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**Phosphors supply shortage is expected to continue in the short term**

The phosphorus shortage is likely to continue in the short term due to: (1) no remarkable capacity expansion projects during 2022–2024, (2) China’s export restrictions on phosphorus-based products until the end of 2Q22, and (3) Western sanctions against Russia along with Russia extending export bans on fertilizers.

**Phosphorus consumption demand would remain high in 2022**

Favorable weather conditions and positive movements in the prices of many agricultural products pushed fertilizer consumption. Besides, the demand for phosphorus-based chemicals is likely to keep growing in the event of the chip shortage until the end of 2022 along with the trend of shifting to lithium iron phosphate (LFP) battery use.

**Low electricity prices and full control of inputs will help DGC maintain its competitive advantage**

The price of wholesale electricity is relatively low in Vietnam compared to other major phosphate producers in the world. Despite high costs of primary inputs such as coal, oil, and natural gas, Vietnam Electricity’s (EVN) commitment not to raise electricity prices in 2022 will help phosphorus producers maintain a competitive advantage. Besides, putting Khai Truong 25 into exploitation throughout this year will improve DGC’s profit margin.

**We recommend HOLD for DGC stocks with target price of VND254,000/share**

We expect Duc Giang Chemicals (DGC) to achieve NPAT of VND4,141 billion (+64.7% YoY) and revenue of VND12,528 billion (+31% YoY). Based on the business outlook and valuation results, we recommend HOLD for DGC stocks with a target price of VND254,000/share, 9.09% higher than the closing price on April 13, 2022.

## Hold

**Target price VND254,000**

Upside/Downside	9.09%
Current price (Ap 13, 2022)	VND 231,100
Market cap (VNDbn/USDmn)	36,953.21/1.62

### Trading data

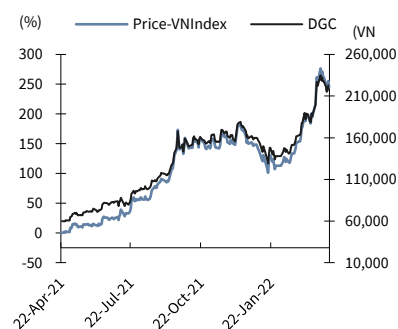
Free float	55%
3M avg trading value (VNDbn/USDmn)	304.54/
Foreign ownership	14.02%
Major shareholder	Dao Huu Huyen (18.51%)

### Share price performance

(%)	1M	3M	6M	12M
<b>Absolute</b>	20	56	34	265
<b>Relative</b>	18	54	27	245

### Forecast earnings & valuation

FY-end	2019A	2020A	2021A	2022F
Net sales (VNDbn)	5,091	6,236	9,550	12,528
Operating income (VNDbn)	596	1,024	2,644	4,353
NPAT (VNDbn)	572	948	2,514	4,141
EPS (VND)	4,241	5,733	13,125	23,105
EPS growth (%)		35%	129%	76%
P/E (x)	4.1	7.7	12.2	11.0
P/B (x)	0.9	1.9	4.3	4.6
ROE (%)		24%	46%	51%
Dividend yield (%)	40%	35%	25%	30%



Source: Bloomberg, KB Securities Vietnam

## Business performance

### Revenue mainly comes from the export of yellow phosphorus and phosphorus-based products

DGC, formerly known as Duc Giang Chemical Company, is a State-Owned Enterprise (SOE) under Vietnam Chemicals Agency (Vinachem). With the main input material being apatite ore, the company's main business products are yellow phosphorus (~40% of total revenue), phosphoric acid products (~30% of total revenue), and phosphorus-based fertilizers (~20% of total revenue). DGC's finished products are principally exported to regional countries like Japan, Korea, India, and others, with export turnover accounting for more than 70% of total revenue in 2021. Therefore, DGC's revenue is directly affected by fluctuations in global phosphorus prices.

