

December 3, 2020

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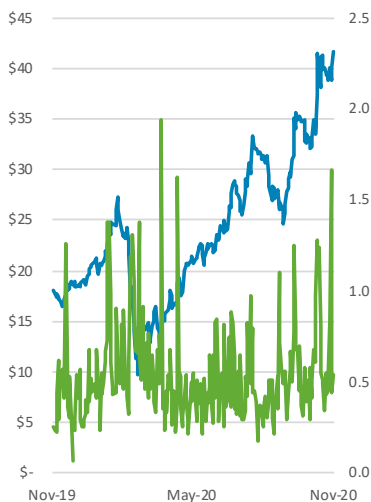
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### TPI Composites (TPIC US)

<b>Share Price in USD</b>	<b>\$45.25</b>
Market Cap (in mln USD)	\$1,617.2
TEV/Rev	1.1x
TEV/EBITDA	16.9x

TPI Composites (TPIC US) last share price in USD (blue, left) and volume (green, right, mln shares)



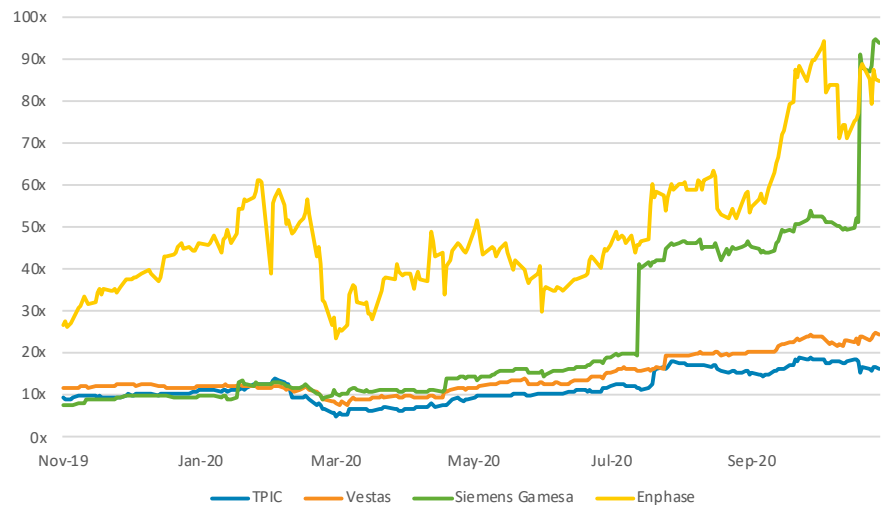
Source: S&P Capital IQ December 3, 2020

## TPI Composites (TPIC US)

# Bladerunner

**W**e believe TPI Composites (TPIC) presents an interesting opportunity to own a business inflecting toward profitable growth with optionality on electric vehicles. In its core business, we believe TPIC may grow EBITDA by 250% over the next two years, propelled by strong demand for new wind turbines. Out beyond two years, demand for offshore wind—where the World Economic Forum predicted an 18.6% CAGR before factoring in Biden Administration programs—is likely to turbo-charge growth and profitability. While we have yet to see results from the EV business, TPIC has secured multiple contracts with automakers including Proterra and Workhorse, and, unlike many of the EV scams with little substance, possesses key EV expertise in composite manufacturing.

### Chart 1. Price/EBITDA: Renewables



Source: Capital IQ

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Simply by ending obstruction of permits, the Biden Administration will accelerate investment in wind.

The new administration in the U.S. will provide a boost to demand. Off-shore wind development has been stymied by President Trump’s vigorous opposition: during his administration, no commercial offshore wind projects have secured federal permits, and that in turn has depressed investment in the industry. Simply by ending obstruction of permits, the Biden Administration will accelerate investment in wind.<sup>1</sup> Biden’s infrastructure and clean energy plan includes measures that, according to the plan, “will unleash a clean energy revolution in America, create good paying union jobs that cannot be outsourced, and spur the installation of . . . tens of thousands of wind turbines – including thousands of turbines off our coasts – in Biden’s first term.”<sup>2</sup>

Likely measures that will boost wind energy: restarting auctions for off-shore wind farms, rejoining the Paris Climate Accord, with its zero-emissions targets, and ending around \$20 bln in annual subsidies for the fossil fuel industry.<sup>3</sup> “To get to some of the targets that they have talked about, wind installs would have to double or triple from where they’re currently estimated,” TPIC CEO William Siwek said in a September 29 webcast.<sup>4</sup>

TPIC has a manufacturing edge on other companies in the sector: it is faster and has lower defect rates. The company already has about 18% of the onshore market and is poised to capture share in the offshore wind market, which offers higher margins than onshore. We believe it can take a piece of the large China market. And TPIC is piloting a business in making parts for electric vehicles. Investors have not recognized any of this potential.

TPIC has been battered since 2018 by a price war in wind. The conclusion to the price war was disguised in 2020 by Covid19 shutdowns, which de-

1 See Corinne Grinapol, Mary B. Powers, Pam Radtke Russell, and Debra K. Rubin: “2020 Election Transition: Biden Climate Goals Will Boost Renewable Energy, but Fossil Fuel Still Has Life,” Engineering News-Record, November 18, 2020: <https://www.enr.com/articles/50774-biden-climate-goals-will-boost-renewable-energy-but-fossil-fuel-still-has-life>

2 <https://joebiden.com/clean-energy/>

3 See The Maritime Executive: “America’s Offshore Wind Industry Stands to Gain From Biden’s Win,” <https://www.maritime-executive.com/article/america-s-offshore-wind-industry-stands-to-gain-from-biden-s-win> and PV Magazine: “Five pro-renewable energy actions to expect from President-Elect Joe Biden,” November 23, 2020 <https://www.pv-magazine.com/2020/11/23/five-pro-renewable-energy-actions-to-expect-from-president-elect-joe-biden/>

4 Webcast hosted by Morgan Stanley: [https://morganstanley.webcasts.com/starthere.jsp?ei=1367421&tp\\_key=52ec9ed47d](https://morganstanley.webcasts.com/starthere.jsp?ei=1367421&tp_key=52ec9ed47d)

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pressed cash flows and EBITDA margins. Now the company is turning the corner. TPIC's recent Q3 results were just the start of what we think will be a steady upward trend: adjusted EBITDA rose 79%, and the company raised its full-year guidance, pushing up projected full-year EBITDA from \$90 to \$100 mln. Factory utilization is rising, and costs are coming down. The order backlog showed an uptick on a previously declining trend. Meanwhile, we learned that blade material costs in Q4 have declined, and blade prices are rising.

