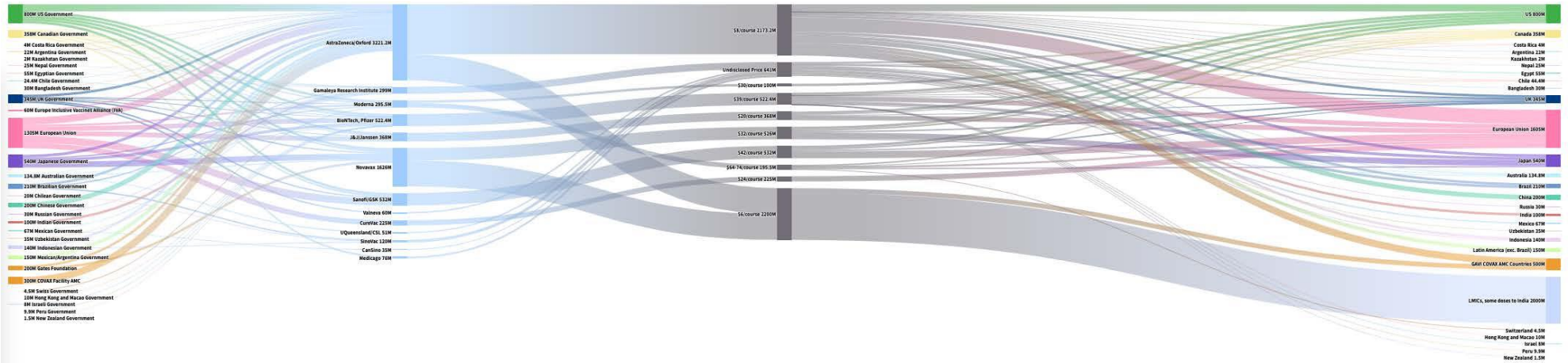


Figure S1. COVID-19 Vaccines: Who has reserved them, and where might they be going?

COVID-19 Vaccines: Who has reserved them, and where might they be going?

All data are as of November 15, 2020.



*Under a \$300M grant from the Bill and Melinda Gates Foundation, the Serum Institute of India will scale up production of 200 M vaccine doses from AstraZeneca/Oxford University for 57 COVAX AMC-eligible LMIC countries and Novavax for 92 AMC-eligible LMIC countries at a ceiling price of \$3/dose or \$6/course. The precise allocation of these 200 M vaccine doses between the two firms is not yet known. For purposes of this study and the data visualization, the volume of this pre-market purchase commitment is divided equally between the two vaccine manufacturers. **Two licensing agreements with the Serum Institute of India—one with AstraZeneca/Oxford University and Novavax—each carry the potential of delivering a billion doses. It has been assumed that these doses, destined for use in low- and middle-income countries, would be made available at the ceiling price of \$3 per dose, or \$6 per course, set by the separate Bill and Melinda Gates Foundation grant with the Serum Institute of India for both of these manufacturers. However, this pricing information remains to be publicly confirmed.

This Sankey diagram maps the flows of publicly known, COVID-19 vaccines pre-market purchase commitments from those who have reserved them, the vaccine manufacturers supplying these doses, the tiered pricing of these vaccine doses, and their potential recipient countries. The full interactive version can be found at <https://www.ignitetheidea.org/covid-reservedvaccines>. This visualization was made using [Flourish](#).

Notes:

1. Under a \$300M grant from the Bill and Melinda Gates Foundation, the Serum Institute of India will scale up production of 200 M vaccine doses from AstraZeneca/Oxford University for 57 COVAX AMC-eligible LMIC countries and Novavax for 92 AMC-eligible LMIC countries at a ceiling price of \$3/dose or \$6/course. The precise allocation of these 200 M vaccine doses between the two firms is not yet known. For purposes of this study and the data visualization, the volume of this pre-market purchase commitment is divided equally between the two vaccine manufacturers.
2. Two licensing agreements with the Serum Institute of India—one with AstraZeneca/Oxford University and Novavax—each carry the potential of delivering a billion doses. It has been assumed that these doses, destined for use in low- and middle-income countries, would be made available at the ceiling price of \$3 per dose, or \$6 per course, set by the separate Bill and Melinda Gates Foundation grant with the Serum Institute of India for both of these manufacturers. However, this pricing information remains to be publicly confirmed.
3. Only publicly disclosed deals are visualized in this diagram; however, the vaccine price is not always known. These are labeled as “Undisclosed Price in the third pillar of the Sankey diagram.
4. The European Inclusive Vaccines Alliance, comprised of France, Italy, Germany and the Netherlands, has secured COVID-19 vaccines for countries in the European Union and beyond. In this data visualization, it is assumed that its pre-market purchase commitments will go to the European Union.

