



# INVESTMENT OPPORTUNITIES: Kryvyi Rih's Construction Cluster



Building Capacity in Evidence-Based Economic Development  
Planning in Ukrainian Oblasts and Municipalities  
International technical assistance project



Kryvyi Rih is a large industrial city in Dnipropetrovsk Oblast, located at the confluence of two rivers with picturesque landscapes of the steep slopes of its valleys. The city started its industrial development since discovery of rich deposits of iron ore in Kryvyi Rih basin, known today as Kryvbas. It is the most important raw resource base for Ukraine's steel industry. Modern-day Kryvyi Rih is an industrially well-developed city of strategic importance where 1.5% of Ukraine's total population reside. Sales of industrial products in the city are 6.0% and exports are 7.0% of the all Ukrainian rates.



The building materials industry of Kryvyi Rih takes the place among 5 largest centers of this industry in the country. But its potential has many unused investment opportunities, as the industry has plenty of attractive investment opportunities for further development, the value of which is provided by the wealth of natural and man-made resources as well as by an enormous consumer market in the city and the area around it. The sector needs its facilities to be upgraded using energy efficient manufacturing technologies for modern building materials, as well as greater use of secondary mineral industrial wastes as raw material. With these changes in place, the local consumer market will gain highly competitive products whose manufacture will diversify and strengthen the local economy.

**The most commercially attractive directions for developing the building material sector in Kryvyi Rih is manufacturing:**

- 1  portland slag cement and other types of binders
- 2  concrete fillers and other non-metal building materials
- 3  inorganic insulating materials

The first two areas are complimentary to key municipal mining and metallurgy industry. Insulating materials are a priority because of the need to modernize the existing fixed assets and improve their energy efficiency. Further substantiation of the investment-worthiness of these three areas will require market surveys and feasibility studies.

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## ABOUT THE CITY



Kryvyi Rih is located in central Ukraine in the steppe zone at the confluence of the Ingulets and Saksahan rivers. The city is surrounded by numerous gullies and four water reservoirs. The unique locale and the way that its natural resources have been developed by industry have drawn the city out over 126 km, making Kryvyi Rih one of the longest cities in the world.



Administratively, Kryvyi Rih belongs to Dnipropetrovsk Oblast and its population of 651,000 is 8<sup>th</sup> largest settlement in Ukraine. This large city combines a deep historical and cultural heritage with a high concentration of modern heavy industry, making Kryvyi Rih a true “city of contrasts”.





## KRYVYI RIH IN NUMBERS

**1775** first historical note

**1919** gains status of the city

**651,000** city population

**1,5%** of total population of Ukraine

**6,000** enterprises

**6%** of total industrial sales volume

**7%** of total national exports

The first evidence of human activity on Kryvyi Rih territory going back to the Stone Age can be seen in the remains of pottery and weapons from the Trypillia Era. But the first stable settlement and reclamation these lands gained in the 16<sup>th</sup>-17<sup>th</sup> centuries during the time of the famed Zaporizhzhian Sich, a territorial entity with the features of the first republic and the first constitution in Europe. One legend it that the city's name came from the name of its founder - kozak nicknamed "Rih" or "horn", who settled near the confluence of the two rivers after being wounded in battle.