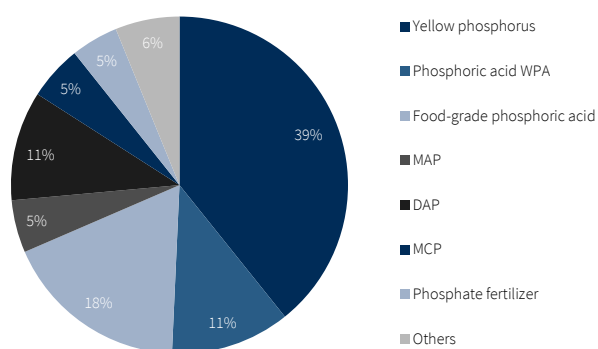
### 2021 saw remarkable growth

The positive movement of yellow phosphorus price in 2021 helped DGC's gross margin improve significantly to 33.3% from 23.7% in 2020. DGC's net revenue (+53.14% YoY) and profit after tax (+165.21% YoY) witnessed outstanding growth thanks to huge consumption demand.

### DGC targets revenue and NPAT to grow by 26% and 39% YoY respectively

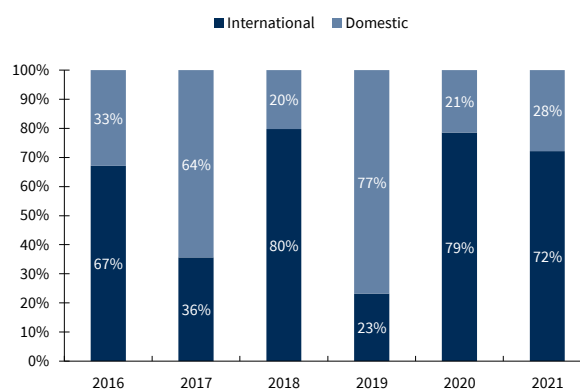
At the FY22 Annual General Meeting (AGM) on March 29, the Board of Directors of DGC approved the business plan for 2022F with consolidated revenue of VND12,117 billion (+26% YoY) and profit after tax of VND3,500 billion (+39% YoY). The company estimates its first quarter profit after tax VND1,500 billion, completing 42.85% of the year plan.

Fig 1. DGC – Revenue breakdown by product (%)



Source: Duc Giang Chemicals

Fig 2. DGC – Domestic and export revenue (%)



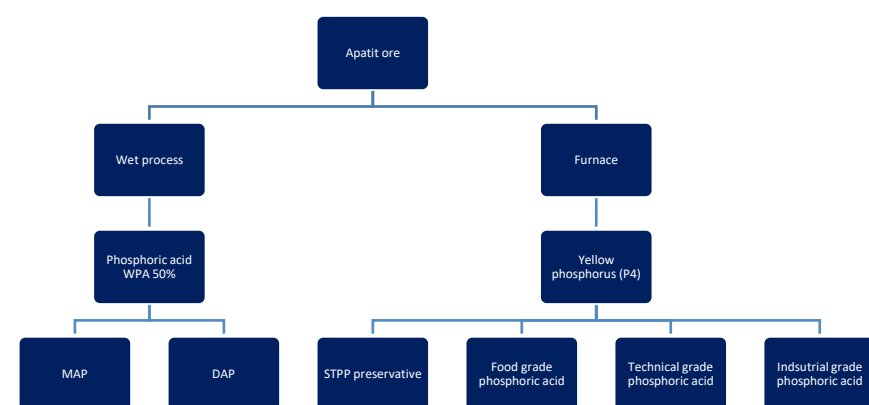
Source: Duc Giang Chemicals, KB Securities Vietnam