Figure S2. Companies bringing forward COVID-19 vaccine candidates with leading pre-market purchase commitments

Companies Bringing Forward COVID-19 Vaccine Candidates with Leading Pre-Market Purchase Commitments

All data are as of November 15, 2020. *To enable easier tracing, the pillars for each vaccine candidate and its corresponding R&D stage are identically color coded in the Sankey diagram.



*Under a \$300M grant from the Bill and Melinda Gates Foundation, the Serum Institute of India will scale up production of 200 M vaccine doses from AstraZeneca/Oxford University for 57 COVAX AMC-eligible LMIC countries and Novavax for 92 AMC-eligible LMIC countries at a ceiling price of \$3/dose or \$6/course. The precise allocation of these 200 M vaccine doses between the two firms is not yet known. For purposes of this study and the data visualization, the volume of this pre-market purchase commitment is divided equally between the two vaccine manufacturers. **Two licensing agreements with the Serum Institute of India--one with AstraZeneca/Oxford University and Novavax--each carry the potential of delivering a billion doses. It has been assumed that these doses, destined for use in low- and middle-income countries, would be made available at the ceiling price of \$3 per dose, or \$6 per course, set by the separate Bill and Melinda Gates Foundation grant with the Serum Institute of India for both of these manufacturers. However, this pricing information remains to be publicly confirmed.

This Sankey diagram maps the flows of publicly known, COVID-19 vaccines pre-market purchase commitments from companies with leading pre-market purchase commitments. The full interactive version can be found at <https://www.ignitetheidea.org/covid-reservedvaccines>. This visualization was made using [Flourish](#).

Notes:

1. Under a \$300M grant from the Bill and Melinda Gates Foundation, the Serum Institute of India will scale up production of 200 M vaccine doses from AstraZeneca/Oxford University for 57 COVAX AMC-eligible LMIC countries and Novavax for 92 AMC-eligible LMIC countries at a ceiling price of \$3/dose or \$6/course. The precise allocation of these 200 M vaccine doses between the two firms is not yet known. For purposes of this study and the data visualization, the volume of this pre-market purchase commitment is divided equally between the two vaccine manufacturers.
2. Two licensing agreements with the Serum Institute of India--one with AstraZeneca/Oxford University and Novavax--each carry the potential of delivering a billion doses. It has been assumed that these doses, destined for use in low- and middle-income countries, would be made available at the ceiling price of \$3 per dose, or \$6 per course, set by the separate Bill and Melinda Gates Foundation grant with the Serum Institute of India for both of these manufacturers. However, this pricing information remains to be publicly confirmed.
3. Only publicly disclosed deals are visualized in this diagram; however, the vaccine price is not always known. These are labeled as "Undisclosed Price in the third pillar of the Sankey diagram.

Table S1. COVID-19 Vaccines: Key Characteristics of Pre-Market Purchase Commitments