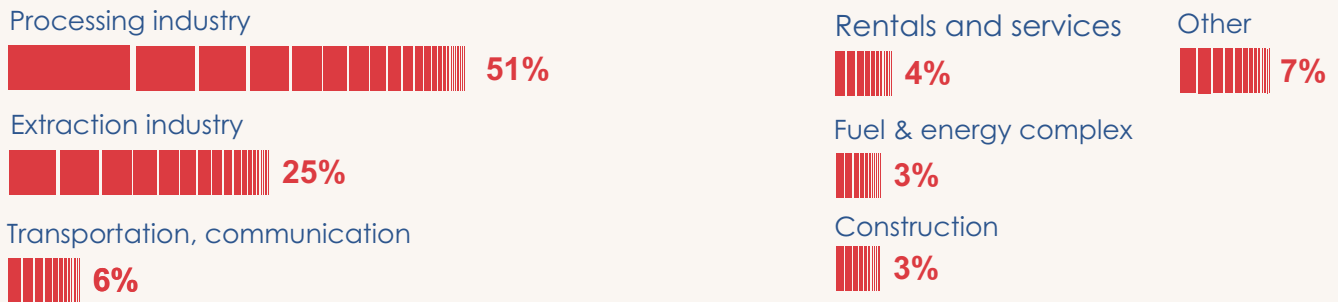
Modern-day Kryvyi Rih is a large industrial center of strategic importance for the economic independence and security of Ukraine. Heavy industry began to develop in the city under tsarist Russia since the discovery of huge deposits of iron ore. In 1881, the first mine was built and by 1882 the construction of the railroad began. When the Soviet Union began to work on massive industrialization, some of the largest enterprises in heavy industry were established in Kryvyi Rih.

The main industry at the heart of the city's economy is the steel industry, which grew out of Kryvyi Rih's enormous mineral resources and the concentration of processing capacities. The Kryvyi Rih basin, Kryvbas, comprises 8 out of 11 main iron ore extraction and processing enterprises of Ukraine's as well as one of the largest full-cycle steelworks in the world.

Kryvbas covers nearly 300 sq km and contains 60 iron ore deposits with total reserves of 18.7 billion t. This amounts to 68% of all Ukrainian reserves and 6% of global reserves. The Kryvyi Rih basin stretches from the north to the south along the Ingulets, Saksahan and Zhovta rivers in the shape of a narrow (2-7 km), long (nearly 100 km) strip. Its iron ore deposits lie at a depth of up to 2.5 km which makes possible the open pit mining operations.

# KRYVYI RIH'S ECONOMY

## Breakdown of products made in Kryvyi Rih:



As of October 1, 2014, Kryvyi Rih had 9,500 actively operating businesses and 26,000 sole entrepreneurs (individuals). The key sectors of the city's economy are steel, heavy engineering, construction, chemicals, printing, wood processing, light industry and food processing.

The high profile of the mining industry in Kryvyi Rih is based on the enormous natural resources located around the city. Kryvbas deposits comprises nearly 50 different metal and non-metal minerals of industrial purposes. The most valuable of these are iron ore, brown coal, marble, dolomite (40% of domestic reserves), roofing and talcum slates, ochre, mummy, building sands, loam, scandium, vanadium, and nearly 40 more minerals from the table of elements. For the construction industry, Kryvyi Rih's the Hleyuvat (Gleyevat) formation is particularly valued for, its unique radiant quartz known as Kryviy Rih jasper.

### Kryvbas ores and minerals



ironstone



marble




ocher

Over the last 100 years, the extraction and processing of iron ore was the city's main industry. In 2013, the steel industry produced 86% of the city's industrial output. The main products are: iron ore, concentrate, sinter, pellets, pig iron, steel, and finished steel products. The immense reserves of iron ore and the current pace at which they are being extracted make possible to be sure that these resources will continue to be available in significant quantities for many years to come and will continue to provide a foundation for the city's future development.

Taking into account a high level of heavy industry and the unusual shape of the city the city transport infrastructure is an important element in the proper functioning of Kryvyi Rih. It includes:

  
**2,8** km of roadways  
**4** bus stations

  
**120** km  
**3** railway stations  
**67** million t of freight annually

  
**1** international airport  
**2,5** km of landing strips  
**9** take-offs/landings per hour

Passenger transport is handled by specialized transport companies, a bus and trolleybus network, and a subway line Kryviy Rih is one of only four cities in Ukraine with a subway system. IT runs 18.7 km, with 4 underground and 11 surface stations.



Other sectors may be far less significant for the municipal economy, but they complement key industries, provide added opportunities for employment, provide for the needs of local residents, and sell products to other regions and for export.

Kryvyi Rih's economy is predominantly oriented on exports, which is accounted for more than 80% of the value of all city industrial output. The main exported commodities are ferrous metals and mining industry products. The biggest exporting company is PJSC ArcelorMittal Kryvyi Rih.