We have conducted about 30 interviews of TPIC formers, competitors, and manufacturers of wind turbines, spoken with industry experts, and reviewed industry reports. This work leads us to conclude that, on the most conservative assumptions, TPIC has a clear runway for growth in the current environment, while a sharp acceleration in wind installations driven by grid upgrades or technological advances would provide a significant boost.

### TPIC's edge

TPIC is a "build to print" or outsourced manufacturer of blades for wind turbines. The company started in 1968 building sailboats and power boats, a business it split off in 2004. Now, TPIC makes about 3,500 sets of wind turbine blades per year and has 13,000 employees. TPIC typically signs contracts of three to five years with its customers and derives 93% of its revenue from four customers, Vestas, GE Wind, Siemens Gamesa, and Nordex, reflecting the concentration in the turbine industry. TPIC is also building and prototyping composite shells for commercial electric vehicles. The company is in active discussions with EV makers about contracts. In addition to revenue visibility, TPIC has a significant moat around its technology, which low-cost Chinese producers have not been able to replicate. TPIC can produce blades with faster cycle times and significantly lower defect rates. An executive of the GE blade manufacturer LM said she thought TPIC was attractive as an outsourcing partner because the company is highly skilled in manufacturing. "The technology is as much in the production process as it is in the design of the blade itself," she said. "A company like TPI may have very good production processes that are superior in terms of quality of output, costs, et cetera, compared to LM, for example, in particular regions."

TPIC is positioned for a growth spurt, for four key reasons:

- ▶ **Regional diversification** of turbine demand now under way in the wind power industry will benefit outsourced blade suppliers. A Nordex executive told us that his company expects very strong demand

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TPIC has a manufacturing edge on other companies in the sector: it is faster and has lower defect rates.

from South Africa, Brazil, Spain, and India in the coming two or three years but that the demand may be sporadic. Turbines and their parts are too big to transport very far. Transporting a 60-meter set of blades that costs \$500,000 can cost the customer around \$80,000, according to a former TPIC executive. Buyers prefer to have plants near their wind farms. “If you put up wind farms, let’s say, outside the Argentinian or Chilean coast, then I would expect blades to come from that region, [such as] TPI in Mexico. . . That would be obvious,” a former Vestas executive commented in a call. As demand accelerates, we expect that the turbine manufacturers will choose outsourcing over additional capex for their own facilities. “We see more and more outsourcing,” an LM executive told us in an interview. “Verticalization is expensive.”

“I think TPI has done a pretty good job of positioning itself in these low-cost hubs to try to serve some regional markets,” a former TPIC executive told us.

- ▶ **Margins are set to improve:** Order backlogs at major manufacturers are at an all-time high, and blades are the key constraint on production, according to an executive at Nordex. A Vestas executive told us he thought this would support the market price of even onshore and repowering blades—the cheaper types—in 2021-22.
- ▶ **Independence from turbine manufacturers:** TPIC is the only independent blade manufacturer left outside of China. Executives of blade companies have told us they think independence is an important value for OEMs. “Going back to my earlier career in oilfield services,” a former TPIC executive said, “when we had internal turnkey companies, they were kind of a monopoly. When I was on the business-development side, they had a tendency to get fat, dumb, and happy. They would tell you can’t do this. You can’t do that. And, you know, as a developer or as an OEM, you want a check on that market to see what third parties can do.”
- ▶ **Blades are getting longer and have more technical content:** TPIC projects that average blade lengths will grow by 50% by 2028.<sup>5</sup> This improves the efficiency of turbines, especially offshore turbines. Blade lengths are a key driver of margin. “The gross margin on blades of 70 meters is close to 20%,” said a Chinese blade engineer in an interview, compared with about 10% for shorter blades for this company.

<sup>5</sup> See TPIC 2019 ESG report

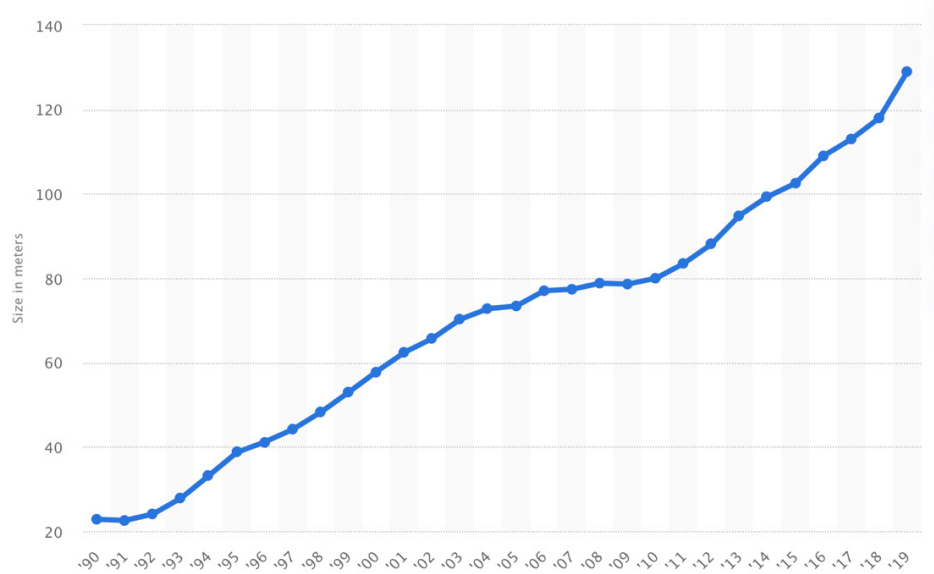
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TPIC’s average gross margin in 2019 was 10.2%. As blades get longer and turbines larger, quality challenges favor specialists like TPIC.

