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Limiting Attacks on Dual-Use Facilities Performing Indispensable Civilian Functions*

Henry Shue† & David Wippman‡

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Introduction

The Law of Armed Conflict (LOAC) is necessarily an uneasy compromise. If the LOAC prohibited everything necessary to the effective conduct of warfare, it would simply be ignored and would quickly fall into disuse. On the other hand, if it allowed whatever most contributes to victory, it would be pointless and would add nothing to good strategy. At either extreme, excessive stringency or excessive permissiveness, the LOAC would fail to accomplish its goal of limiting war while permitting conduct that contributes to victory. In this uneasy compromise some find the genius of the LOAC; others find its disgrace. We will not address here whether the LOAC overall is too stringent or too permissive.¹ Instead, we will focus on one particular, but crucial, issue on which the LOAC is sometimes given an interpretation permissive enough to defeat one of its essential purposes. Specifically, the provisions of Protocol I of the Geneva Conventions² pertaining to attacks on military objectives are sometimes read in a way that

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1. This is briefly discussed in Henry Shue, *War* in THE OXFORD HANDBOOK OF PRACTICAL ETHICS 734-61 (Hugh LaFollette ed., 2003). For a more in depth discussion, see generally A.J. COATES, THE ETHICS OF WAR (1997); MICHAEL WALZER, JUST AND UNJUST WARS (3d ed., 2000).

2. Protocol Additional to the Geneva Conventions of Aug. 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts, *opened for signature* Dec. 12, 1977, 1125 U.N.T.S. 3, *reprinted in* 16 I.L.M. 1391 (1977) (entered into force Dec. 7, 1978) [hereinafter Protocol I].

undermines what is arguably the single most significant principle for the conduct of war—the principle of discrimination.³ The thesis of this article is that a less permissive reading better maintains the coherence of the LOAC as a whole.⁴

The principle of discrimination is the most important restriction on damage to civilians and civilian property during warfare. A central expression of the principle of discrimination in Protocol I appears in Article 51(4), which provides that: “[i]ndiscriminate attacks are prohibited. Indiscriminate attacks are: (a) those which are not directed at a specific military objective; . . . and consequently, in each such case, are of a nature to strike military objectives and civilians or civilian objects without distinction.” This principle of discrimination is supplemented by an additional but elusive principle of proportionality. Article 51(5)(b), which pertains to indiscriminate attacks, and Article 57(2)(b), which pertains to required precautions in attack, state that even attacks directed at specific military objectives are impermissible if they “may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.”

A decision-maker considering the legality of attacking a particular target must therefore consider first whether the target is a military objective, and second, whether an attack on that target, even if it is a military objective, will be proportionate. Our argument is that, as currently interpreted, the law applicable to these decisions unduly favors military efficiency over protection of the civilian population when the object in question can simultaneously serve military and civilian functions. We first examine the definition of a military objective, and then look at the proportionality calculus.

I. Defining Military Objectives

Protocol I largely separates its discussion of attacks upon persons from its discussion of attacks upon objects. Articles 50 and 51 define and prohibit attacks upon “civilians” and the “civilian population.”⁵ Article 51 also contains a two-step expression of the general principle that attacks are only permissible on military objectives. First, indiscriminate attacks are prohibited, and second, attacks not directed at specific military objectives are defined as indiscriminate. Article 52(2) specifies which objects are “military objectives.” After repeating the prohibition against attacks on

3. See Protocol I, *supra* note 2. As of November 1, 2002, 159 states were party to the Protocol.

4. For a splendid overview of the cluster of issues about civilian infrastructure, of which the issue discussed here is a member, see Ward Thomas, *Going Downtown: Civilian Infrastructure as a Target in Air Campaigns*, Paper Prepared for the Annual Meeting of the American Political Science Association (Aug. 30, 2002) (on file with authors).

5. These Articles are found in Part IV, Chapter II, of the Protocol which contains the provisions for the protection of “civilians and civilian population.” See Protocol I, *supra* note 2, at arts. 50-51.

anything not fitting the definition of a “military objective,” Article 52(2) provides the crucial definition:

Attacks shall be limited strictly to military objectives. In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose, or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.

The definition of military objective in Article 52(2) consists of two parts. The first part limits military objectives to objects making an effective contribution to military action. The second part introduces a further restriction that applies even to objects that satisfy the first part of the definition. We simply want to note the significance of the further restriction before turning our attention to the first part of the definition. What we are calling the second part of Article 52(2) is the following portion: “and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage.” This language establishes an additional requirement of situational relevance. Even an object that makes an effective contribution to military action may nevertheless fail to qualify as a military objective if, in the specific situation, its “destruction, capture or neutralization” would not offer a definite military advantage. In other words, even objects with the general characteristics of a military objective do not qualify to be attacked if, in the concrete circumstances holding then and there, destroying them would provide no “definite military advantage.”

