ARMING THE NATION

CANADA'S INDUSTRIAL WAR EFFORT 1939-1945

A PAPER PREPARED BY
DR. J. L. GRANATSTEIN FOR THE
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In the course of the Second World War, Canada's factories, mines, and fields produced billions and billions of dollars worth of goods and foods to support the war effort. The nation created and produced more than Canada's million men and women in uniform needed to fight and win, so arms, equipment, food, minerals and metals were sold or, if our Allies did not have the money to pay, given away for the cause of victory. This was an astonishing feat of production and organization, a massive effort by every sector of the Canadian economy and by Canadian workers and business leaders. Canadians won the economic war, and their efforts from 1939 to 1945 also ensured that the postwar years would be very different than the bleak decade that had preceded the war.

Canada was a small and weak country in 1939. The Gross National Product, the sum total of all the goods and services created by the population of 11.2 million Canadians, was only $5.6 billion. The federal government's expenditures in 1939 were only $680 million, and Canadian corporations paid only $115 million in taxes while income taxes generated only an additional $112 million.

Unemployment remained very high, though down from the worst years of the Great Depression.[1] There were still hundreds of thousands on relief and men who continued to "ride the rods" across the country, seeking work at a time when jobs were few. The nation's mines produced metals and minerals—gold, copper, zinc—and the factories produced automobiles, trucks, steel, durable goods and clothing; most heavy industrial goods were imported, and even the auto sector relied heavily on American motors. Moreover, there were almost no munitions

[1] There are no wholly reliable unemployment data for the 1930s, but in 1933, generally judged to be the worst year of the Depression, there were 2.2 million Canadians with non-farm jobs; in 1938, the last full year of peace, there were 2.7 million men and women so employed. By contrast in 1943, with hundreds of thousands serving in the military, there were 3.37 million civilians employed in Canada in non-agricultural work. In 1943, the Unemployment Insurance Commission, created two years before and collecting hard data, reported that only 62,000 Canadians were listed as unemployed.

plants in that last year of peace. There was only a small federally-owned arsenal in Quebec City (that primarily made limited quantities of small arms ammunition) and a subsidiary plant in Lindsay, Ontario, re-opened in 1937. The British government just before the war started had placed a small contract with Marine Industries Limited of Sorel, Quebec, to make one hundred 25-pounder artillery field guns. There were a few tiny aircraft manufacturers that produced airplanes on an almost piecework basis (in 1933, no aircraft were produced in Canada; in 1938, 282 worth $4 million). In Toronto, the John Inglis Company in March 1938 had won a contract to build seven thousand Bren light machine guns for the Canadian military and five thousand for Britain—through a contracting process that produced cries of scandal and resulted in a Royal Commission to investigate. Perhaps the Bren Gun fiasco had something to do with the cancellation of the order placed by the United Kingdom in Canada for one hundred Bren Gun tracked carriers, an order extraordinarily ended by London just *after* the outbreak of war.

Nor was there much of a legacy from the industrial war effort of the Great War of 1914-1918. The British government then had arranged its own procurement in Canada through the Imperial Munitions Board, and the Dominion had produced mainly artillery shells, an effort that had proved difficult enough and one which had generated a succession of scandals and many production failures, eventually resolved. In all, the industrial effort had generated a billion dollars worth of munitions, a figure then seen as huge. The country's shipyards had built some small ships and a few aircraft factories produced tiny numbers of "flying machines". But the main effort had come in the form of shells, automobiles, and the produce of the fields and mines.

Few in the dark years of the Depression believed, should there be another war, that Canada could do much more. There had been a "Survey of Industry" in 1936, the first full-scale attempt to catalogue what resources Canada might have for war production. But the difficulty was that few Canadians in government or industry could

foresee the creation of war industries in Canada if only the Canadian forces were to be equipped. British orders were needed to make the creation or re-tooling of factories economical and, the British order for Bren guns aside, orders for Britain's armed forces almost always went only to British firms. Nor were there prospects of orders from the United States—America was neutral in word and deed and its small armed forces used different patterns of military equipment.