Wage levels in Kryvyi Rih for most of professions are higher than the average one in Oblast. During 2000-2013, the average wage in the city was 18.4% higher than the oblast average wage. During 2003-2013, wages grew 2.8 times, or an average by 9.3% per year.

More than **80%** of the value of Kryvyi Rih industrial output is exported

The average wage in Kryvyi Rih is **18.4%** higher than the average one for Dnipropetrovsk Oblast and **14.6%** higher than the national average one

## THE CONSTRUCTION INDUSTRY

There are more than 50 construction companies in Kryvyi Rih, most of them specialize in construction activities under industrial projects. The largest of these (see Cluster analysis) have nearly all the necessary building machinery, and other logistic support to carry out most construction activities of industrial, residential, transport and other building projects.



This branch has enormous potential to supply all the city's construction needs, as well as those of nearby Dnipropetrovsk, Zaporizhzhia, Kirovohrad, Kherson, Mykolaiv, Donetsk Oblasts. R&D support for the modern development of this industry is provided by the construction faculty at Kryvyi Rih National University.

## Kryvyi Rih construction cluster features

Criterion	Characteristics
Commercial potential	Employment levels in the cluster and real volumes of product sales are showing gradual growth after the crisis of 2009. Using new technologies could significantly improve the quality, range and price levels of cluster products, and substitute for imports and products made in other regions.
Contribution to sustainable growth	Modern approaches to the manufacture of building materials are environmentally more friendly and are complementary to the main mining and metallurgical industries in the city. New manufacturing facilities will also generate new jobs.
Countercyclicity	Demand for the cluster's goods and services is directly related to the economic state of the city and region, which depends, in turn, on the cycles of the mining and metallurgical industry.
Relevance to City Strategy	The City Strategy requires the reconstruction of the municipal inventory of housing, transport and social infrastructure. In addition, the city needs to have the by-products of the mining and metallurgy industry processed and the land reclaimed. The latest technology includes the manufacture of a variety of building materials using these by-products.
Utilization of municipal and regional infrastructure	The expansion of the cluster in Kryvyi Rih will be driven a number of factors, such as the availability of raw materials, growing domestic demand starting with the major mining and metallurgy companies, relatively cheap labor, and extensive transportation links.
Synergy with other clusters	The construction cluster complements the mining and metallurgy and transport branches.

The volume of industrial construction work is determined by reconstruction plans, the expansion of production capacities, and the situation on external and domestic markets for the products made by the given industrial client. The industrial segment is highly competitive because both local and outside players are active in this market.

Kryvyi Rih anticipates high demand for construction works for improving housing social infrastructure and industrial facilities. Projections for the construction of housing and social facilities are based on the City's General Plan, which was approved in 2011 and includes:

- ◆ modernizing housing stock to improve energy efficiency;
- ◆ comprehensive reconstruction of entire housing blocks, including some demolition of old stock;
- ◆ moving some utility companies to the outskirts of the city;
- ◆ additional construction on existing blocks and high-rise clusters;
- ◆ building out-patient family medicine facilities as a part of healthcare reform;
- ◆ renovating kindergartens and daycare centers;
- ◆ road works, reconstructing tram lines.

**High demand is anticipated for construction works to upgrade both housing, social infrastructure and industrial facilities in Kryvyi Rih**





## Map of building material manufacturing cluster of Kryvyi Rih



The building materials sector of Kryvyi Rih consists of a relatively small number of manufacturers and a limited assortment of products (see cluster map above). For such a large city with huge natural resources, limiting the supply of locally-made building materials is unreasonable in little long-term sense. This limitation can actually restrict the growth of the construction sector and of the overall municipal economy because the cost of transporting materials from elsewhere considerably increases the cost to the end-consumer.

Given the current state of the city's housing stock and the priority given to upgrading buildings to be more energy efficient, the greatest demand for locally-made building materials is expected to be in insulation, wall and binding materials, as well as in plumbing pipes.