For example, a heavy bridge that would enable tanks to cross into a combat area on the other side of a river would generally qualify as a military objective under the first part of the paragraph. However, if in fact no combat is occurring or is likely to occur in the area to which the bridge leads, then the bridge may not be destroyed simply because it is the kind of object whose destruction could hypothetically be militarily advantageous. To be a military objective under Protocol I, it must be the case that its destruction would provide a definite military advantage in the actual circumstances. Further, the military advantage must be real, not merely theoretical. Otherwise, an adversary force could simply range around a country destroying all its bridges and thus wreaking indiscriminate destruction upon civilian objects. We recognize that this additional requirement of situational relevance significantly restricts the range of objects that may permissibly be attacked.⁶ In this article, however, we

6. The additional restriction is significant enough to have aroused opposition from within the U.S. Air Force. See Jeanne M. Meyer, *Tearing Down the Facade: A Critical Look at the Current Law on Targeting the Will of the Enemy and Air Force Doctrine*, 51 A.F. L. REV. 143 (2001). Major Meyer argues that the second requirement in Protocol I art. 52(2) would, if it had been authoritative during World War II, have prohibited the Allied bombing at Pas de Calais as a ruse to divert defensive forces from Normandy prior to the Allied landing there. See *id.* at 169-70. Major Meyer reasons that the bombing at Calais produced “little immediate military advantage” in the sense required by “restrictive” interpretations of Article 52(2) since the actual landing was at Normandy. *Id.* While line-drawing problems will always arise in such cases, it seems clear that the fore-

restrict ourselves to issues about the permissiveness of the general definition in the first part of paragraph 52(2).

Article 52(1) states that: “[c]ivilian objects shall not be the object of attack or of reprisals.” The object of attack is the target or what is aimed at as distinguished from what is in fact struck, which may of course be different. The “object of attack” refers to what in moral terminology would be stated in terms of “intention.” Civilian objects shall not be intentionally attacked, one ought not to intend to destroy or damage them (moral requirement), and one shall not aim at them, that is make them “the object of attack or of reprisals” (legal requirement).⁷ The legal requirement does not, perhaps, fully make sense unless one tacitly presupposes the moral requirement. Why does it matter what is the object of attack? Because the choice of the object is the expression of what one intends to destroy or damage, and it is of great (moral) significance what one does intentionally and what one does unintentionally.

In any case, the primary difficulty arises with regard to “dual-use” facilities. “Dual-use” refers not simply to two uses, but to two kinds of uses, namely civilian and military. The difficult cases arise when the two kinds of uses are simultaneous rather than alternative; in other words not when a facility sometimes serves civilian purposes and sometimes serves military purposes, but rather when it continuously serves both civilian purposes and military purposes. While the label “dual-use” is relatively recent, objects and facilities meeting this definition have always existed. For example, a bridge that is capable of allowing a farmer to truck produce across a river to the market and that is also capable of allowing a tank to cross is a dual-use object. One use is civilian (products to market) and one use is military (tanks to battle). Currently the label “dual-use” is primarily applied to essential infrastructure such as electricity-generating installations and oil-refining facilities that simultaneously serve civilian and military purposes.

Protocol I does not use the term “dual-use” or refer explicitly to dual-purpose facilities or objects. However, the definition of military objective in the first part of Article 52(2) can be read to classify every dual-use facility as a potential military objective. This reading is the object of our concern, because it is extraordinarily permissive in the bombing that it allows. According to this permissive reading of Article 52(2), if an object by virtue of its “nature, location, purpose or use make an effective contribution to military action,” and its destruction under the circumstances “offers a definite military advantage,” then the object becomes a legitimate military objective. No attention need be paid to that object’s contribution to civilian life. Strictly speaking, its civilian function does not figure into whether the

seeable military advantage of bombing at Calais was the reduction in the forces positioned at Normandy and that Article 52(2) would, if it had been in force, have been fully satisfied. See MICHAEL BOTHE ET AL., *NEW RULES FOR VICTIMS OF ARMED CONFLICTS* 325 (1982).

7. Attacks in reprisal are a special case which this Article does not address.

object is a "military objective."⁸ Whatever contribution the facility makes to civilian life drops out of the equation, subject only to application of the principle of proportionality.

The difficulties in the position embodied in Article 52(2) come out most clearly when we compare one dual-use facility with a pair of separate facilities. For example, consider two different wars, one against adversary Able and the other against adversary Baker. Able has a pair of electricity-generating plants: a coal-burning plant that exclusively serves civilian purposes and an oil-burning plant that exclusively serves military purposes. Neither of Able's generators is a dual-purpose facility: the coal-fired plant is strictly civilian, and the oil-fired plant is strictly military. The coal-fired plant cannot be considered a military objective, and thus making it the object of an attack would be committing an indiscriminate attack upon a civilian object. The oil-fired plant is a military objective (assuming that its destruction would offer a definite military advantage in the actual circumstances), so it is a lawful target. However, suppose that the pair of facilities in Able are immediately next to each other, so that any munitions that normally would be used in order to have a sufficiently high probability of destroying the military objective (oil-fired plant) would foreseeably incapacitate the civilian object (coal-fired plant) as well.

Under these circumstances, provided that only the oil-fired plant serving the military was the object of attack—and the intention was to destroy the military facility and not to destroy the civilian facility—then an attack on the oil-fired plant *could* be a discriminate attack even if the coal-fired plant was also destroyed. However, the justification of any attack as "discriminate" involves at least two steps. The first step, as discussed above, involves the inquiry as to what in the morality of war would be called "intention"; in legal terms, were all the objects of the attack military objectives?⁹ The second step concerns what in the morality of war is called "proportionality," which in Protocol I is expressed in terms of excessive incidental loss. If Able's civilian facility was not an "object of the attack," then damage to the civilian facility is "incidental." Incidental damage is what is more popularly referred to as "collateral damage," although Protocol I does not use this terminology. Some incidental ("collateral") damage is permitted, but not without limit. The second step involves an examination of whether the incidental damage which may be expected from the attack is excessive in relation to the military advantage anticipated.