Announced turbine supply agreements indicate high growth offshore, not only in number of wind farms but capacity, height, and blade length.

“Rotor diameter,” meaning the size of the circle swept by turbine blades, has grown 7x since 1990 and is expected to keep growing for nearly a decade. Bigger blades generate more power for the consumer and better margins for manufacturers.

**Rotor diameter size of wind energy turbines from 1990 to 2019**



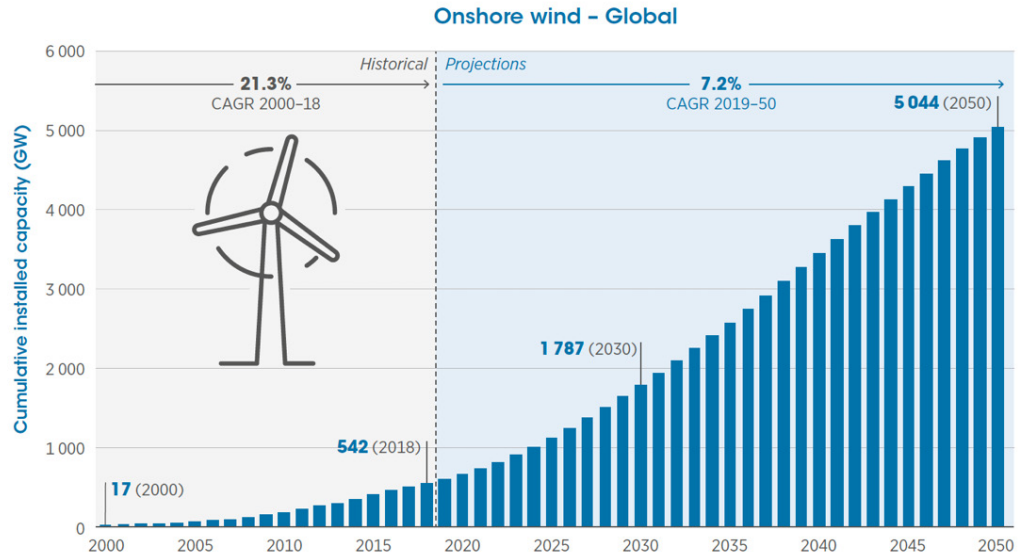
Source: Statista

**Breaking down the EBITDA projection**

To estimate TPIC’s potential, we look at new market installations through 2025. The most conservative estimates put average annual growth in new installations at 7.3% for onshore and 11.5% for offshore capacity.<sup>6</sup>

6 [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Oct/IRENA\\_Future\\_of\\_wind\\_2019.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Oct/IRENA_Future_of_wind_2019.pdf)

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Source: IRENA

We think the offshore estimate is too low: CAGR offshore since 2000 has been 38.5%, and in 2019, offshore wind installations grew by 19%, according to the U.S. government.<sup>7</sup> Both 4C Offshore<sup>8</sup> and Bloomberg New Energy Finance<sup>9</sup> have raised their annual growth projections by between 50-70% compared with their 2018 estimates. Based on industry estimates and our interviews, we add one point of growth to IRENA's 11.5% estimate of offshore installation growth for each year from 2022.

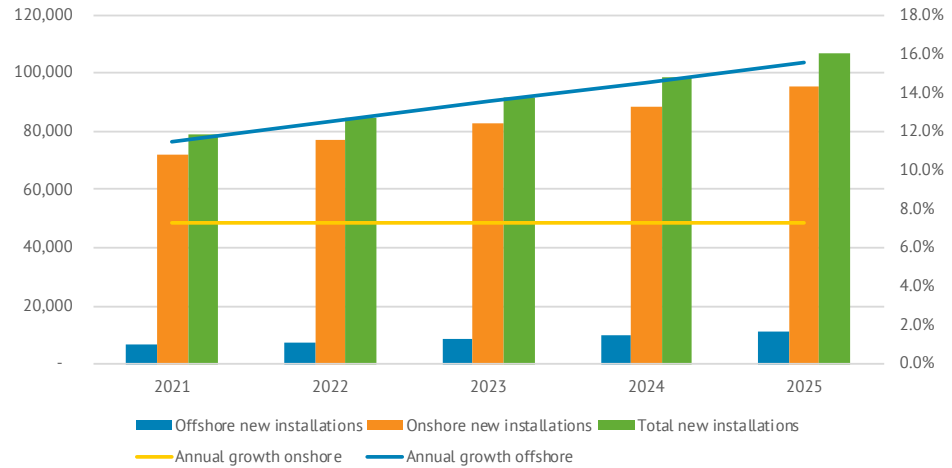
<sup>7</sup> See NREL September 2020: <https://www.nrel.gov/news/program/2020/2019-offshore-wind-data.html>

<sup>8</sup> <https://www.4coffshore.com/news/offshore-wind-continues-to-grow-in-2019-nid13984.html>

<sup>9</sup> <https://about.bnef.com/new-energy-outlook/>

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**Chart 2. Estimated Global New Wind Installations 2021-2025 (MW and % growth)**

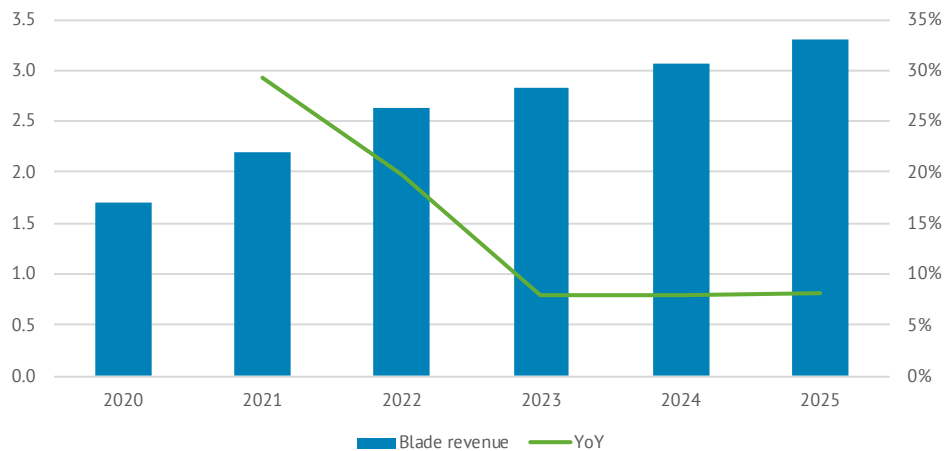


Source: IRINA, World Economic Forum, J Capital

It would be tough for TPIC not to rapidly improve its earnings.