## Investment catalysts

### 1. Low electricity prices and full control of inputs help DGC maintain its competitive advantage

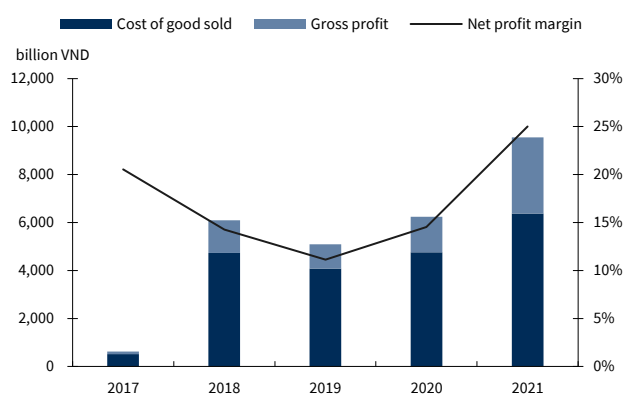
Yellow phosphorus and phosphorus-based products are manufactured at Duc Giang – Lao Cai Chemical Complex, including 6 electric arc furnaces (60,000 tons/year), 2 phosphoric acid plants (350,000 tons/year), 2 phosphoric acid plants (350,000 tons/year), 2 fertilizer plants (200,000 tons/year), and 1 feed additive plant (70,000 tons/year). To produce 1 ton of yellow phosphorus, DGC needs to consume an average of 11-12 tons of apatite ore that are charged to an electric arc furnace with coke as a reductant and silica as a flux at a temperature of 1400-16000C (Figure 5). Because apatite ore is largely in grade 3 and the production process consumes a lot of electricity, the cost of raw materials and electricity normally substitutes more than half of the input costs.

Fig 3. DGC – Value chain



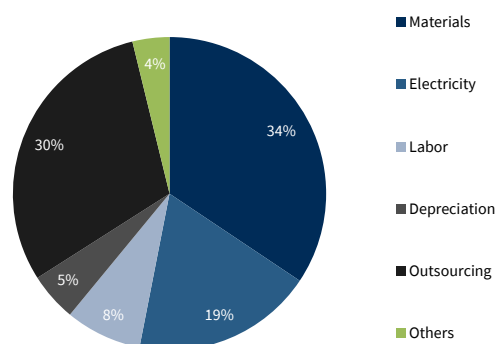
Source: KB Securities Vietnam

Fig 4. DGC – Business results



Source: Duc Giang Chemicals

Fig 5. DGC – Input cost breakdown (%)



Source: Duc Giang Chemicals, KB Securities Vietnam

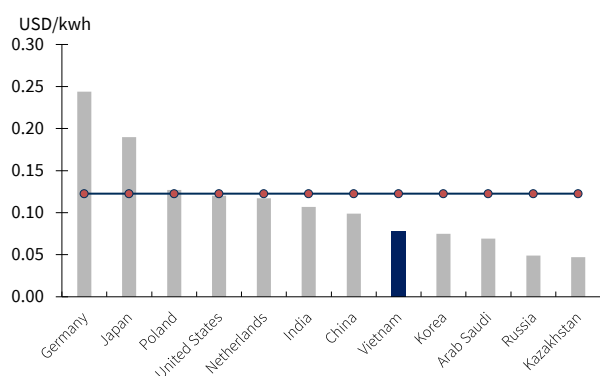
### Low electricity prices help domestic phosphorus producers to gain a competitive edge

In Vietnam, the wholesale electricity price was only 7.8 cents/Kwh in 2021, much lower than the world average of 12.3 cents/Kwh (Figure 6). Russia and Saudi Arabia, two major phosphorus exporters with apatite ore exploitation output in 2021 of 14 million tons and 8.5 million tons respectively, have lower electricity prices than Vietnam. However, supply chain disruptions arising from Western sanctions against Russia will facilitate phosphorus exports to Russia's major customers such as India.