8. A previous article called for revision of Article 52(2), but mistakenly assumed that this permissive reading of Article 52(2) was correct; revision of the text was therefore necessary. See Henry Shue, *Bombing to Rescue? NATO's 1999 Bombing of Serbia*, in *ETHICS AND FOREIGN INTERVENTION* (Deen K. Chatterjee & Don E. Scheid eds., forthcoming July 2003). Other authors endorse the call for revision of Article 52(2). See Nicholas J. Wheeler, *The Kosovo Bombing Campaign: The Limits of Civilian Protection in International Humanitarian Law*, in *THE POLITICS OF INTERNATIONAL LAW* (Paul Keal & Christian Reus-Smit eds., forthcoming).

9. As already indicated, this first step itself has two parts, embodied in the two parts of the definition of military objective in Article 52(2). See Protocol I, *supra* note 2.

II. The Proportionality Calculus

Considerable doubt exists concerning how precise or demanding the test of anticipated excessive incidental loss is.¹⁰ Nevertheless, in spite of the fact that the civilian plant is not an object of attack—that is, the civilian plant is not damaged intentionally—the damage to it must be taken into account. That damage may indeed be incidental or unintentional, but it is still real damage. Under LOAC all damage—at least all direct damage¹¹—is significant, though intentional damage carries greater significance than unintentional damage. If the damage to the civilian facility were intentional, the attack would be straightforwardly prohibited because it is impermissible to target an object that is not a military objective. But even incidental civilian damage should not be excessive, so the magnitude of the expected incidental civilian loss comes into the overall judgment of whether the attack is permissible. Therefore, Able's military facility (oil-burning plant) may be attacked only if the expected incidental damage to its civilian facility (coal-burning plant) is not excessive.

In the case of Able's civilian facility, the immediate costs of any direct damage to the facility are visible and easy to ascertain. Thus military planners can be expected to take them into account when deciding whether to attack Able's military facility. By contrast, the indirect costs stemming from the long-term effects of the plant's destruction, as they ripple through the civilian society, are less visible and more difficult to ascertain and so are often ignored.¹²

Next consider adversary Baker, which has only the one dual-use electricity-generating facility: a gas-burning plant that serves both civilian and military purposes. Obviously, the premise of our comparison between Able and Baker is that from any commonsense point of view Baker's single facility is essentially Able's two facilities under one roof. Notice, however, what the difference between a single dual-use facility and a pair of single-use facilities makes in the legal analysis. The first question once again, as in the case of Able, is whether the Baker dual-use facility is a military objective that may permissibly be attacked. Plainly it is, because the gas-fired plant, *ex hypothesi*, makes an effective contribution to military action and its destruction under the circumstances offers a definite military advantage. The plant also makes a contribution to civilian life, but according to the permissive reading of Article 52(2), the concurrent civilian contribution is irrelevant to the inquiry as to whether the facility is a military

10. See, e.g., Shue, *supra* note 4, at 734, 747-52 (discussing the excessiveness test in its moral guise as a proportionality test).

11. By direct damage, we mean the harm caused as the immediate result of an attack (e.g., the collapse of a building hit by a bomb); by indirect damage (sometimes called "reverberating effects"), we mean harm that occurs after an attack but as a foreseeable result of it (e.g., the effects of the loss of electrical power to hospitals, sewage treatment facilities, etc., following the destruction of a power plant). See *supra* text accompanying notes 19-27 *infra*.

12. See *id.*

objective.¹³

Theoretically, the second test, which concerns whether the damage to the civilian facility may be expected to be excessive, would still remain to be conducted, as it was in the case of Able. However, in the case of Baker where is the civilian facility that could suffer excessive incidental damage? The gas-burning plant, because it makes a military contribution, and in spite of its civilian contribution, has already been classified as a military objective. It is the only plant there is in Baker. When it is attacked, where is there any civilian object that is incidentally damaged, excessively or not? What is destroyed is the gas-burning electricity-generating plant, and this plant is a military objective. Only this plant is destroyed, so there is no direct incidental damage to be assessed for excessiveness.¹⁴

Now, we think one could reasonably argue that the idea just expressed—that there is only one object, that it is a military objective and so there is no civilian object that could suffer incidental damage—is contrary to common sense and would be legalistic in the worst sense. The plant's destruction made its performance of a civilian function impossible. Even if the object in question is indeed properly classified as a military objective, the loss of the civilian function also performed by that object cannot be allowed to disappear from all calculations as if it had never been performed. The civilians in Baker are as affected by the loss of their dual-use facility as the civilians in Able were from the loss of their single-use facility.

