
- **Agriculture:** benefiting from the country's capacity to produce primary goods but complementing it with research and development towards new technologies and the addition of value to the industry.
- **Mining:** a sector that holds great potential considering Argentina's mineral resources.

Dow is prepared to support a public-private partnership that brings together thought leaders in economics, manufacturing, innovation and education, and public policy to identify and prioritize key recommendations that will drive an advanced manufacturing economy in Argentina.

Dow reinforces its commitment to the economic and social development of Argentina in order to adopt a leading role in the industrial rebirth of the country based on the potential of advanced manufacturing.

This dialogue forum can adopt the form of an **Advanced Manufacturing Council**, which would carry out discussions and define a strategy to help Argentina develop advanced manufacturing based on its key growth platforms.



dowargentina.com.ar



/DowArgentina



/DowArgentina

© 2017

design mroa.com.ar