Vaccine Company	R&D Phase	Vaccine Platform	Pricing	Procurement Agent	Recipient Country	Doses Reserved	Intermediary
AstraZeneca/Oxford*	Phase 2/3 ¹	Non-replicating viral vector ¹	\$8/course ^{2***}	U.S. Government ^{3,4}	U.S. ^{3,4}	300 million ^{3,4}	
			\$8/course ^{***}	UK Government ^{79,5,6}	UK ^{79,5,6}	100 million ^{79,5,6}	
			\$8/course ^{***}	Europe Inclusive Vaccines Alliance (IVA) ^{7,8**}	European Union ^{7,8}	300 million ^{7,8}	
			\$8/course ^{***}	European Union ^{9,10,11}	European Union ^{9,10,11}	300 million ^{9,10,11}	
			\$8/course ^{***}	Japanese Government ¹²	Japan ¹²	120 million ¹²	
			\$8/course ^{***}	Canadian Government ^{13,28}	Canada ^{13,28}	20 million ^{13,28}	
			\$8/course ^{***}	Australian Government ¹⁴	Australia ¹⁴	33.8 million ¹⁴	CSL ¹⁴
			\$8/course ^{***}	Brazilian Government ¹⁵	Brazil ¹⁵	100 million ¹⁵	Oswaldo Cruz Foundation ¹⁵
			\$8/course ^{***}	Chinese Government ¹⁶	China ¹⁶	200 million ¹⁶	Shenzhen Kangtai Biological Products ¹⁶
			\$8/course ^{***}	Mexican/Argentina Government ¹⁷	Latin America (excluding Brazil) ¹⁷	150 million ¹⁷	mAbxience (INSUD Group) ¹⁷
			\$8/course ^{***}	Indonesian Government ⁵⁶	Indonesia ⁵⁶	100 million ⁵⁶	
			\$8/course ^{***}	Egyptian Government ^{57,92}	Egypt ^{57,92}	30 million ^{57,92}	Vaccira ⁵⁷
			\$8/course ^{***}	Costa Rica Government ⁹⁰	Costa Rica ⁹⁰	1 million ⁹⁰	
			\$8/course ^{***}	Argentina Government ⁹¹	Argentina ⁹¹	22 million ⁹¹	
			\$8/course ^{***}	Chile Government ⁹³	Chile ⁹³	14.4 million ⁹³	
			\$8/course ^{***}	Bangladesh Government ⁹⁴	Bangladesh ⁹⁴	30 million ⁹⁴	Beximco Pharmaceuticals
\$6/course ²⁰	Gates Foundation ^{18,19,20}	GAVI COVAX AMC Countries ^{18,19,20}	200 million split between AZ/Oxford and Novavax ^{18,19,20}	Serum Institute of India ^{18,19,20}			
\$6/course ²¹	COVAX Facility AMC ^{21,22}	GAVI COVAX AMC Countries ^{21,22}	300 million ^{21,22}				
\$6/course ^{22**}	--	LMICs, some doses to India ^{22,23***}	1 billion ²²	Serum Institute of India ²²			
Gamaleya Research Institute	Phase 3 ¹	Non-replicating viral vector ¹	Undisclosed	Russian Government ⁵⁴	Russia ⁵⁴	30 million ⁵⁴	
			Undisclosed	Indian Government ^{68,54}	India ^{68,54}	100 million ^{68,54}	Dr. Reddy's Laboratories ⁶¹
			Undisclosed	Brazilian Government ^{68,54}	Brazil ^{68,54}	50 million ^{68,54}	