Indeed, state practice suggests that governments are uncomfortable with the notion that the civilian function of a dual-use facility can be ignored. For example, in its attacks on the Federal Republic of Yugoslavia's electrical power facilities, NATO forces sometimes used special carbon-graphite filaments designed to disrupt power temporarily, in part to minimize long-term incidental harm to civilians.¹⁵ Similarly, in the Gulf War

13. See, e.g., Françoise J. Hampson, *Means and Methods of Warfare in the Conflict in the Gulf*, in *THE GULF WAR 1990-91 IN INTERNATIONAL AND ENGLISH LAW* 89, 98-100 (Peter Rowe ed., 1993) (arguing that "[i]f it is assumed that power supplies are military objectives then, by definition, they are not civilian objects"); Christopher Greenwood, *Customary International Law and the First Geneva Protocol of 1977 in the Gulf Conflict*, in *THE GULF WAR 1990-91 IN INTERNATIONAL AND ENGLISH LAW* 63, 73 (Peter Rowe ed., 1993) (arguing that if "an object is a military objective, it may be attacked. . . while if it is a civilian object it may not be attacked. There is no intermediate category of 'dual-use' objects: either something is a military objective or it is not").

14. Of course, the risk of incidental harm to civilians and civilian objects in the vicinity of the plant would have to be taken into account, but under this reading harm to the plant itself is irrelevant. Whether *indirect* incidental harm must be taken into account is considered below.

15. See Randy W. Stone, Comment, *Protecting Civilians During Operation Allied Force: The Enduring Importance of the Proportional Response and NATO's Use of Armed Force in Kosovo*, 50 *CATH. U. L. REV.* 501, 528-29 (2001); see also James A. Burger, *International Humanitarian Law and the Kosovo Crisis: Lessons Learned or to be Learned*, *INT'L REV. RED CROSS* No. 837, at 129, 134 (2000) (arguing that "[i]n the Kosovo air campaign, in acknowledgement of the limited political objectives, an effort was made to distinguish as much as possible the military from the civilian aspects of these dual use targets. Planners endeavored to strike targets in such a way that the military purpose for their

coalition forces took steps to limit the indirect consequences to civilians of attacks on dual-use power facilities. One such step was taken by “adopting a policy of attacking switching stations rather than generating stations, to enable repair of the electricity system after the war.”¹⁶

But for the most part relatively little attention is paid to the long-term, indirect harm to civilians from attacks on dual-use facilities and infrastructure. As Christopher Greenwood notes, “[a]t the time that Protocol I was drafted, the main concern was to minimize the civilian casualties and damage to civilian objects occurring *during* attacks, for example those killed by the explosion of a bomb or the collapse of a building which had been hit.”¹⁷ Accordingly, during the Gulf War coalition forces took “great pains . . . to minimize this kind of collateral damage.”¹⁸ Similarly, the United States and its allies took great care to minimize direct collateral damage during the Kosovo conflict.

While the United States and its coalition partners made some effort to limit the indirect “reverberating effects” on civilians of attacks on power facilities and other economic infrastructure during those conflicts, U.S. military planners do not appear to view such efforts as legally required. As Matthew Waxman observed in a Rand study prepared for the U.S. Air Force:

Some disagreement exists with respect to how to calculate adverse civilian effects of attacks on military targets. One view holds that planners must consider the long-term, indirect effects of attacks on a civilian population, whereas the U.S. military adheres to a narrower interpretation emphasizing direct civilian injuries or deaths. During operational planning, when target lists are reviewed for compliance with international law, much greater emphasis is typically given to immediate and direct collateral effects.¹⁹

attack would be obtained while minimizing, as far as practicable, the impact on the civilian nature of the target”).

16. A.P.V. ROGERS, *LAW ON THE BATTLEFIELD* 45 (1996). Most of the actors involved in the Gulf War were not party to Additional Protocol I, though most of them acknowledge the customary law nature of some aspects of the Protocol, including the prohibition on attacks that would cause clearly disproportionate civilian casualties. See Judith Gail Gardam, *Proportionality and Force in International Law*, 87 AM. J. INT’L. L. 391, 407-08 (1993).

17. Greenwood, *supra* note 13, at 79 (emphasis added).

18. *Id.*

19. Matthew C. Waxman, *INTERNATIONAL LAW AND THE POLITICS OF URBAN AIR OPERATIONS* 21 n. 44 (2000). See also J.W. Crawford, III, *The Law of Noncombatant Immunity and the Targeting of National Electrical Power Systems*, 21 FLETCHER F. WORLD AFF. 101, 106 (1997) (noting that “[h]umanitarians argue that the focus of the U.S. military on direct injury or death as the exclusive calculus for collateral casualties is a reflection of short-sighted thinking”); Lt. Col. Kenneth R. Rizer, *Bombing Dual-Use Targets: Legal, Ethical, and Doctrinal Perspectives* (2001), available at <http://www.airpower.maxwell.af.mil/airchronicles/cc/Rizer.html> (last visited Jan. 20, 2003) (arguing that “[t]he Air Force perspective on non-combatant immunity for such dual-use targets is that since the targets are military, the US is responsible for minimizing the direct collateral damage of nearby civilian persons and property. This doesn’t preclude the Air Force from taking a liberal interpretation of weapon-selection duties that permit high levels of force protection, nor does the Air Force consider the long-term, indirect effects of such attacks when it applies proportionality to the expected military gain”).