In 2019, TPIC had an 18% share of the global onshore wind market in MW terms. The company targets a 20% market share in the near future.<sup>10</sup> Currently, revenue per MW is nearly \$155,000. Assuming that the company reaches a 20% share overall in 2022, revenue ramps from \$1.65 bln this year to \$3.3 bln in 2025.

**Chart 3. TPIC Revenue Projection (Bln USD and % YoY)**



Source: IRINA, World Economic Forum, TPIC, J Capital

Next, we looked at the company’s expected margins. In Q3 2020, the company reported an EBITDA margin of 10.4%, a recovery from the 7.2% margin in Q3 2019 and from the losses of Q2. TPIC targets an EBITDA margin

<sup>10</sup> See September 29, 2020 company presentation: <https://ir.tpicomposites.com/download/companies/tpicomposites/Supplements/200929%20TPIC%20ESG%20Webcast.pdf>



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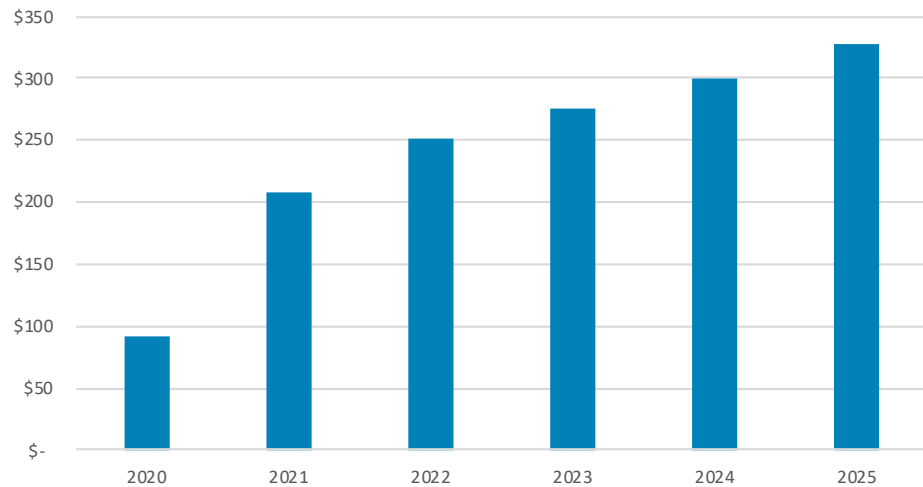
The wind industry no longer suffers from the pricing dynamics that pressured margins from 2017-2019 and that were a key reason why investors have overlooked the company.

next year of 12%. We think that is about right: as transition costs come down, EBITDA will rise.

Transition costs were \$68 mln in 2019 but are trending down. Those costs are incurred by changing factory constellations to suit new customer demands. The transition costs represent investment in future production, but the company needs to strike a balance between margin and new products. We believe that greater industry concentration and standardization around a few turbine models is driving higher volumes of production for single contracts, and that means lower transition costs. Vestas, for example, has a highly touted program of modularizing components in order to allow the company to develop new models with less disruption to the value chain. TPIC's start-up and transition costs soared in 2017-19, from \$40.6 mln in 2018 to \$74.7 mln in 2018 and \$68 mln in 2019. In 2020 so far, the cost has halved, to \$31.5 mln for the first nine months of 2020.

To be safe, we assume an EBITDA margin of 9.5% next year, rising just 10 basis points a year through 2025. That will account for the possibility that the EV program could drag down TPIC's average for a year or two.

**Chart 4. Projected EBITDA (mln USD)**



Source: TPIC, J Capital

Our model shows that it would be tough for TPIC not to rapidly improve its earnings. So what have investors been missing?

**End of the price war**

One key is a hidden end to the price war. We think the wind industry no longer suffers from the pricing dynamics that pressured margins from 2017-2019 and that were a key reason why investors have overlooked the

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As turbine manufacturers see higher margins, they relax pressure on the supply chain, and blade manufacturers get more room to raise prices.

company. A key driver of this price pressure was a shift in Europe and Canada from a feed-in tariff to an auction system for renewables. As turbine manufacturers see higher margins, they relax pressure on the supply chain, and blade manufacturers get more room to raise prices. This is already happening. TPIC prices picked up slightly in Q3, according to the company's 8-K. In 2019, ASP per blade rose from \$140,000 to \$145,000.<sup>11</sup>

During the price war, "Everything was about volume, volume, volume, volume," said a Nordex executive in a call with us. "In order to survive and maintain an economy of scale in costing, all players, no exception, had to accept very low-margin deals for two, three years," he said. "For the last year, year and a half, we've seen a very interesting and solid margin recuperation. We've seen margins month after month steadily increasing."