			Undisclosed	Mexican Government ^{68, 61}	Mexico ^{68, 61}	32 million ^{68, 61}	Landsteiner Scientific ⁶¹
			Undisclosed	Uzbekistan Government ^{68, 61}	Uzbekistan ^{68, 61}	35 million ^{68, 61}	Laxisam ⁶¹
			Undisclosed	Vietnamese Government ⁵⁵	Vietnam ^{55 †}	50-150 million ⁵⁵	
			Undisclosed	Kazakhstan Government ⁸²	Kazakhstan ⁸²	2 million ⁸¹	
			Undisclosed	Nepal Government ⁸³	Nepal ⁸³	25 million ⁸³	
			Undisclosed	Egyptian Government ⁸⁴	Egypt ⁸⁴	25 million ⁸⁴	
Moderna	Phase 3 ¹	mRNA ¹	\$30/course ²⁴	U.S. Government ^{80,25}	U.S. ^{80,25}	100 million ^{80,25}	
			\$64-74/course ^{2,40}	European Union ²⁶	European Union ²⁶	80 million ²⁶	
			\$64-74/course ^{2,40}	Japanese Government ²⁷	Japan ²⁷	50 million ⁶³	Takeda Pharmaceutical ²⁷
			\$64-74/course ^{2,40}	Canadian Government ²⁸	Canada ²⁸	56 million ²⁸	
			\$64-74/course ^{2,40}	Switzerland ⁷⁰	Switzerland ⁷⁰	4.5 million ⁷⁰	
			\$64-74/course ^{2,40}	United Kingdom ^{76,77}	United Kingdom ^{76,77}	5 million ⁷⁷	
Sino Vac	Phase 3 ¹	Inactivated ¹	Undisclosed	Brazilian Government ²⁹	Brazil ²⁹	60 million ²⁹	
			Undisclosed	Indonesian Government ^{74,30}	Indonesia ^{74,30}	40 million ^{74,30}	
			Undisclosed	Chile Government ⁶⁶	Chile ⁶⁶	20 million ⁶⁶	
Pfizer/BioNTech	Phase 2/3 ¹	mRNA ¹	\$39/course ^{31,40}	U.S. Government ³²	U.S. ³²	100 million ³²	
			\$39/course ^{31,40}	UK Government ^{79,33}	UK ^{79,33}	30 million ^{79,33}	
			\$36.68/course ⁶⁷	European Union ³⁴	European Union ³⁴	200 million ³⁴	
			\$39/course ^{31,40}	Japanese Government ^{12,35}	Japan ^{12,35}	120 million ^{12,35}	
			\$39/course ^{31,40}	Canadian Government ^{28,36}	Canada ^{28,36}	20 million ^{28,36}	
			\$39/course ^{31,40}	Hong Kong and Macao Government ⁷¹	Hong Kong and Macao ⁷¹	10 million ⁷¹	
			\$39/course ^{31,40}	Australian Government ⁸⁵	Australia ⁸⁵	10 million ⁸⁵	
			\$39/course ^{31,40}	Israeli Government ⁸⁷	Israel ⁸⁷	8 million ⁸⁷	
			\$39/course ^{31,40}	Peru Government ⁸⁸	Peru ⁸⁸	9.9 million ⁸⁸	
			\$39/course ^{31,40}	New Zealand Government ⁸⁹	New Zealand ⁸⁹	1.5 million ⁸⁹	
			\$39/course ^{31,40}	Costa Rica Government ⁹⁰	Costa Rica ⁹⁰	3 million ⁹⁰	
			\$39/course ^{31,40}	Chile Government ⁹³	Chile ⁹³	10 million ⁹³	
Johnson & Johnson/Janssen‡	Phase 3 ¹	Non-replicating viral vector ¹	\$20/course ^{2,40}	U.S. Government ³⁷	U.S. ³⁷	100 million ³⁷	
			\$20/course ^{2,40}	UK Government ^{78,38,39}	UK ^{78,38,39}	30 million ^{78,38,39}	
			\$20/course ^{2,40}	European Union ⁴¹	European Union ⁴¹	200 million ⁴¹	
			\$20/course ^{2,40}	Canadian Government ^{28,42}	Canada ^{28,42}	38 million ^{28,42}	
Novavax	Phase 3 ¹	Protein subunit ¹	\$32/course ⁴⁰	U.S. Government ⁴³	U.S. ⁴³	100 million ⁴³	
			\$32/course ⁴⁰	UK Government ^{78,38,39}	UK ^{78,38,39}	60 million ^{78,38,39}	
			\$32/course ⁴⁰	Japanese Government ^{12,44,45}	Japan ^{12,44,45}	250 million ^{12,44,45}	

			\$32/course ⁴⁰	Canadian Government ^{28,42}	Canada ^{28,42}	76 million ^{28,42}	
			\$32/course ⁴⁰	Australian Government ⁶⁰	Australia ⁶⁰	40 million ⁶⁰	
			\$6/course ²⁰	--	LMICs, some doses to India ^{58,59} ****	1 billion ^{58,59}	Serum Institute of India ^{58,59}
			\$6/course ²⁰	Gates Foundation ^{18,19,20}	GAVI COVAX AMC Countries ^{18,19,20}	200 million split between AZ/Oxford and Novavax ^{18,19,20}	Serum Institute of India ^{18,19,20}
CanSino [‡]	Phase 3 ¹	Non-replicating viral vector ¹	Undisclosed	Mexican Government ^{72,64}	Mexico ^{72,64}	35 million ^{72,64}	
Medicago	Phase 2/3 ¹	Protein subunit ¹	Undisclosed	Canadian Government ⁶⁵	Canada ⁶⁵	76 million ⁶⁵	
Sanofi/GSK	Phase 1/2 ¹	Protein subunit ¹	\$42/course ⁴⁶	U.S. Government ⁴⁷	U.S. ⁴⁷	100 million ⁴⁷	
			\$42/course ⁴⁶	UK Government ^{77,48}	UK ^{77,48}	60 million ^{77,48}	
			\$42/course ⁴⁶	European Union ⁴⁹	European Union ⁴⁹	300 million ⁴⁹	
			\$42/course ⁴⁶	Canadian Government ^{28,50}	Canada ^{28,50}	72 million ^{28,50}	
CureVac	Phase 2 ¹	mRNA ¹	\$23.68/course ⁶⁷	European Union ⁵¹	European Union ⁵¹	225 million ⁵¹	
University of Queensland/CSL	Phase 1 ¹	Protein subunit ¹	Undisclosed	Australian Government ^{73,14}	Australia ^{73,14}	51 million ^{73,14}	
Valneva	Preclinical ¹	Inactivated ¹	Undisclosed	UK Government ^{69,52,53}	UK ^{69,52,53}	60 million ^{69,62,52,53}	

Note: All data are updated as of November 15, 2020.