Partly as a result of the Bren Gun affair, the Liberal government of Mackenzie King in June 1939 had passed the "Defence Purchasing, Profits Control and Financial Act" which aimed to control profits and the costs of defence contracts. Profits could not exceed 5 percent, a stipulation that meant that soon after the war began, C.D. Howe, the Minister of Transport, told the House of Commons that Canada had not managed to place a single contract. The Act had also created the Defence Purchasing Board to coordinate purchases, and in its short life (July 14 to October 31, 1939) the Board managed to buy only $43.7 million worth of goods, with three-quarters of the orders placed after Nazi Germany had invaded Poland in September 1939 and Britain and France had declared war against the Hitler regime on September 3; Canada had followed with its own declaration of war one week later.

One of the first casualties of the Second World War was this system of profit controls, quickly repealed so that war orders could be placed. A second casualty was the Defence Purchasing Board itself, replaced on November 1, 1939 by the War Supply Board, led by Wallace Campbell, the president of the Ford Motor Company of Canada. Initially, the new Board fell under the control of the Finance Minister, but in mid-November, in a fateful and fortunate move, the Board came under the ambit of the Minister of Transport, the just-named Minister of Munitions and Supply, Clarence Decatur Howe. Howe had no department as yet, only a title. But when the War Supply Board was swallowed by the new department on April 9, 1940, just days after the King Liberals' election victory, Canadian war production had found its czar.

Howe was American-born, a graduate of the Massachusetts Institute of Technology, a former engineering professor at Dalhousie University, and a man who had made himself rich by constructing grain elevators throughout the west. In 1935, he had won election to Parliament from Port Arthur, Ontario as a Liberal, and he instantly went into Mackenzie King's Cabinet. Tough, blunt, familiar with business and the men who ran it, Howe proved to be the right minister to lead the nation's wartime industrial mobilization.

But even Howe could do little until the urgency of war began to drive matters. The Nazi invasion of Denmark and Norway was quickly followed by the stunning victory of the Wehrmacht in the Low Countries and France. The Dunkirk evacuation at the end of May 1940 was the only grace note in the requiem for the European democracies. But now, at least, the financial concerns that had crimped British armaments orders in Canada and restrained Ottawa's own purchases were gone. In April 1940, $11.6 million in contracts were placed; in May $31 million; in June $45 million; in July $82 million; in October 1940 $148 million. Both London and Ottawa wanted everything now, right now. The dollar no longer reigned; the idea that Canada would fight a "limited liability" war had disappeared, a casualty of the Hitlerian blitzkrieg.

Howe set out to seize the initiative. He began to look to Canadian business for executives who could step in to organize and galvanize war production and allocate scarce commodities. He expected their employers to pay their salaries, and he offered nothing beyond a dollar a year, only expenses; many of those he brought to Ottawa declined to take their expenses at all. The "dollar a year men," as they quickly became known, were the cream of Canadian business, men like H.J. Carmichael of General Motors, R.C. Berkinshaw from Goodyear Tire and Rubber, Henry Borden, a powerful corporate lawyer from Toronto, E.P. Taylor, a Toronto businessman and brewery owner, H.R. MacMillan, the British Columbia lumber giant, and W.C. Woodward, the West Coast department store owner. There were many more—a

parliamentary return in late February 1941 noted that 107 dollar a year men were employed across the government; Howe's department with its array of executives, accountants, and lawyers had by far the most. There would be many more as the war went on.

The Department of Munitions and Supply had control over all orders placed by Britain in Canada, soon had similar sway over a re-arming United States' orders, and, of course, controlled all Canadian orders. The Act that had created the department was amended by Parliament in August 1940, giving Howe the power to "mobilize, control, restrict or regulate to such extent as the Minister may, in his absolute discretion, deem necessary, any branch or trade or industry in Canada or any munitions of war or supplies." Moreover, the amended Act gave Howe exclusive power to buy, manufacture or produce munitions and supplies required by the Department of National Defence. Howe was in charge, the one man directing the Canadian industrial war effort. And Canada was the only Allied nation that had one agency handling all war procurement. There was no competition for scarce supplies between the armed forces. The Cabinet and Howe decided, and Howe's voice was the clearest in the decisions.