### Putting Khai Truong 25 into exploitation will reduce input costs

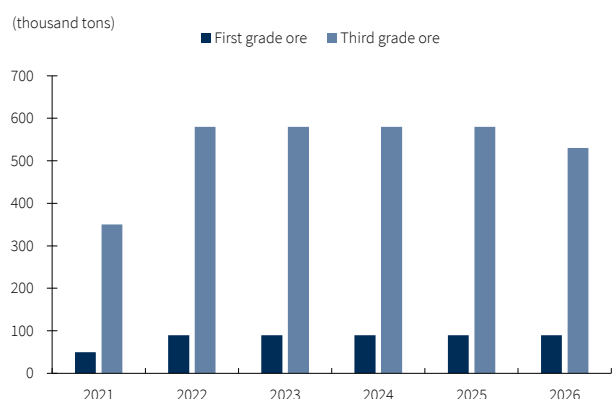
By the end of 2021, DGC had completed the basic construction and put Khai Truong 25 into exploitation. Previously, Lao Cai apatite mines were managed and exploited by Vinachem. The self-sufficient supply will help DGC lower input costs and improve its gross profit margin in the coming years. It is expected that DGC will exploit 720 thousand tons of apatite ore in 2022, satisfying 80% of the input demand of the plant.

Fig 6. Global - Wholesale electricity prices (USD/Kwh)



Source: Global Petrol Prices

Fig 7. DGC - Mining output (thousand tons)



Source: Duc Giang Chemicals, KB Securities Vietnam

## 2. Phosphorus and fertilizer prices are likely to continue their uptrend

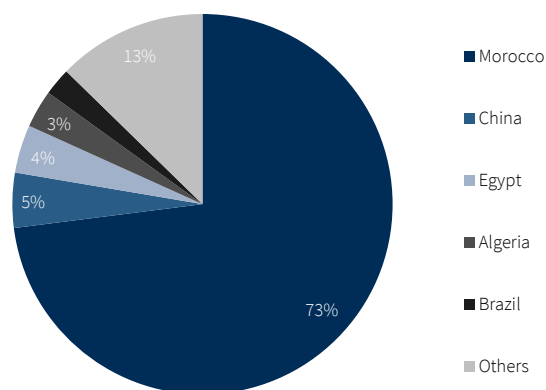
According to the United States Geological Survey, the total optimal exploitation reserves of phosphate rock in the world are about 71 billion tons, concentrated in Morocco (73%), China (5%), and Egypt (4%) (Figure 8). Vietnam ranks 24th with total optimal exploitation reserves of 30 million tons, mainly in Lao Cai province. In 2021, the total global phosphate rock output increased slightly to 220 million tons (+0.5% YoY) thanks to the capacity expansion projects in Morocco, Saudi Arabia, and Egypt.

### The phosphorus shortage is expected to prolong until the end of 2Q22

A report by the US Geological Survey implies the phosphorus shortage is likely to continue, given no remarkable capacity expansion projects among the world's major phosphorus exporters over the next three years. Surging prices of various fertilizers threaten China's food security, prompting the country to adopt export restrictions on fertilizer products, including phosphate fertilizer, until the end of 2Q22. At the same time, in order to reduce environmental pollution, China also shut down old phosphorus factories and cut back on production due to power shortages in many provinces, such as Yunnan,

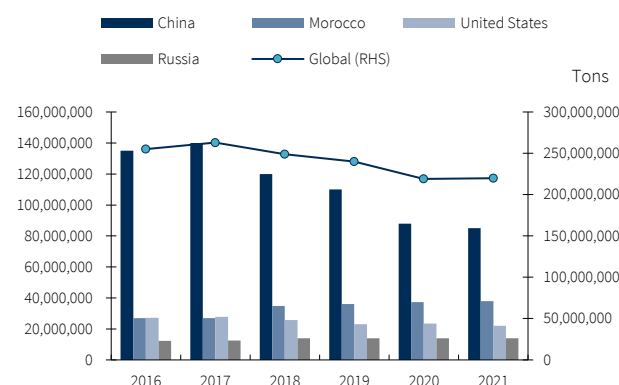
Guangxi, Jiangxi. In the 2016–2021 period, China's phosphate rock production fell by more than a third to 85 million tons/year. In addition, the Western embargo on Russian energy and Russia's export restrictions exacerbated the global phosphorus shortage.