### Key manufacturers of building supplies and materials in Kryvyi Rih:

- **cement:** Kryvorizhtsement (PJSC HeidelbergCement Ukraine);
- **concrete and steel-reinforced concrete:** LLC Sparta, LLC KryvbasZalizoBeton, LLC Rastro, PJSC KryvorizhAgloBud, PC Noviy Dvir;
- **electrical products:** PJSC Elektrohrad, POH Kryvorizske UPP UTOS;
- **insulation materials:** LLC Tekhnolyst, LLC Pinokom, POH Kryvorizske UPP UTOS.



## PROSPECTS FOR INVESTING IN THE MUNICIPAL CONSTRUCTION CLUSTER

Deciding where to locate manufacturing facilities is generally determined by two key criteria:

- where raw materials are;
- where consumers are.

Based on the first criterion, Kryvyi Rih has a considerable competitive advantage because of its enormous Kryvbas mining region and the variety of by-products of large processing companies. According to the second criterion Kryvyi Rih also has a competitive advantage because of the large number of industrial consumers and the population of the city, the 8th largest in Ukraine, and average wage 15% higher than the national average one.

Given the factors of market demand and resource base, we singled out **three most promising areas** for developing the building supplies and materials industry in Kryvyi Rih.

Kryvyi Rih has two of advantages for investors interested in its construction cluster: **nearby material resources and a large local consumer base**



### Prospects for developing the building supplies and materials sector in Kryvyi Rih

Finished product	Raw material	EBITDA range*	Risks
Portland slag cement Other binders Iron ore	steel slag and sludge	25-30%	oversaturated market, access to raw materials
Concrete fillers Other non-metallic building materials	enrichment process by-products	30-40%	oversaturated market, access to raw materials, impact of global markets on ore prices
Inorganic thermal insulation materials and products	rocks, steel slag	15-20%	new technologies, oversaturated market

\* Anticipated profitability is based on a stable macroeconomic situation

#### 1. Manufacture of portland slag cement and other binding building materials

The production of portland slag cement has considerable advantages over standard portland cement production technology, such as (1) being more energy-efficient and producing less air pollution, (2) offering ready-made products whose quality matches the standard technology in most aspects and is better in some, (3) using secondary mineral wastes from other manufacturing processes as its main raw material, and (4) being complementary to the manufacture of more expensive products.

The main material used in producing portland slag cement is generated from the processing of slag in the steel industry using modern technology. Other products resulting from the processing of slag include:

- iron ore concentrate;
- fillers for concrete, asphalt and other non-metallic building materials;
- lime or slag flour and other fertilizers for agricultural use.



## Comparison of technologies for making cement clinker

Manufacturing method	Raw material	End product	Energy used	Consumption per tonne of clinker		
				lime, kg	gas emissions, kg	CO <sub>2</sub> emissions, kg
Traditional	clay, limestone	cement clinker	natural gas, electricity	1150-1850	1500-1700	720-840
Recycling slag*	ferrous by-products	cement clinker, iron alloys	natural gas, electricity, coal	50-570	520-930	290-615

\* based on the sample aggregate of EcoGeoTechnology company

Clearly, using and expanding the use of newer technologies in processing slag for the production of portland slag cement is an attractive alternative to the traditional processes used to produce cement.

## 2. Manufacture of concrete fillers and other non-metallic building materials

Kryvyi Rih has a considerable stock of non-metallic building materials comprised of accumulated industrial by-products. The volume of industrial wastes of Kryvyi Rih generated by its industries adds up to 10 billion t, that is more than 30% of total industrial wastes generated in Ukraine. These include:

- 5bn t of mining by-products;
- 4bn t of wastes generated by enrichment plants (crushed mineral mass in tailings depository).

Many countries have accumulated valuable experience and technologies due to which the attitudes towards such wastes are changing. World practice has revealed unrealized opportunities for getting quality products by processing mining wastes, which can help (1) reduce the need for extracting new natural resources, (2) reduce the cost of storing and maintaining the wastes, and (3) fosters the reclamation of soil and reduces its loss.

To identify the optimal technology for this manufacturing process, a detailed study of the qualities of each accumulation of by-products and a feasibility study are needed.