Howe and his men did everything in a hurry. As his biographer, historian Robert Bothwell, noted, "There was no time to consider production programs in detail. No one could hope to know when production would actually come on stream—merely that a commitment to production must be made, often orally, and ratified with government dollars." Munitions and Supply offered loans and grants, it purchased licenses to permit Canadian production of foreign-owned weapons and equipment, and it helped secure the British and American experts to let Canadian firms get up and running. This was usually sufficient to get detailed planning underway; getting the actual armaments produced was more difficult.

Canadian industry was small and slow, plant was often obsolete, machine tools were scarce, and skilled workers in short supply. Howe's

production chief, Harry Carmichael who had come to Ottawa from his post as Vice-President of General Motors, had the answer—sub-contracting. The lead firm could likely produce a few artillery pieces a month, for example, if it worked on its own. But if it could get carefully machined parts from other smaller plants across the country that could be screwed into place at the main shops, production could be stepped up. That was how the big automobile plants worked, Carmichael said, so why couldn't the same methods be employed in building artillery or ships or aircraft? It required planning and control, a careful allocation of scarce materials, and a high level of inspection to ensure that the requisite quality was maintained, but it could be done. Yes, it was a "bits and pieces" program, just as Howe called it. But it worked and, moreover, it spread wartime jobs across the country and not just in central Canada. That was a political necessity if complaints from the Maritimes and the West that Ontario and Quebec received all the jobs were to be dealt with. "Will Saskatoon get its share [of jobs]?," election campaigners asked in a 1939 by-election. In fact, Saskatoon and virtually every city and province did.

There were inevitable bottlenecks and failures, of course, but one way around them was to create Crown corporations. There was a shortage of rubber? Set up a Crown company to produce synthetic rubber. Wood veneers for aircraft were in scarce supply? A Crown corporation could do the job. Machine tools? Howe's Citadel Merchandising could get them and make sure they went where they were most needed. In all, 28 Crown corporations came into being during the war, some manufacturing, some purchasing and distributing, others supervising and controlling. The establishment of Crown companies, operating with great flexibility outside the usual bureaucratic restraints, allowed for efficiencies. Even so, Howe and his advisers believed that private enterprise was inherently more efficient than government-run operations. The Second World War made the government—or at least C.D. Howe's part of it—operate much like a corporation. The state helped with plant expansion and re-tooling, and corporate Canada itself put its money into wartime growth. It had to—more than half of

Canadian war production came from plants that had not existed in 1939. In 1939, some $3.65 billion had been invested in the country's factories. Four years later, capital invested was $6.3 billion, a huge jump. Much of that was government money, but because Howe and his controllers ran what the press called "a graftless war," one almost wholly without patronage and preferment, there were relatively few complaints.

But there were some, and not everyone was happy. H.R. MacMillan was Howe's Timber Controller, and by the end of 1940, he had become displeased with the minister's management style and with what he saw as the bloated, confused bureaucracy of Ottawa. Munitions and Supply needed to be run in a business-like fashion—by him?--if war production was to get moving properly. But to the B.C. tycoon's surprise, few listened to MacMillan, and he found himself effectively isolated within Munitions and Supply where all of the other dollar a year men understood that the sleeping giant that was Canadian production required time to get moving. MacMillan left Ottawa later in 1941, just as production in Canada began to get untracked, and went to Montreal where a charitable Howe put his undoubted talents to work as president of Wartime Merchant Shipping, charged with the task of building cargo ships. He proved hugely successful in that role.

MacMillan's were not the only complaints. The social-democratic left in Canada, just beginning to sprout during the hothouse atmosphere of war, worried about the ways in which Howe's men were doing business. T.C. Douglas, the Cooperative Commonwealth Federation Member of Parliament from Weyburn, Saskatchewan, said in July 1942 that "Instead of government taking over industry, industry has taken over government." Canada needed, Douglas said, to be able to get its government back again. There was some truth in Tommy Douglas' complaints, but only some.