Feed-in-tariff policies have been increasingly replaced by auctions in the last decade. Auctions put pressure on price. The industry publication Market Intelligence reported that wind equipment manufacturers were pushing "to find ways to cope with price reductions resulting from the switch to auction systems for new renewables projects in many European markets, which has resulted in cost pressure throughout the wind supply chain."<sup>12</sup> In May 2017, GTM Research Director of Product Strategy Matthew DaPrato said: "Feed-in tariffs were an expressed desire to pay more for renewable power. Now it's getting to a point where the technology is competitive, and that's a big milestone for markets like Germany and Spain."<sup>13</sup>

Largely as a consequence of falling prices, the wind industry has undergone two waves of consolidation, in 2017 and in 2018-19. In 2017, Siemens acquired Gamesa, and GE acquired blade manufacturer LM. Turbine suppliers declined from 37 globally in 2018 to 33 in 2019, while the top six turbine manufacturers increased their industry share to 72%, according to the Global Wind Energy Council.<sup>14</sup> Senvion filed for insolvency in April

11 See February 27, 2020 presentation: <https://ir.tpicomposites.com/download/companies/tpicomposites/Supplements/TPI-Earnings-Deck-4QFY19.pdf>

12 Yannic Rack, "Vestas cuts staff to shift business as turbine-makers cope with cost pressure," Market Intelligence, October 1, 2018

13 GTM "Wind Markets and Policy," May 22, 2017: <https://www.greentechmedia.com/articles/read/germanys-first-onshore-wind-auction-brings-low-prices-for-citizen-projects>

14 "Wind turbine sizes keep growing as industry consolidation continues," May 2020: <https://gwec.net/wind-turbine-sizes-keep-growing-as-industry-consolidation-continues/>

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2019. Enercon nearly collapsed in November 2019. Then, plummeting oil prices in 2019 pushed down investment in oil and gas and gave wind some room to run.

“The good news,” a former TPIC executive told us, “is the industry has gotten its costs down to a point where it feels it can survive without subsidies. The way it was doing this was making bigger and bigger wind turbines.”

### Covid19 distortion

All the majors had started to see margin improvement before Covid19 hit. Mid-2018 was the nadir. On the Vestas Q3 2018 earnings call, a Credit Suisse analyst said: “If I look over the last two years, it seems that gross margin on your metric has fallen by 300 to 400 basis points. So I guess we can say that the price war took 2% to 3% off — or 3% off your margins.” In that quarter, Vestas, TPIC’s largest customer, reported gross margins of 15.5%. By Q3 2019, the gross margin had risen to 16.9%. Siemens Gamesa saw its gross margin rise from 8.9% in 2017 to 10.5% in 2019. Inox Wind also saw margin expansion over this period.

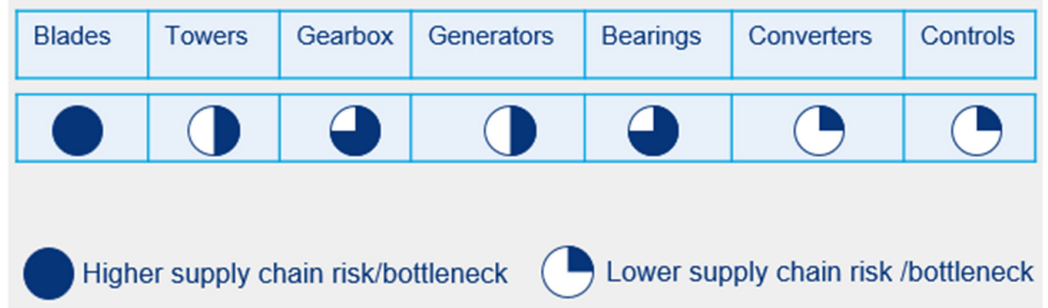
But the improved pricing dynamic has been hidden by the temporary shutdowns induced by Covid19. We learned in interviews with a number of blade engineers that costs for raw materials on average rose by 10% in 2020 through October.

- ▶ Fiberglass prices rose by around 15%.
- ▶ The price of balsa wood, used for about 8% of blade material, rose by 20-30%. Most balsa is produced in Ecuador, which took tough containment measures in March and April this year following high Covid19 infection rates. That drove up prices.
- ▶ PVC and epoxy resin prices rose slightly.
- ▶ Labor costs rose sharply.

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But by October, the cost of all these inputs, according to our interviews, had returned to the 2019 level, while blade prices remain elevated.

### Global wind turbine supply chain impact in 2020 due to coronavirus



Source: Wood Mackenzie "Global wind turbine supply chain trends 2020"

### Offshore promise

A key driver of revenue growth and margin expansion for TPIC will be the offshore wind market. Offshore is growing as a proportion of wind power, and the bigger, longer-lasting turbines at sea offer higher margins to blade makers. A former executive of TPIC, who also was at Vestas, estimated that gross margins for offshore blades are about 20% and ultimately may settle at a floor of 15%. TPIC's onshore gross margin in 2019 was 10.2%.

Offshore wind farm development starts from a low base but is faster than onshore. In the U.S., state procurement commitments rose by 45% in 2019 over 2018, from 19,968 MW in 2018 to 28,898 MW, according to the U.S. Department of Energy.<sup>15</sup> Many projections are much higher. The World Economic Forum expects 18.6% annual growth.<sup>16</sup> Wood Mackenzie expects these volumes to drive faster growth in components.<sup>17</sup>

Globally, offshore installations were about 32,682 MW in early 2020. The global pipeline is over 230,000 MW.

The share between offshore and onshore in the coming year will be about 25% and 70% respectively, with the balance of 5% from replacement tur-

15 <https://www.nrel.gov/docs/fy21osti/77411.pdf>

16 See the World Economic Forum: "The Winds of Change," <https://www.weforum.org/agenda/2020/08/offshore-wind-power-growth-energy-transition/>