Fig 8. Global – Apatite ore reserves



Source: United States Geological Survey, KB Securities Vietnam

Fig 9. Global – Mining output of phosphorite (ton/year)



Source: United States Geological Survey, KB Securities Vietnam

Meanwhile, global phosphorus demand is forecast to remain high in 2022, supported by three factors:

**Major rice producers actively are increasing production throughout 2022**

**Agriculture:** Russia and Ukraine are two of the largest grain suppliers, together exporting 25% of the world’s wheat and 16% of the world’s corn. The Russian invasion of Ukraine cut off some international shipments of wheat and corn and drove up prices of these commodities to record highs. It made global agricultural importers scramble for supplies as well as seek substitutes such as rice. The US Department of Agriculture (USDA) raised its forecast for global rice production to 510.3 million tons, up 2.8 million tons YoY. Favorable weather conditions and positive price movements will boost the rice production of major producers like China, Thailand, India, and Bangladesh.

**The demand for chips and inputs for semiconductor manufacturing remains heavy**

**Electronic components:** The global chip shortage since 2020 has had profound impacts on prices, production time, as well as the launch of many new product lines by consumer electronics brands and automakers. Although major electronic components manufacturers such as Japan, Taiwan have stepped up investment and expanded the capacity of multiple factories, the supply of semiconductors is unlikely to improve until the end of 2022. The demand for phosphorus, silicon, and inputs for semiconductor production is expected to remain high in the medium term.

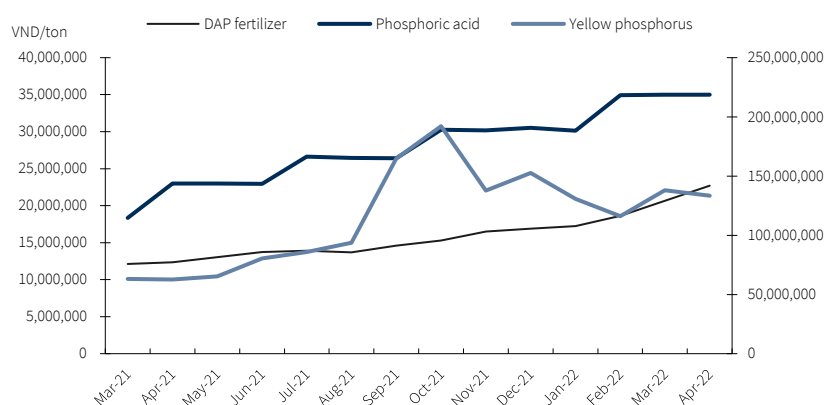
**The shift to LFP battery use for electric vehicles will promote phosphorus consumption**

**Electric vehicle batteries:** Dominant battery lines used for electric vehicles include NMC (Nickel Manganese Cobalt Oxide), NI-MH (Nickel Metal Hydrate), and LFP (Lithium Iron Phosphate) batteries. Compared to NMC and NI-MH batteries, LFP batteries have stable operation, long lifespan, are environmentally friendly, and are more economical, with the input being iron rather than nickel. LFP batteries are primarily made in China due to patent-

related problems. The expiration of the above patents in 2022 will facilitate battery manufacturers and the integration of LFP batteries into product segmentations of major electric vehicle manufacturers such as Tesla, Ford, and Volkswagen.

After assessing the global phosphorus supply and demand, we estimate the average selling price of yellow phosphorus in 2022 at USD5,500/ton (+19% YoY).