*On November 23, 2020, AstraZeneca/Oxford published clinical results showing 90% efficacy when their vaccine candidate was given as a half dose, followed by a full dose at least one month apart. However, as more data are needed to support this dosing regimen, two doses per course were assumed for this vaccine for all calculations in this study. [Source: AstraZeneca. "AZD1222 vaccine met primary efficacy endpoint in preventing COVID-19." Press release, November 23, 2020. Available at: <https://www.astrazeneca.com/media-centre/press-releases/2020/azd1222hr.html>.]

** The European Inclusive Vaccines Alliance brings together France, Italy, Germany and the Netherlands in a partnership to secure enough COVID-19 vaccines for countries in the European Union and beyond. [Source: Government of the Netherlands. "France, Germany, Italy and the Netherlands working together to find a vaccine for countries in Europe and beyond." Press release, June 3, 2020. Available at: <https://www.reuters.com/article/us-health-coronavirus-vaccines-price/eu-governments-to-pay-750-million-euros-for300-million-doses-of-astrazeneca-vaccine-italy-idUSKBN23M1F0>.]

***Based on the announced U.S. deal with AstraZeneca to provide 300 million doses for \$1.2 billion, the per dose price of the AstraZeneca/Oxford University vaccine for the United States has been implicitly estimated at \$4 per dose, or \$8 per course [Loftus P, Covid-19 Vaccine Makers Signal Prices. *Wall Street Journal*, August 5, 2020. Available at: <https://www.wsj.com/articles/covid-19-vaccine-makers-signal-prices-11596648639>]. It has also been reported that the AstraZeneca/Oxford University vaccine is priced at about \$3-\$4 per dose [Mancini DP, AstraZeneca vaccine document shows limit of no-profit pledge. *Financial Times*, October 7, 2020. Available at: <https://www.ft.com/content/c474f9e1-8807-4e57-9c79-6f4af145b686>]. For purposes of the Sankey diagram visualization and Table S1, apart from the doses provided through the Serum Institute under the Bill and Melinda Gates Foundation or through the COVAX Facility, the per dose cost for the AstraZeneca/Oxford University vaccine has been assumed to be \$4 per dose, or \$8 per course.

**** Both AstraZeneca/Oxford University and Novavax have signed licensing agreements to scale production of their respective vaccines through the Serum Institute of India. Each of these licensing agreements comes to 1 billion doses. While these deals are not pre-market purchase commitments signed at a specific price, these deals were included here because they are signed agreements. It has been assumed that these doses, destined for use in low- and middle-income countries, would be made available at the ceiling price of \$3 per dose, or \$6 per course, set by the separate Bill and Melinda Gates Foundation grant with the Serum Institute of India for both of these manufacturers. However, this pricing information remains to be publicly confirmed.

† Vietnam reached a commitment for 50-150 million doses from the Gamaleya Research Institute. For calculations of vaccine doses per capita and manufacturing capacity calculations, the lower limit (i.e., 50 million) was used; however, the full range is listed here.

‡ The CanSino vaccine plans a one-dose per course regimen. The Johnson & Johnson/Janssen vaccine candidate is currently in trials as a one- OR two-dose course. For all calculations, two doses per course were assumed for the Johnson & Johnson/Janssen vaccine.

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Table S2. Vaccine doses reserved in pre-market purchase commitments compared against country population and COVID-19 cases

Country	COVID-19 cases ¹	Country Population ²	Reserved Vaccine Doses ³
World	54,296,615	7,674,000,000	7,481,100,000
United States	11,022,584	328,239,520	800,000,000
United Kingdom	1,372,884	66,834,400	345,000,000
European Union	9,256,496	447,512,040	1,605,000,000
Japan	118,601	126,264,930	540,000,000
Canada	299,246	37,589,260	358,000,000
Australia	27,711	25,364,310	134,800,000
Brazil	5,848,959	211,049,530	210,000,000
Indonesia	467,113	270,625,570	140,000,000

Note: All data are updated as of November 15, 2020. Data from this table were used to make the calculation that the United States has reserved 800M doses, but accounts for a fifth of all COVID-19 cases globally, while Japan, Australia, and Canada have collectively reserved more than 1B doses and do not account for even 1% of current global COVID-19 cases globally.