While the United States is sensitive to the political and humanitarian costs of the destruction of power plants and other infrastructure, U.S. military doctrine places great importance on the use of infrastructure attacks to disrupt an enemy's command and control capabilities, air defenses, and weapons production. In addition, many U.S. military planners also see an advantage to placing pressure on an enemy's civilian population. Attacks against economic infrastructure enable the attacker to "bypass the enemy's fielded military forces by influencing the enemy populace and its leadership's decisionmaking."²⁰ In the Gulf War, for example, "to some degree civilian deprivations were intended as part of the overall air strategy to compel the regime's capitulation."²¹ Accordingly, concerns over the indirect, long-term harms to the civilian population of the destruction of Iraqi infrastructure played only a modest role in Gulf War military planning, as evidenced by the extent of the damage to Iraqi infrastructure caused by coalition bombing.²² The same was true in the Kosovo conflict. While NATO forces gave "special consideration—especially with regard to the question of proportionality" to decisions involving attacks on power plants and oil depots,²³ such considerations seem to have had relatively little effect on target selection.

Michael Schmitt suggests that recent technological improvements in the targeting capabilities of modern weaponry may in the future draw increasing attention to the "reverberating effects" of attacks on dual-use facilities:

If first-tier collateral damage and incidental injury (i.e., damage and injury directly caused by the kinetic force of the attack) become rarer, it is probable that humanitarian attention will increasingly dwell on subsequent-tier, or reverberating, effects. As an illustration, since electrical grids will be attackable with highly surgical strikes, proportionality analysis in future may well center on derivative consequences, such as unintended but foreseeable denial of power to medical facilities Of course, reverberating effects were theoretically always calculated when assessing proportionality. However, it is only now that the means exist to limit dramatically direct collateral damage and incidental injury that we are being sensitized to reverberation.²⁴

But to date, military planners continue to resist incorporating such "reverberating effects" into their proportionality calculus.²⁵

The difficulty with ignoring the indirect long-term consequences to civilians of the destruction of dual-use facilities is that such consequences

20. Waxman, *supra* note 19, at 22; see Rizer, *supra* note 19, at 7.

21. Waxman, *supra* note 19, at 21.

22. Commander J.W. Crawford goes so far as to say that "the United States adheres to the view that proportionality is equivalent to a prohibition on the direct or negligent targeting of civilians." Crawford, *supra* note 19, at 106.

23. Niek Biegan, *Political Decision Making and Responsibility Regarding the Conduct of Hostilities*, in *PROTECTING CIVILIANS IN 21ST-CENTURY WARFARE* 71, 74 (2000).

24. Michael N. Schmitt, *The Principle of Discrimination in 21st Century Warfare*, 2 *YALE HUM. RTS. & DEV. L.J.* 143, 168 (1999).

25. See, e.g., Rizer, *supra* note 19, at 8.

often outweigh the short-term, direct incidental harm. Attacks on power plants that supply both military and civilian needs may result in the loss of electricity used to purify water, treat sewage, run hospitals, and otherwise sustain civilian life, with grave repercussions for public health. As Middle East Watch concluded in an assessment of the coalition's attacks on Iraqi infrastructure in the Gulf War:

[T]he cost to the civilian population of these attacks on the electrical system was severe. Iraq was quickly transformed from a modern, energy-dependent society into, in the now-famous words of the Ahtissari report, a "pre-industrial age." Shortages of food due to the U.N. embargo were exacerbated by the lack of refrigeration and the impairment of Iraq's highly mechanized, irrigation-based agriculture. The nation's electricity-dependent water-purification and sewage-treatment facilities were crippled, creating a serious health hazard. Hospitals and clinics were forced to meet this growing health emergency, and to treat the war wounded, with, at most, erratic electricity supplied by back-up generators. Vaccines and medicines requiring refrigeration deteriorated and were difficult to replace.²⁶

By one estimate "more than 70,000 noncombatant deaths can be directly attributed to the systematic destruction of Iraq's electrical power."²⁷ In Baghdad, where the "cascading repercussions of the systematic elimination of electric power" were felt most acutely, the destruction of infrastructure "resulted in the death of 30 times more civilians than did direct war effects."²⁸

Of course, what matters for purposes of the law of armed conflict is not the actual incidental harm to civilians but the expected incidental harm. On this issue, opinions differ. As one U.S. government expert on the law of war has observed, Iraqi power and water treatment plants "remained unrepaired long after the war" because of the effects of continued UN sanctions, Saddam Hussein's refusal to accord repair of such facilities a high priority, and Saddam's willingness to use the plight of Iraq's civilian population to manipulate international public opinion on sanctions.²⁹ But even if the full extent and duration of the harm could not have been anticipated, it seems likely that at a minimum, substantial adverse effects should have been expected.³⁰ Moreover, as technologically devel-

26. *Needless Deaths in the Gulf War, Civilian Casualties During the Air Campaign and Violations of the Laws of War*, available at www.hrw.org; see also Report to the Secretary-General on Humanitarian Needs in Kuwait and Iraq in the Immediate Post-Crisis Environment, UN Doc. S/22366, at 5, ¶ 8 (1991) (noting the "near apocalyptic results" of coalition bombing on Iraqi infrastructure, and finding that "most means of modern life support have been destroyed or rendered tenuous").

27. Crawford, *supra* note 19, at 110.

28. *Id.* at 111.