Certainly, Canadian business was paying its full share of the war's costs, for one thing. Business contributed billions of dollars to Victory Loans, helping the government finance the war—for interest rates that ranged from 1.5 to 3 percent. Corporation taxes had increased from a rate of 18 to 40 percent, generating $636 million—or nearly half of all corporate profits—in 1943 and $850 million the next year. Excess profits taxes produced even more revenue. Profit on government contracts was limited to 10 percent, and all profits in excess of 116 2/3 percent of standard profits (the average of an individual corporation's profits for the lean years from 1936 to 1939) were taxed at 100 percent by 1942. In 1945, this generated $466 million. Corporations, however, could claim double depreciation against taxes for plant renovations, machinery acquisition, and other expenses, and they were to receive a 20 percent rebate on their excess profits taxes after the war, a conscious attempt to help in the eventual reconversion to peacetime production. "No great fortunes," Finance minister J.L. Ilsley said in 1941, "can be accumulated out of wartime profits." H.R. MacMillan said the same thing in a speech to British Columbia lumbermen: "We must kill off that hangover from the last war—great profits. There can be no profits in this war to capitalists, labour or anyone else. Instead, there will be a sharing of losses."

For most Canadians working in war industry, in fact, there were gains. Average wages increased dramatically, rising from $956 in 1938 to $1525 in 1943. There was as much overtime as people wanted, and many worked fifty or even sixty hours a week. Families that had struggled to keep one breadwinner employed in the Depression years now had a son in the army and two, three, or more family members bringing home good pay cheques each week from factory work. The government's National Selective Service system controlled where people could work in an economy struggling to find enough workers for factories and men for the army, navy, and air force, and the flood from small town and rural Canada into the urban factories was enormous, not least the huge numbers of women who went to work for the first time. By 1943, 261,000 women were employed in war factories and

making almost equivalent wages to male workers. The growth in wages across the country, moreover, outstripped inflation, thanks to the federal government's wage and price control system. And wartime Canadians ate better and spent more, despite rationing and controls, than they had in the 1930s.

No one begrudged the improvements in wages and living standards. What mattered most during the war years was victory and victory could only be won through the efforts of fighting men. Their triumph demanded production and more production. Canada delivered the goods, producing 40 percent of Allied aluminum and 95 percent of the nickel. It mined 75 percent of the asbestos, 20 percent of the zinc, 12 percent of the copper, and 15 percent of the lead. Very simply, without the aluminum provided by the Dominion, the Royal Air Force could not have fought the war. At the same time, in great secrecy, Howe secured majority control for the government of Eldorado Gold Mines Limited, the sole producer of uranium under Allied control (other than the more inaccessible Belgian Congo) from a mine at Great Bear Lake in the North West Territories and a refinery at Port Hope, Ontario. Whether or not Canadian uranium was used in the atomic bombs that brought the war with Japan to an end and the world into a new era is uncertain; what is beyond doubt is that Canadian uranium played a key role in the research and development of the bomb. Canada's raw materials, $5.8 billion in all produced from 1939 to 1945, made an extraordinary contribution to victory.

At the same time, Canada produced an array of military equipment, its war production overall ranking fourth among the Allies, behind only the United States, the United Kingdom, and the Soviet Union. For a nation of just 11 million people, this was little short of amazing. The orders, for example, went out for Anson aircraft so that training under the British Commonwealth Air Training Plan could speed up, with $58.4 million provided for this in December 1940. Canadian firms could build the airframes but none could manufacture the engines which had to be imported. In 1941 only 88 Ansons came off the lines; in 1942, total

production had risen to 1432; and by the end of 1943 to 2269. The story was much the same for other aircraft types, Canadian firms producing 1451 Hurricane fighters, 894 Curtiss Helldivers, more than a thousand DeHavilland Mosquitos, 676 giant Catalina flying boats, 2000 Harvard and 2800 Cornell trainers. More than 16,400 aircraft in all were produced in Canada by 116,000 workers of whom more than 30,000 were women. It was a massive, hugely successful effort even if the engines had to be brought into the country or installed in aircraft once the airframes reached Britain or the United States, all the more so for beginning from a standing start.