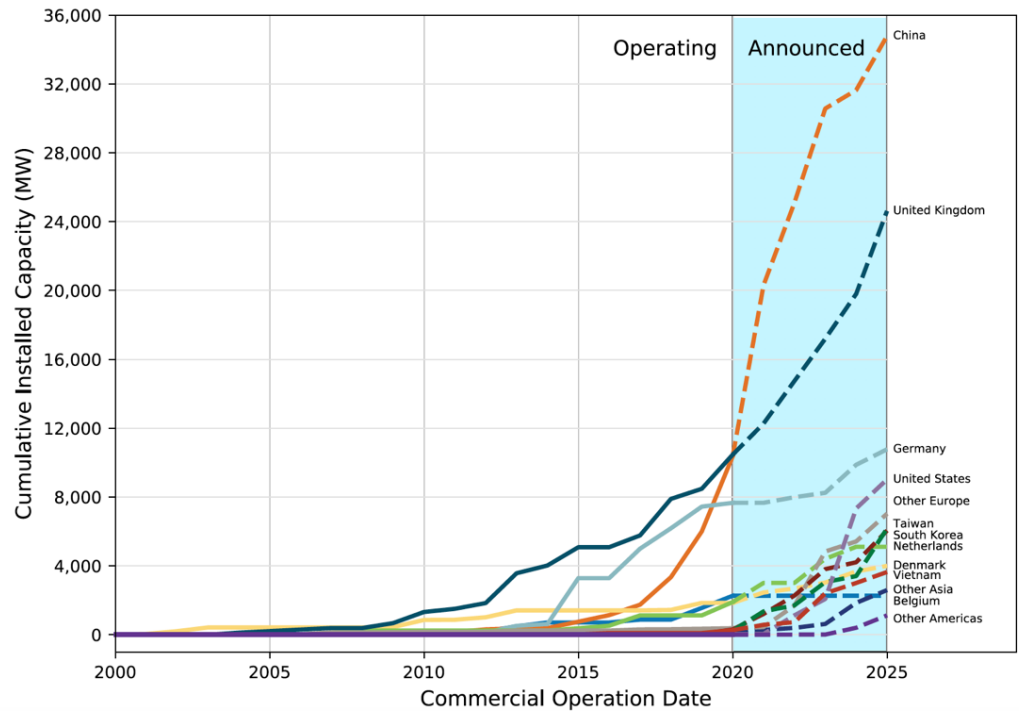
17 <https://www.woodmac.com/our-expertise/focus/Power—Renewables/global-wind-turbine-supply-chain-trends-2020/>

A key driver of revenue growth and margin expansion for TPIC will be the offshore wind market.

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bines, according to a business development executive we interviewed at Nordex. That balance should shift to 35% offshore/45% onshore over the next decade, with 20% replacement or repowering projects, he estimated. The shift is in a much larger market, with offshore going from 8,800 MW installed in 2020 to 19,000 MW installed in 2025.

### Announced Offshore Capacity Through 2025



Source: 2019 Offshore Wind Technology Data Update, National Renewable Energy Laboratory, U.S. Department of Energy October 2020

Looking at the way wind has taken off in China and the UK, It is clear the potential for upgrade from other countries, including the U.S., is huge.

### Accelerants

We see several wild-card elements that could accelerate wind-power installations:

- ▶ **Upgrades in grid storage capacity:** Heightened grid efficiency, principally through the ability to store more energy in periods of low demand, would create significant new demand for wind turbines. One former Vestas executive believes that adoption of hydrogen cell technology could be that catalyst. “Grid improvements could cause an explosion in demand for wind,” the executive said. “The key missing element is storage. Hydrogen manufacturing to use idle wind capacity then store the hydrogen could solve this problem.” According to

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a consultant who is expert in hydrogen technology: “Hydrogen is a strong candidate for storage of wind and solar generation, for supply-demand balancing, which requires storage during peak production but low demand periods. . . Of all the schemes for storing generated power that exceeds demand, hydrogen generation through electrolysis is arguably potentially the most efficient. Competing systems to store power, which span everything from pump-filling reservoirs to drive hydroelectric turbines to compressed air to flow batteries, are under development but present bigger inefficiencies. Hydrogen can be generated, stored, and subsequently drive thermal, turbines or fuel cells to generate electricity when demand exceeds supply.” We believe that an offshore wind-to-hydrogen solution could come soon and create a major boost for wind power.

- ▶ **A carbon tax:** To date, Joe Biden’s renewables plan does not include a carbon tax but instead relies on a less market-focused approach involving emission caps. We expect this could change. In 2019, a group of 45 renowned economists signed an open letter in the Wall Street Journal<sup>18</sup> calling for a carbon tax. The original proposal was drafted by such centrist figures as James Baker, George Schulz, and Henry Paulson under the aegis of the Climate Leadership Council, which has drafted a “Bipartisan Climate Roadmap.”<sup>19</sup>
- ▶ **Extension of tax-credit programs.** The production tax credit for wind projects, now \$0.015 per kwh, is set to be phased out. We expect a Biden Administration will extend it and increase the value. An executive of a blade company told us in an interview, “In the 12 years that I’ve been in the wind industry, it’s always been renewed.”
- ▶ **Investment in port infrastructure:** Wind farm operators need ports large enough to support installation and maintenance vessels. We would look for port upgrades under a Democratic infrastructure bill. The Biden infrastructure plan, proposed during his campaign, includes significant upgrades to ports.<sup>20</sup>
- ▶ **State-level “carbon neutral” commitments:** Key east coast states with

18 <https://www.wsj.com/articles/economists-statement-on-carbon-dividends-11547682910?mod=searchresults&page=1&pos=1>

19 <https://clcouncil.org/bipartisan-climate-roadmap/>

20 <https://joebiden.com/clean-energy/>

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large electricity markets have committed to generate all their electricity from renewable sources by certain target years—Connecticut and New York by 2040, Maryland by 2030. As more coastal states announce commitments, there will be more investment in offshore wind.

“I think the appetite behind wind among the public is very, very much stronger than it was,” a former executive of Exxon Mobil who handled new energy policy told us in a phone interview. This executive, who more recently worked for blade manufacturer LM, was seconded to the Clinton White House when NAFTA was enacted, and he compared potential Biden policy in wind to NAFTA: “What NAFTA could change isn’t much, but the will to try to create a free trade area was very, very encouraging and created new energy and new opportunities. So there’s this equivalent of an energy NAFTA that could occur in the United States for sure,” he said. This former executive also believes that improved relations with Canada and Mexico in the Biden Administration will promote wind. “You open up one energy chain between Canada and the United States, and you’re suddenly sharing base-load energy, wherever it’s generated from wind and solar. So it’s tremendously exciting to think what when does already generating far more wind energy then can be utilized in the existing system,” he said.

### The China market

We have not modeled any capture of contracts in China for TPIC, but we do think Chinese turbine manufacturers could choose TPIC in the future. That is because the structure of Chinese wind subsidies has changed and now rewards higher efficiency of the turbines. That means that “the higher defect rates of Chinese manufacturers will start to matter,” said a former TPIC executive. TPI currently does not sell blades to any of the Chinese turbine manufacturers.