## 3. The making inorganic insulation materials

The proposal to develop the manufacture of inorganic insulation materials is based primarily on an expectation that demand for this type of product will increase as housing, office and industrial facilities are made more energy-efficient.

Current capacities for manufacturing thermal, audio and water insulating materials offer opportunities to:

- ◆ make efficient use of the available natural materials base;
- ◆ offer consumers quality products at a reasonable price;
- ◆ replace imported equivalents and products from other domestic regions.

### Tailings depository of mining and enrichment plant



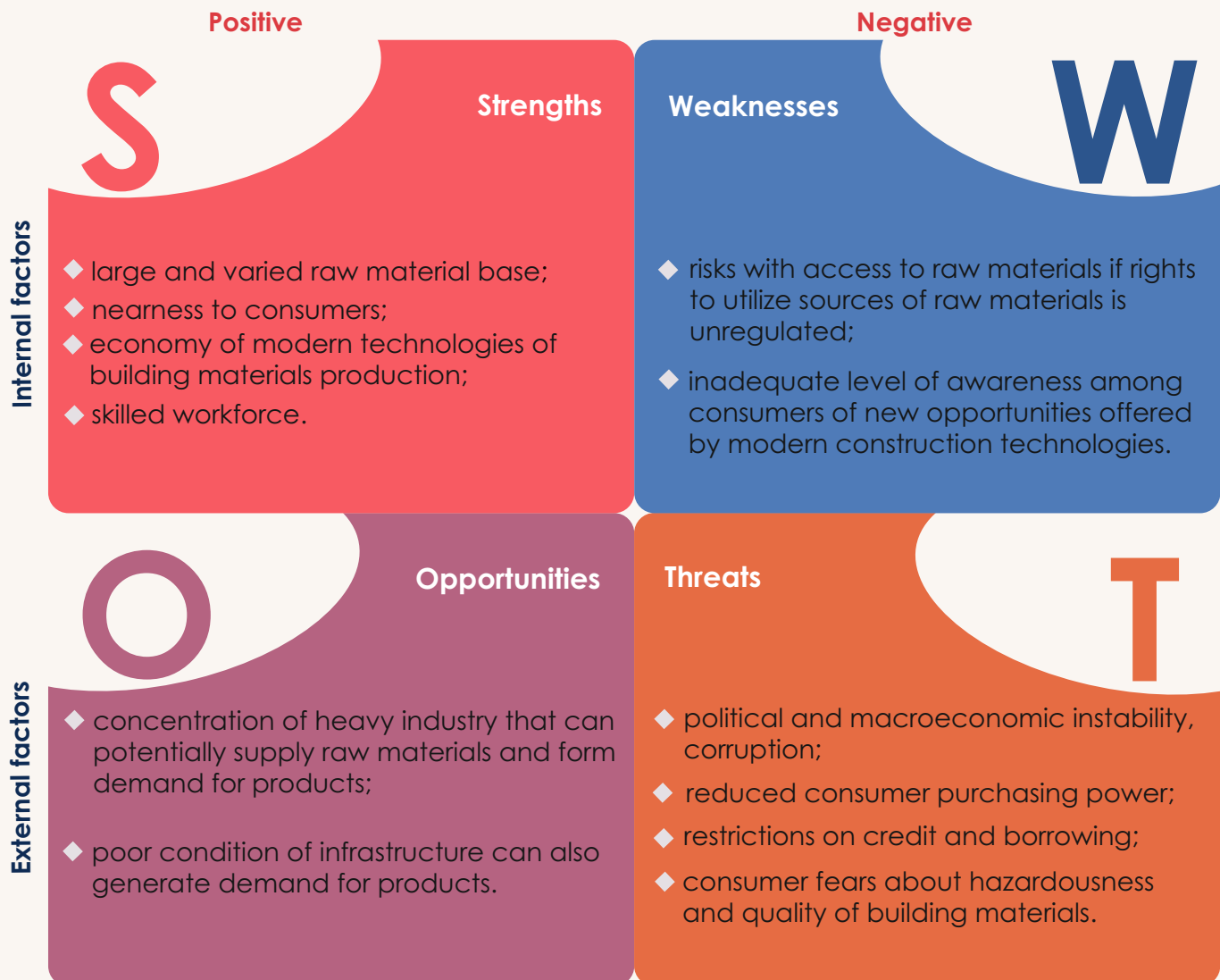
### The goals of manufacturing inorganic insulation materials are:

- ◆ import substitution
- ◆ efficient use of available raw materials

<sup>1</sup> The handling of tailings produced as by-products at enrichment plants is a particularly serious problem for Kryvyi Rih as the level of accumulation is critical and the cost of expanding capacities very high.