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[3] The number of reserved vaccine doses represents the total from pre-market purchase commitments from the vaccine manufacturers, by country, identified in **Table S1.** COVID-19 Vaccines: Key Characteristics of Pre-Market Purchase Commitments.

Table S3. Per capita COVID-19 vaccine courses

Country	Reserved Vaccine Courses ¹	Country Population ²	Per Capita Reservations ³ In Courses
World	3,740,550,000	7,674,000,000	0.49
Canada	179,000,000	37,589,260	4.76
Australia	67,400,000	25,364,310	2.66
United Kingdom	172,500,000	66,834,400	2.58
Japan	270,000,000	126,264,930	2.14
European Union	802,500,000	447,512,040	1.79
United States	400,000,000	328,239,520	1.22
Brazil	105,000,000	211,049,530	0.50
Indonesia	70,000,000	270,625,570	0.26

Note: All data are updated as of November 15, 2020. All of the vaccine candidates identified in Table 1 are undergoing clinical testing as two-dose courses, except CanSino which has a one-dose course regimen. Johnson & Johnson/Janssen is undergoing clinical testing for one-dose or two-dose course application, but in this analysis, is being counted as a two-dose per course regimen.

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[1] The number of reserved vaccine doses represents the total from pre-market purchase commitments from the vaccine manufacturers, by country, identified in **Table S1.** COVID-19 Vaccines: Key Characteristics of Pre-Market Purchase Commitments.

[2] 2019 World Bank Population, as of November 15, 2020. Available at: <https://data.worldbank.org/indicator/SP.POP.TOTL>

[3] Displayed in doses and calculated by the given formula:

$$\text{Per capita reservations in courses} = \frac{\text{Reserved vaccine courses}}{\text{Country population}}$$

Table S4. COVID-19 vaccine projected manufacturing capacity, by company, by the end of 2021

Company	Projected Manufacturing Capacity by end of 2021 (in courses)	Reserved Courses ¹	Remaining Manufacturing Capacity (in courses) ²
AstraZeneca/Oxford*	1,500,000,000 ³	1,610,600,000	-66,900,000
Novavax	1,000,000,000 ⁷	813,000,000	187,000,000
Pfizer/BioNTech	650,000,000 ⁵	261,200,000	388,800,000
Sanofi/GSK	500,000,000 ⁸	266,000,000	234,000,000
Johnson & Johnson/Janssen	500,000,000 ⁶	184,000,000	316,000,000
Moderna	500,000,000 ⁴	147,750,000	352,250,000
SinoVac and CanSino+ **	805,000,000 ¹⁰	95,000,000	710,500,000
Gamaleya Research Institute	250,000,000 ⁹	174,500,000	75,500,000
CureVac*	150,000,000 ¹²	112,500,000	37,500,000
Medicago	50,000,000 ¹¹	38,000,000	12,000,000
University of Queensland/CSL	50,000,000 ¹³	25,500,000	24,500,000

Note: All data are updated as of November 15, 2020. Projected manufacturing capacity by the end of 2021 are based on publicly available, company-based estimates assuming successful regulatory approval, scale-up and demand for the company’s vaccine candidate. Reserved courses refer to publicly known, pre-market purchase commitments as of November 15, 2020. Total projected manufacturing capacity is 5.96B courses, and total remaining manufacturing capacity is 2.36B courses.

* For AstraZeneca/Oxford, the number of reserved vaccine courses exceeds the projected manufacturing capacity by the end of 2021. Limited transparency of these arrangements and uncertainties over the speed of introduction and scale-up of these COVID-19 vaccine candidates do not make it possible to know whether these reserved courses have been promised to be delivered by the end of 2021 or whether the projected manufacturing capacity announced by each company is just a ballpark figure.

** Multiple firms based in China are bringing forward COVID-19 vaccine candidates. Only two—SinoVac and CanSino—have pre-market purchase commitments of publicly known volumes. However, China’s National Health Commission has announced plans of producing 610 million doses by the end of 2020 and at least a billion doses annually by the end of 2021. This combined figure for 2020 and 2021 COVID-19 vaccine production was used in this study’s calculations.

References:

[1] The number of reserved vaccine doses represents the total from pre-market purchase commitments from the vaccine manufacturers, by country, identified in **Table S1. COVID-19 Vaccines: Key Characteristics of Pre-Market Purchase Commitments.**

[2] Displayed in courses and calculated given by the given formula:

$$\text{Remaining manufacturing capacity in courses} = \text{Projected manufacturing capacity} - \text{reserved courses}$$

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