29. W. Hays Parks, *Book Review*, 28 G.W. J. INT'L L. & ECON. 207, 222 (1994).

30. See, e.g., JUDITH GAIL GARDAM, *NON-COMBATANT IMMUNITY AS A NORM OF INTERNATIONAL HUMANITARIAN LAW* 152 (1993) (arguing that "[t]o take the example of water treatment plants, it must have been apparent that the loss of civilian life in the long term from such an attack would be considerable. Both the civilian casualties and the military advantage were capable of measurement"). See also Crawford, *supra* note 19, at 108 (noting that in the Gulf conflict, "[t]here was a strikingly evident imbalance between the supposed military advantage to be gained from attacking electricity and the discrimina-

oped societies become ever more dependent on the uninterrupted functioning of basic infrastructure for the satisfaction of both civilian and military needs, the problems posed by attacks on such infrastructure will only increase.

III. Options for Evaluating Attacks on Dual-Use Facilities

How then is the overall acceptability of attacking a dual-purpose facility to be judged? Three broad options are evident; we will call them limited proportionality, enhanced proportionality, and protective proportionality.

A. Limited Proportionality

The first, and most simplistic, option is limited proportionality. Article 52(2) says that if an object makes an effective contribution to military action, and its destruction offers a definite military advantage, it is a military objective and that is that. Some objects that make effective contributions to military action, namely the dual-use ones, also make important contributions to civilian life. Since Article 52(2) says nothing about the civilian contributions, they simply are not included in the calculus. The civilian contributions by dual-use facilities simply evaporate from the analysis once the facilities are correctly classified as military objectives, and only direct incidental harm to civilians and civilian objects is taken into account in making proportionality assessments.

Although this limited proportionality option largely reflects current U.S. practice, it has drawn significant criticism from within the U.S. military.³¹ Even the United States Air Force's Major Meyer, who is highly critical of what she calls "current restrictive interpretations" of Article 52(2),³² draws attention to the fact that the destruction of dual-use targets may cause pointless, long-term civilian damage.³³ Major Meyer notes that during the Gulf War, "Coalition forces struck dual-use targets such as power supplies, railroads, and bridges. The strikes had the desired temporary effects, but also imposed more serious long-term effects on the civilian population. Similarly, in Kosovo . . . the means chosen ultimately may have caused more negative long-term effects than desired."³⁴ We would describe the civilian damage in both cases in considerably stronger terms, but the immediate point is that Major Meyer is far from suggesting that the incapacitation of the civilian function should simply be forgotten. Similarly, Lieutenant Colonel Rizer, though he concludes that current law does not require inclusion of long-term, indirect effects in proportionality

tion and proportionality constraints devised for the protection of noncombatant civilians").

31. See, e.g., Crawford, *supra* note 19, at 110.

32. Meyer, *supra* note 6, at 177.

33. *Id.* at 180-81.

34. *Id.* at 178. Major Meyer's proposed solution to the problem is, however, quite different from ours, as we note later in the text.

assessments, also states that ignoring such effects would be absurd.³⁵

B. Enhanced Proportionality

The second option is to enlarge the scope of the conventional proportionality test. In the case of a dual-use facility there is indeed only a single facility, not a pair of facilities that can be compared to each other. Yet, since this one facility performs two kinds of functions, a military one and a civilian one, it is perfectly intelligible to inquire whether the expected loss of the civilian function would be disproportionate—or in the language of LOAC, excessive as compared to the military advantage gained by the thwarting of the military function. As indicated above, the present tendency is to focus on the immediate collateral consequences of an attack, such as the immediate loss of civilian life associated with the bombing of a plant in an urban center.

However, serious consideration of the long-term effects of the loss of the facility's civilian function could substantially alter the proportionality calculus. While a facility's serving a civilian function as well as a military function would never in itself prevent the facility from being designated a military objective, the significance of the civilian function might overwhelm the significance of the military function and make any attack upon the facility impermissible because it could be expected to cause excessive incidental harm to civilians. Therefore, while the object might be classified as a military objective, any attack upon it would nevertheless be disallowed by the excessive incidental damage expected from the thwarting of the civilian function of that same object. This shift in approach to the calculation of proportionality, which some critics of infrastructure bombing contend is already required by Protocol I,³⁶ would by itself, if accepted by the major powers, likely preclude the kind of bombing campaign carried out by coalition forces in the Gulf War.

It might be objected that indirect effects are too speculative and remote to factor into proportionality calculations. As Professor Christopher Greenwood notes, indirect effects may be difficult to predict, and difficult to separate from other contributing factors, such as the effect of economic sanctions and decisions taken by the government of the state subject to attack.³⁷ Similarly, as Lt. Col. Rizer observes, it may be difficult to specify temporal limits on indirect effects.³⁸ As time passes, the effects of damage to economic infrastructure become increasingly remote; if the damage is not repaired, the fault may well lie with the state that has been attacked. Such concerns may be valid in many cases, but more often than not the effects of large-scale infrastructure attacks are clear and foreseeable. As Professor Oscar Schachter points out, the bombing of Iraqi infrastructure

35. Rizer, *supra* note 19, at 8. However, Rizer also states that "requiring open-ended consideration of indirect effects is equally troubling." *Id.*

36. See Crawford, *supra* note 19, at 106.

37. Greenwood, *supra* note 13, at 79.

38. Rizer, *supra* note 19, at 8.

“predictably devastated civilian life.”³⁹ Similarly, Commander Crawford concludes that the military planner’s job would not “become unduly burdensome merely because an additional level of cognition is required in order to fulfill faithfully the obligations of discrimination and proportionality relative to collateral costs.”⁴⁰ Accordingly, we think that the proportionality principle obligates states to make at least a good faith effort to factor indirect effects into their targeting decisions.