The Chinese market is by far the biggest in the world. Analysts anticipate wind capacity growth in the 14th Five Year Plan, starting next year, to be 9.2%, with 27 GW installed annually. Of that, about 4 GW of offshore wind capacity will be installed next year, rising to 9-10 GW in 2025, according to our interviews with executives in the Chinese industry.

**Windpower Annual Additions 2019 (MW)**

China	26,155
United States	9,137
United Kingdom	2,393
India	2,377
Spain	2,319
Germany	2,189
Sweden	1,588
France	1,336
Mexico	1,281
Argentina	931
Rest of World	10,639

Source: Lawrence Berkeley National Laboratory: Wind Energy Technology Data Update: 2020 Edition

TPIC is likely safe from Chinese competition. The international wind turbine blade market does not easily lend itself to “Made in China” competition. Chinese blade manufacturers have a significant price advantage, with prices 20-30% lower than those of international manufacturers who build blades in China—TPIC and LM—but we do not think they are internationally competitive. Sniffed a turbine company executive, “We do not sell at negative margins.”

Manufacturing huge blades made of composite materials to highly exacting standards is not easy. “There’s a little bit of black magic or, you know, art to making these blades right,” a former TPIC executive told us. “And TPI is very good at it, with a 24-hour cycle time no matter how big the blade. So, you know, while the OEMs would like to threaten TPI, I think they feel they need them.”

“Cycle time” refers to the time it takes to make a complete blade in a mold. We spoke with a former executive of the company in Turkey who told us that TPIC in less than a year had pushed cycle time from 70 to 24 hours in that facility. We spoke with production engineers in China at Ming Yang, Goldwind, and Envision, who told us that their blade cycle time, depending on the size of the blade, is anywhere from three to five days. Time to market is important to turbine manufacturers, which will outsource if an external vendor can provide better time to market, our interviewees said. “That cycle time drives outsourcing,” said an engineer at Envision Energy.



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Everyone we interviewed in China agreed that TPIC has a competitive edge in quality over the domestic manufacturers. Chinese manufacturers tend to provide blades that are 20-30% cheaper, but they have around double the defect rate. Blades are a small portion of wind turbine costs, and we believe that turbine manufacturers value reliability over cost so will choose TPIC, especially for the expensive turbines in the growing offshore market.

A former executive of a turbine company described his attempt to purchase parts from a Chinese manufacturer that was offering high apparent quality at a price much lower than that of the dominant international players: “We said, ‘Give us some statistics on quality,’ and either they were not willing to give us it or they didn’t have it.” This turbine manufacturer chose the more expensive component from an international supplier.

“Aelon is terrible,” another turbine maker said, referring to China’s biggest private blade manufacturer.

A former TPIC executive familiar with the China market said: “I have not seen any Chinese manufacturers that have succeeded in selling internationally, and that is mainly because of quality issues. It’s all up to risk. If you’re not able to provide documentation, then the insurance fees will go sky high.”

“In-service documentation is a real problem for most Chinese suppliers,” said a consultant by email. “They either do not have the data, or global customers do not trust it.”

Blade engineers told us about problems with bonding and lamination of blades and wrinkles in the skin. “A technology that was designed for 30-meter blades has been stretched to blades that are 70 meters,” a turbine executive told us.

TPIC quality is significantly higher than that of the Chinese manufacturers. Although it is hard to find comparable defect ratings, four Chinese wind energy engineers we interviewed all said that TPIC quality is higher on average than that of Chinese manufacturers, and defect rates are generally low.

TPIC China “has a defect rate of about 0.8-1%,” said a production manager at one of TPIC’s major client companies. A Goldwind engineer told us that Chinese blades have a roughly 3% defect rate.

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“There were a lot of blade factories in the past with very uneven quality,” an engineer from Xinjiang Goldwind told us. “Some companies ... at the beginning were regarded as the best in the industry. Later, there were large-scale accidents, and some blades cracked or snapped.” These types of problems are fatal to a company, the engineer said. TPIC is distinguished by consistent quality. But “as long as the price of TPI does not drop,” the engineer said, “we will basically not consider” TPIC as a supplier.

But blades represent only 10% of the cost of an onshore turbine and a lower proportion offshore. We believe that international turbine companies and farm operators are not willing to risk the integrity of a \$4 mln turbine to save \$100,000 buying sub-standard blades.

For the same reasons of technical precision and reliability, we believe that TPIC has a chance to capture contracts for Chinese offshore wind turbines. Offshore turbines are far more powerful than onshore but also cost two to three times as much. Turbine manufacturers are not willing to risk the high cost associated with a defective blade when it threatens an offshore platform that must be reached by helicopter. Furthermore, China’s government recently change its subsidy structure for wind power, rewarding operators for performance rather than simply for installing turbines. This may create more market space for TPIC.

### Electric vehicles

Our model excludes any potential revenue from composite bodies and parts for electric vehicles, because we are skeptical that composites will grow as a portion of the electric vehicles fleet. The more commonly used aluminum/lightweight steel alloy is cheaper. But TPIC has opportunity for process improvements that could accelerate the use of composites.

TPIC got into making bodies for electric vehicles in 2017, when it signed a five-year supply agreement to manufacture composite bus bodies for Proterra, which makes zero-emission buses. TPIC is uniquely positioned to make these composite “unibodies,” which combine the vehicle’s structural body with aesthetic exterior parts into a single shell.

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Photo from Newton Daily News January 24, 2020<sup>21</sup>

Proterra's agreement with TPIC was for 3,350 bus shells. The company shipped the first bus body in August 2018 after occupying an old Maytag factory in Newton, Iowa a month earlier. In early 2020, TPIC consolidated the operations into its 108,750 sqf Warren, RI facility. Other customers in the facility are Navistar Inc. (design for a composite tractor, February 2018), and Workhorse (pilot production of bodies for delivery vehicles, Q1 2019). TPIC has made automotive parts for Volvo/Nova Bus. TPIC is also building EV prototypes for GM.

By using composite materials, TPIC has reduced the weight of the bus bodies by about 4,000 pounds.<sup>22</sup> Removing that weight while actually strengthening the body extends both the battery range and the life of the vehicle. Composites are also arguably safer. "In a crash, composites win," said a materials engineer formerly with Workhorse. They are "very strong, very resilient."