**Fig 10. Global – Yellow phosphorus, phosphoric acid and DAP prices (VND/ton)**



Source: CME Group, KB Securities Vietnam

### 3. The promotion of major projects will create long-term growth momentum

#### Duc Giang – Nghi Son Chemical Complex will enter operation in 2025

DGC is boosting site clearance for the Duc Giang – Nghi Son Chemical Complex project in Thanh Hoa and will put it into operation in 2025. With a total investment capital of VND10,000 billion, DGC plans to contribute VND5,500 billion of the capital demand and borrow VND4,500 billion from Vietcombank (VCB) to implement the project. The main final products include concentrated NaOH solution (150,000 tons/year), PVC (150,000 tons/year), Ca(OCl)<sub>2</sub> bleaching powder (34,000 tons/year),... The project is expected to bring in VND8,700 billion in revenue and VND1,800 billion in earnings.

#### Bauxite mining will be the next strategic business of DGC

On March 21, DGC approved the establishment of Duc Giang – Dak Nong Chemical Co., Ltd with a charter capital of VND300 billion, specializing in mining and processing bauxite ore and producing non-ferrous metals. It is the next strategic business that DGC will concentrate on in the foreseeable future.

## Risks

### **Prices of phosphorus-based products face adjustment pressure as China resumes exports**

China's export restrictions combined with production cuts led to a steep rise in phosphorus price in 2021, peaking at USD8460/ton (three-fold the 2020 average). It is expected that China will resume exports by the end of the second quarter of 2022, mitigating the supply shortage and slowing the phosphorus price surge. However, a sharp increase in COVID-19 infections since the beginning of the year has forced the Chinese government to adopt aggressive lockdown measures in major cities, raising concerns about the extension of export restrictions. This will likely limit DGC's business activities and should be closely followed in the coming time.

## Forecast & Valuation

### 2022F business results

We make our forecast for DGC's 2022F business results based on the assumption that the selling price of yellow phosphorus would reach USD5,500/ton (+19% YoY). The operation of Khai Truong 25 in 2022 is expected to improve gross profit from 33.3% in 2021 to 41% in 2022. NPAT and revenue should be VND4,141 billion (+64.7% YoY) and VND12,528 billion (+31% YoY), respectively.

### We recommend HOLD for DGC stocks with a target price of VND254,000/share

As a leading company in the field of phosphorus and chemical fertilizer production in Vietnam, we use the EV/EBITDA ratio in relation to typical listed companies in the same industry to determine DGC's target price. Accordingly, we consider DGC's reasonable EV/EBITDA to be 8.5x, higher than the average forward EV/EBITDA of the compared counterparts to reflect growth expectations for ongoing projects of DGC. Given DGC's 2022 forward EBITDA of VND4,667 billion, we recommend HOLD for DGC stocks with a target price of VND254,000/share, 9.09% higher than the closing price on April 13, 2022.

Table 1. DGC – Valuation results

STT	Companies	Ticker	Business results			Valuation
			ROE	Net profit growth	EBITDA forward	EV/EBITDA
1	CF Industries Holdings, Inc	CF US	29.9%	+92.82%	53.6%	8.0x
2	Nutrient Ltd	NTR US	13.7%	+75.83%	32.8%	8.0x
3	The Mosaic Company	MOS US	16.2%	+53.40%	30.8%	7.5x
4	ICL Group	ICL IT	18.5%	+31.83%	25.8%	8.0x
5	SNB Capital	SAFCO AB	44.1%	+61.52%	76.2%	8.7x
6	Duc Giang Group	DGC VN	45%	+60.80%	37%	8.5x

Source: KB Securities Vietnam



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## Investment ratings & definitions

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### Investment Ratings for Stocks

(based on expectations for absolute price gains over the next 6 months)

Buy:	Hold:	Sell:
+15% or more	+15% to -15%	-15% or more

### Investment Ratings for Sectors

(based on expectations for absolute price gains over the next 6 months)

Positive:	Neutral:	Negative:
Outperform the market	Perform in line with the market	Underperform the market

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