The protection afforded civilians by the proportionality analysis could be enhanced further by insisting that military planners examine the cumulative effects of multiple attacks on dual-use facilities. Under current practice “each target is assessed individually.”⁴¹ Although the military advantage to be gained from an attack on a particular target may be assessed with reference to the larger operation of which the attack is a part,⁴² “[t]here appears to be no requirement that the cumulative effect of attacks against targets of a similar type should also be taken into account.”⁴³ Thus, while the military advantage to be gained from attacking any particular power station may be insignificant, since power may simply be rerouted from other power stations to serve military needs, attacks on a substantial number of power stations might provide the anticipated military advantage necessary to justify each attack on each individual power station. Under those circumstances, it seems reasonable to insist that the cumulative effects of such attacks on the civilian population also be considered, since destruction of one power plant by itself might not cause grave consequences for the civilian population, while the cumulative effects of the destruction of numerous power plants might.⁴⁴

Nevertheless, we do not believe, in this context at least, that the application of an indirect and cumulative effects standard of excessive incidental damage is a sufficiently rigorous test. As already mentioned above, considerable grounds exist for general doubt about the stringency of excessive damage or proportionality tests because the proportionality principle is too vague, the values it compares are too different in content,⁴⁵ and except in the clearest of cases, the indirect effects at issue are considered

39. Oscar Schachter, *United Nations Law in the Gulf Conflict*, 85 AM. J. INT’L L. 452, 466 (1991) (arguing that “[t]he enormous devastation that did result from the massive aerial attacks suggests that the legal standards of distinction and proportionality did not have much practical effect”).

40. Crawford, *supra* note 19, at 115.

41. Hampson, *supra* note 13, at 98.

42. See, e.g., *Methods and Means of Combat*, in THE HANDBOOK OF HUMANITARIAN LAW IN ARMED CONFLICTS 444 (Dieter Fleck, ed. 1995).

43. Hampson, *supra* note 13, at 98.

44. Thus, Hampson suggests that if a change in the LOAC is needed, one option would be to “require the likely cumulative effect on the civilian population of such attacks against such targets [civilian infrastructure] to be taken into account.” See Hampson, *supra* note 13, at 100.

45. See, e.g., International Criminal Tribunal for the Former Yugoslavia, *Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign Against the Federal Republic of Yugoslavia*, 31 I.L.M. 1257, 1271 (2000) (noting that the comparison is “often between unlike quantities and values”).

too speculative for military planners to exclude otherwise legitimate military targets on the grounds of proportionality. In principle any civilian loss, however terrible, could be thought to be outweighed by an even greater military advantage. As Commander Crawford notes “[t]he aerial bombardment of national electric power systems has long been considered indispensable to an effective wartime campaign.”⁴⁶ Prevailing military doctrine emphasizes infrastructure attacks, particularly attacks on the national power grid, as an essential means to degrade an enemy’s air defense, telecommunications, and command and control capabilities.⁴⁷

Whether the undeniable military advantage produced by such attacks is as great as military planners claim is a matter of debate.⁴⁸ Critics conclude that the tactical advantages produced by such attacks may be substantially outweighed by their catastrophic effects on the civilian population.⁴⁹ But herein lies the weakness of proportionality analysis; it is principally of use in clear cases where there is relatively broad agreement both on the extent of the military advantage and the extent of the civilian harm at issue. Where such agreement is lacking, proportionality is unlikely to exercise much of a constraining influence on targeting decisions. Indeed, one study of the coalition’s application of the principle of proportionality in the Gulf War concluded that “the military advantage always outweighed the civilian casualties as long as civilians were not directly targeted and care was taken in assessing the nature of the target and carrying out the attack itself.”⁵⁰ Similarly, as another commentator notes with reference to the Kosovo conflict, “the reality of the situation is that those objects which military commanders wished to attack, for whatever reasons, were attacked. There is no evidence that the rigors of the limitations imposed on the definition of a military objective were applied to attacks against dual purpose objects.”⁵¹ While these assessments may overstate the case, it seems clear that considerations of proportionality played only a modest role in target selection.

However, we do not here wish to rest our position only on general doubts about the excessive-damage standard. It is the specific nature of some few civilian functions that force us to the conclusion that those few civilian functions require a higher and firmer level of protection than the general standard of excessiveness provides. Accordingly, we turn to the third option: a reading of Protocol I that is more protective of a narrow category of exceptionally vital civilian functions.

46. Crawford, *supra* note 19, at 101.

47. *Id.* at 108-09; *see also* Rizer, *supra* note 19, at 6-8.

48. *See id.* at 109-110 (noting a “paucity of empirical evidence” concerning the advantages of such attacks in Iraq).

49. *Id.*

50. *See* Gardam, *supra* note 16, at 410.