Composites compete poorly with aluminum principally because of the long time it takes to make a part, but composites tend to be very strong, they do not corrode, and the production equipment is far cheaper than stamping

21 Christopher Braunschweig, "TPI Composites will close bus body plant in Newton," <https://www.newtondailynews.com/2020/01/23/tpi-composites-will-close-bus-body-plant-in-newton/ak7uuzx/>

22 See TPIC ESG presentation, February 29, 2020

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molds for metallics. That makes composites cheaper for low-volume producers. In the short run, TPIC may get business from the dozens of small EV start-ups looking for prototyping. EVBoosters, a Dutch-based research firm, estimated that a total of 240 companies raised up to \$17 billion in 2019. This was a sharp increase over 2018 and 2017, according to Pitchbook. Manufacturing start-ups accounted for 45% of the fundraising, according to the firm.

The winner in the composites race will be the company that can speed up the manufacturing process from two or three hours per part to five minutes per part. Part of the manufacturing challenge is to make a structural part that also has the smooth, attractive and aerodynamic surface that the industry calls an “A surface” all in one part. Metallic and fiberglass surfaces have to be sanded, painted, and buffed. The hope is that, with more advanced materials like carbon fiber, which can be molded rather than stamped, that process can be skipped.

Major companies like Amazon are also pushing to build lightweight delivery vehicles, because under 10,000 pounds, they do not require a special commercial license to drive. This puts makers of conventional ICE delivery vehicles into the market for composites. The U.S. and U.K. post offices are also exploring composite bodies for electrics.

TPIC has a couple of advantages in the business of building EV shells. TPIC is among the very few companies capable of building a large shell in any volume. “If I were to guess,” said a materials scientist familiar with TPIC, “you’re talking about a small handful of companies that can do this.” According to a former executive of MFG<sup>23</sup>, TPIC is one of only two companies in the United States—the other being MFG—that is currently capable of producing composite auto bodies at volume. The technical moat in this business, he said, is very wide.

TPIC has estimated that it will earn \$500 mln in annual revenue from EV products when this business is mature.<sup>24</sup> In comparison to TPIC’s reported 2019 revenue of \$1.437 bln, this is a 35% revenue boost on top of strong long-term growth in wind power blades. TPIC’s current share price valuation does not factor in this revenue and earnings upside.

<sup>23</sup> <https://www.moldedfiberglass.com/>

<sup>24</sup> See CEO Stephen Lockard comments on the Q4 2019 earnings call

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### Reducing finance costs

With net debt of \$284.1 mln as of the end of Q3 against tangible book value of \$181.5 mln, TPIC's borrowings seem high. But we consider the company's reliance on factoring receivables instead of raising equity to be a positive.

The company factors receivables on a non-recourse basis, with the 2019 10K disclosing \$776 mln for that year, and \$460 mln for the first six months of 2020. The factoring appears to come at a rate slightly lower than bank financing—we estimate 1.5% based on company filings. The factoring discount and TPIC's revolving loans are both priced at a couple of points higher than LIBOR. The six-month LIBOR rate now is about 0.24%

The financing needs will ease as volume grows, because higher utilization and the associated efficiencies lead to improved operating cash flows. In the first half of 2020, TPIC had just about 69% factory utilization, meaning the number of blades invoiced versus the number the factories are capable of producing. Utilization rose to 83% in Q3. The company forecasts utilization averaging 80% in 2021. As throughput more nearly matches customer demand, the financing requirements will relax.

For TPIC, materials costs are about 70% of COGS. Demand is lumpy and depends on the vagaries of windfarm construction, while the company needs smooth production and plant utilization to make money.

### Unimpressive management, core company strengths

We have not been impressed with company management, who seem lacking in strategic vision. Perversely, this suggests to us that this company, already performing well, could realize significant growth with more visionary leadership. CEO William Siwek was elevated in 2019 from CFO and appears to bring to strategy the plodding, engine-room approach more typical of back than front office. For example, when asked on the Q3 earnings call about TPIC's efforts to capture contracts for offshore turbines, he said TPIC's attitude is "wait and see." "Once the volumes get to where we believe that market goes, and it makes sense to localize that manufacturing capacity," Siwek said.<sup>25</sup> Management later specified on a call that they would need to build a new blade facility at a port to supply offshore blades but that they currently have no plans to do that.

Siwek spent 18 years with Arthur Andersen. Two of the independent directors also have backgrounds with Arthur Andersen. Of course, Andersen's

<sup>25</sup> TPIC Q3 earnings call: <https://edge.media-server.com/mmc/p/2fwkrb74>

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negligence and collusion in the Enron case hardly affected all the company's partners. But the affiliation is not a high recommendation.

There are indications that TPIC has weak control over operating subsidiaries. For example, the company reported a \$17.1 mln foreign exchange loss in Q3 from volatility in the Turkish Lira compared with the Euro. But management seemed unable to explain why only Q3 2020 was meaningfully impacted given that the Lira has been volatile over a number of quarters, or what Euro-denominated liabilities could have led to this charge. Similarly mysterious was the income-tax provision of \$49.3 mln in Q2 2020 despite losses in the quarter, reversed in Q3—when we inquired, we got a lecture on the definition of accrual versus cash accounting. We surmise that TPIC management may have poor visibility into the Turkish operations and is simply accepting odd charges sent up by the local staff.

Reviews of management are not very positive. We spoke with three executives who had been fired for what appeared to be trivial reasons having to do with personality clashes. A typical Glassdoor reviewer says: “the CEO Bill is a really nice guy who seems sheltered from the realities of how unskilled, unethical or political the management of all areas, in almost all regions are of the world are.”<sup>26</sup>

None of this is good. But we would prefer to own a solid business run by dim managers than a bad business with a brilliant team at the helm. We view TPIC as the former: a solid company poised to benefit from a structural upturn in the industry.

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<sup>26</sup> <https://www.glassdoor.com/Reviews/TPI-Composites-Reviews-E290214.htm>

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