But sometimes Howe and his men could overreach Canada's productive capacity. The Minister had agreed in September 1941 that Canada would build 15 Lancaster heavy bombers a month beginning in 1943 at the Malton, Ontario plant of what became Victory Aircraft, a Crown corporation. The Lancs would go to the Royal Canadian Air Force's No. 6 Bomber Group, based in Yorkshire, England. But the huge aircraft were complex, and there were a succession of management, labour, and equipment problems that slowed production (and led to Howe's turning the plant into a Crown corporation). The first Canadian-made Lancaster, the *Ruhr Express*, it was dubbed, took part in a raid in November 1943, but no others saw service until March and April 1944. By V-E Day, only three RCAF squadrons had the Canadian-made bombers. Even so, Victory Aircraft produced 450 Lancs all told, exceeding Howe's promised production rate.

The story was very similar for naval and merchant ship construction. At the beginning of the war, the Canadian shipbuilding industry was tiny with only some 2000 skilled workers employed. There were four shipyards with a total of only nine berths capable of handling a 10,000 tonne vessel. The first such cargo ship was delivered in December 1941. Two years later, there were 38 berths and 70 yards (and by the war's end 90 yards), and H.R. MacMillan's Wartime Merchant Shipping was turning out three 10,000 tonne merchant ships a week. One cargo ship, the *SS Fort Romaine* was built from scratch in just 58 days in the

summer of 1943. In all, Canada produced 410 merchant ships, as well as an array of boilers, generators and other marine equipment. MacMillan's empire at its peak employed almost a hundred thousand men and women, while over 300 Canadian firms were involved in the supply of everything from steel plate to rivets to engines.

The growth was as rapid in naval construction which eventually employed some 30,000 workers. The first orders for corvettes, the Royal Canadian Navy's main anti-submarine and convoy escort vessel, were placed in February 1940 and the first ten keels were laid that month. By the end of the year, 44 corvettes had been launched and an even dozen were manned. In all, 206 corvettes were built in Canada, most on the east and west coasts but many in Great Lakes ports and on the St Lawrence. At the same time, Canadian yards built frigates and minesweepers, tugs and landing craft, motor torpedo boats, patrol boats, and Tribal class destroyers. The last class of ships, greatly desired by the Navy, was the shipbuilding equivalent of the Lancaster, a step too far.

Half as big again as the destroyers with which the RCN began the war, the Tribals were heavily armed and fast, almost as powerful as a light cruiser. The Navy secured four such destroyers from the Royal Navy (*Haida, Athabaskan, Huron,* and *Iroquois*), but it wanted more and, late in the war, it secured Munitions and Supply's permission to build four Tribals in Halifax yards. It was a quantum leap forward from constructing corvettes and frigates to building Tribals and, while they were completed, none was in the water and crewed before the war against the U-boats had ended on V-E Day, May 8, 1945.

For army equipment, the equivalent to the Lancaster and Tribals story was the Ram tank. The Nazi blitzkrieg had demonstrated the superiority of the Germans' *panzers*, and the British, Canadians, and Americans scrambled to find something better than the weak, slow, under-armed tanks with which they had begun the war. The army's two armoured divisions and two armoured brigades needed tanks, and the

Montreal Locomotive Works received Howe's authorization to set up a tank factory to manufacture an American-designed tank, the M-3 Grant. But the Grant had a fixed gun, and Canadian armoured specialists recognized this as a flaw. Instead, Canada would manufacture a modified Grant with its gun on a revolving turret, thus giving it a 360 degree range of fire and a lower silhouette. The prototype of the Ram, with its engines imported from the United States, was ready in the summer of 1941. The story is long and complicated but, while almost two thousand Rams eventually came off the lines, the lengthy production time, engineering and armour plate problems, and the relatively high costs guaranteed that the Ram was superseded by the American-made Sherman, soon designated as the Allies main tank. The Sherman was much superior to the Ram (though much inferior to German Tiger and Panther tanks), and U.S. productive capacity simply swamped the potential of the Montreal factory. The Rams nonetheless equipped Canada's armoured divisions until they acquired Shermans, and the Canadian-made tanks ended the war converted into Kangaroos, the first armoured personnel carriers.