# RISK ANALYSIS

## SWOT - Analysis of the construction cluster in the city of Kryvyi Rih



Two types of risk affect the building materials cluster: (1) the basic risks of doing business in Ukraine and (2) specific investment risks.

The general risks of doing business are:

- ◆ macroeconomic and political instability;
- ◆ the anti-terrorist operation in the East and the occupation of some of the country's territory;
- ◆ corruption in the civil service and opaque conditions for doing business;
- ◆ a decline in the real incomes of population.

Risks specific to this investment include:

- ◆ access to available raw materials;
- ◆ opposition to the introduction of new technologies and additional capacities on the part of residents in nearby areas and/or owners of outdated technologies;
- ◆ insufficient awareness among consumers about the quality and safety of products made from the by products of minerals.





Developing the building materials production cluster is a commercially strong proposition for investors because of a number of competitive advantages:

- ◆ a **large consumer market** with incomes that are higher than the national average. The target markets are Kryvyi Rih (pop. 651,000), other cities in Dnipropetrovsk Oblast (pop. 2,600,000), and four neighboring oblasts (pop. 5,000,000);
- ◆ **unsaturated market dominated** by imported manufacturers and manufacturers from other regions in most of the segments, despite of availability of rich materials base;
- ◆ **location of consumers and raw materials** in the same area gives a potential local manufacturer the rare advantage in terms of pricing because shipping costs are minimized.

The proposed building materials cluster development will also have a number of such socio-economic advantages:

- ◆ **improved well-being in the region** due to (1) creation of additional jobs and (2) more tax revenues come to local budgets;
- ◆ partial **import substitution**;
- ◆ **incentive** for new **construction** and for renovating industrial and civil facilities by means of increasing the assortment and price-range of building supplies;
- ◆ **the use of energy-efficient technologies and environmentally friendly approaches** to the use of limited resources;
- ◆ **an improved environment** in the city.

**Commercially attractive investments will strengthen the local economy**

**The suggested areas for developing the construction industry are those most likely to improve the quality of life of local residents**



# NOTES

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**Building Capacity in Evidence-Based Economic Development in Ukrainian Oblasts and Municipalities Project (EBED Project, [www.ebed.org.ua](http://www.ebed.org.ua))** is implemented by The Conference Board of Canada ([www.conferenceboard.ca](http://www.conferenceboard.ca)) and undertaken with the financial support of the Government of Canada.

The EBED Project aims to facilitate sustainable economic development of Ukrainian oblasts and municipalities through building capacity of local authorities in social and economic development planning of the territories using quantitative analysis and forecasting tools.

The project provides assistance to Dnipropetrovsk and Lviv oblasts as well as to six Ukrainian cities (Lviv, Chervonohrad, Drohobych, Nikopol, Kryvyi Rih, and Dnipropetrovsk).

In addition to producing a comprehensive analytical report on social and economic development in the above mentioned Ukrainian oblasts and cities, the EBED project will aid the cities and oblasts in designing improved strategic development plans based on benchmarking (comparative analysis) as well as on demographic, fiscal, and economic forecasts.

Thanks to the EBED project, Ukrainian governmental institutions have an opportunity to engage with Canadian experts and learn from the Canadian experience. This helps to identify evidence-based priorities in the economic development of Ukrainian oblasts and municipalities as well as to design realistic economic development plans for Ukrainian oblasts and municipalities. The project also enhances the capacity officials to defend city and oblast interests before the state government as well as to more effectively attract foreign investment, loans, and donor assistance for economic development.

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