If the Ram experience showed the limitation of Canada's heavy industry, the Canadian and Allied armies were huge beneficiaries of the production of the nation's factories. The major contribution—indeed, arguably Canada's biggest industrial contribution to victory—was in the form of trucks, most particularly Canadian Military Pattern vehicles. These CMP vehicles, produced in huge numbers by Ford and General Motors (along with some 180,000 military versions of Chrysler's D60 truck model), came in a bewildering variety. There were three types of wireless trucks, four of ambulances, thirteen of field workshop vehicles, and 90 types of army vehicles on twelve different chassis. In all, Canada's General Motors, Ford, and Chrysler auto plants produced 815,729 military vehicles that equipped the Canadian and British Commonwealth armies. Britain's Eighth Army, fighting in North Africa and Italy, used huge numbers of CMP vehicles.

Other than the Ram, the only tanks Canada produced in quantity were Valentines, a small, lightly-armed and weakly-armoured tank. Many of the 1420 Valentines, made in the Canadian Pacific's shops in Montreal, went to Britain; some went to the Soviet Union's Red Army.[2] Howe's department also had built 188 Grizzlies, a Sherman variant; more significantly, Montreal's factories turned out 2150 self-propelled 25-pounder guns, a major contribution to Allied firepower. Other factories made armoured cars, scout cars, fire trucks, and universal carriers, the ubiquitous Bren Gun Carrier used by British and Canadian forces. Still others produced weapons large and small—field artillery, heavy anti-aircraft guns, anti-tank weapons, mortars, machine guns, and rifles.

Does it overstate matters to suggest that the British army ran on Canadian vehicles? Yes and no. Large as it was, Canadian war production amounted in all only to ten percent of the total of British Commonwealth production. On the other hand, only 34 percent of Canadian war production was used by the Canadian services, while 53 percent went to the British and Commonwealth nations, 12 percent to the United States, and one percent to other Allied states. In all, Canadian wartime industrial production was valued at more than $9.5 billion in 1940s dollars (the equivalent in today's dollars would be more than $100 billion). Another $1.5 billion was spent on defence construction and the expansion of war plants, all paid for by the government. For a nation that had begun the war with a Gross National Product of $5.6 billion, this was incredible. That Canada's GNP in 1945 was $11.8 billion, more than double the total six years before, is accounted for in large part by the extraordinary production of the nation's war factories and mines.

[2] The Canadian War Museum in Ottawa has a Canadian-made Valentine tank which was recovered long after the end of the Second World War from a bog in Ukraine near the town of Telepino into which it had sunk in an offensive in January 1944. It was acquired by the Museum in 1991-92 in return for a donation of medicines and other items.

On June 12, 1943, the *Globe and Mail* printed a chart showing one week's production from Canada's factories. Each week, the newspaper noted, 900,000 Canadian workers, men and women, made at least six vessels, 80 aircraft, 4000 motor vehicles, 450 armoured fighting vehicles, 940 heavy guns, 13,000 smaller weapons, 525,000 artillery shells, 25 million cartridges, 10,000 tons of explosives, and at least $4 million dollars worth of instruments and communications equipment. It was not until 1944 that Canada reached its peaks in production, so there was more to come. That almost none of these weapons, ammunition, and equipment had been produced in Canada in 1939—that very few in fact were even capable of being produced--is an indication of just how effective Canada's wartime industrial mobilization had been.

Just as striking, the federal government—and not least C.D. Howe who became the Minister of Reconstruction in 1944—actively worked to ensure that the industrial economy was able to make the conversion from war to peace. There were jobs for returning veterans, and soon there were new houses, refrigerators, baby carriages, and clothing for those men and women who had won the war overseas and in the factories of Montreal, Toronto, and Saskatoon and fifty more cities and towns.

The workers of Canada, the Canadian people, and C.D. Howe and his dollar a year men had won the industrial war, they had changed Canada, and they had ensured that the postwar nation would be stronger and more prosperous than it had ever been before the war.

(J.L. Granatstein has written extensively on Canada and the Second World War. He was Director and CEO of the Canadian War Museum from 1998-2000.)

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