51. Peter Rowe, *Kosovo 1999: The Air Campaign: Have the Provisions of Additional Protocol I Withstood the Test?*, 837 INT’L REV. RED CROSS 147, 159 (2000).

C. Protective Proportionality

Protocol I already provides special protection for “objects indispensable to the survival of the civilian population.” The category is most clearly delineated in paragraphs 2 and 3 of Article 54, which provide:

2. It is prohibited to attack, destroy, remove or render useless objects indispensable to the survival of the civilian population, such as . . . drinking water installations and supplies and irrigation works, for the specific purpose of denying them for their sustenance value to the civilian population or to the adverse Party, whatever the motive.

3. The prohibitions in paragraph 2 shall not apply to such of the objects covered by it as are used by an adverse Party [as “sustenance solely for members of its armed forces” or “in direct support of military action”] . . . provided, however, that in no event shall actions against these objects be taken which may be expected to leave the civilian population with such inadequate food or water as to cause its starvation or force its movement.⁵²

Two points need to be made about “indispensable objects,” meaning of course, objects indispensable to the survival of the civilian population. First, a straightforward reading of Protocol I would apply the protection specified in Article 54 to all indispensable objects. This reading is particularly compelling in light of the exceptionally strong language of “whatever the motive” and “in no event.” This means that dual-use facilities whose civilian functions are indispensable to the survival of the civilian population may not be attacked, at least not “for the specific purpose of denying their sustenance value to the civilian population,” or if attacking them will cause starvation or forced movement. Otherwise, the manifest purpose of Article 54 would be entirely defeated by the classification of vital sources of energy, such as electricity-generating plants, as military objectives subject to destruction.

Indeed, since Article 54(2) speaks explicitly of protecting “drinking water installations and supplies,” it can reasonably be read as literally protecting electricity-generating plants that supply the power necessary for the purification and pumping of drinking water. “Drinking water installations” are indeed “render[ed] useless” when deprived of the source of the electricity which they need to function. Consequently, if Article 52(2) is read in conjunction with Article 54, attacks upon the power source for the delivery of potable water, in other words water clean enough to drink without contracting illness, are prohibited subject to the “for the specific purpose” caveat in Article 54(2) quoted above.

The second point is that the caveat largely undercuts the utility of the prohibition as applied to dual-use facilities. If a state attacks a power plant for the purpose of interfering with an adversary’s command and control capabilities, then the attack is not “for the specific purpose of denying” the civilian population the benefits of electrical power (including, for example, potable water), even if the denial of such benefits will be the foreseeable result of the attack.⁵³ Thus, the United States and its coalition partners

52. Protocol I, *supra* note 2.

53. See Hampson, *supra* note 13, at 99.

did not see Article 54 as a significant constraint on targeting decisions in Iraq or Kosovo. As Crawford notes:

The United States accepts as customary international law the prohibition against intentionally targeting drinking-water installations, foodstuffs, crops, livestock and other objects indispensable to the survival of the civilian population. However, in the case of Iraq, these crucial items were lost to the noncombatant populace as a result of the reverberating effects of the aerial bombardment of electricity.⁵⁴

Thus, as currently applied neither the proportionality principle nor the restrictions on attacking indispensable objects provides much protection for the civilian function of dual-use facilities.

Moreover, for reasons considered above, we think that even a proportionality test that factors in indirect and cumulative effects may not provide much protection to civilians in many cases. This leads us to conclude that, at least in the case of attacks on dual-use facilities "indispensable to the survival of the civilian population," the standard should be even more stringent. One way to render the proportionality standard more stringent would be to insist that attacks against indispensable objects, including qualifying dual-use facilities, be treated as impermissible unless the expected incidental civilian harm would not be excessive in relation to an anticipated military advantage that was compelling, not simply concrete and direct.⁵⁵

Proportionality assessments require a balance between the risk to civilians and military necessity. The inclusion of indirect and cumulative effects favors civilians on the risk side of the equation; adoption of a "compelling military advantage" standard would favor civilians on the military necessity side. We think both may be necessary to the effective protection of civilians from the effects of infrastructure bombing.

The United States, among others, would likely oppose any such change. The United States has refused to ratify Protocol I in part because of a concern that its provisions shift too much responsibility for collateral damage from the defender to the attacker.⁵⁶ Our proposal would place an even greater burden on the attacker by insulating an object that qualifies as a military objective from attack unless an unusually stringent proportionality test can be met. But as indicated above, any lesser standard is likely to

54. Crawford, *supra* note 19, at 110.

55. Alternative language is suggested by Michael Schmitt, who notes that the proportionality "standard could be heightened through adverbial supplementation, as in 'military advantage must greatly outweigh' or 'significantly outweigh' collateral damage and incidental injury." Schmitt, *supra* note 24, at 174.

56. See W. Hays Parks, *Air War and the Law of War*, 32 A.F. L. REV. 1, 49-68 (1990). Under Article 58 of Protocol I, parties to a conflict are obligated to "endeavor to remove the civilian population, individual civilians and civilian objects under their control from the vicinity of military objectives," and to "avoid locating military objectives within or near densely populated areas." But the provision is often violated, and defending forces facing attack by a technologically more capable adversary obviously have an incentive to shield their forces from attack by placing them in populated areas. The problem is compounded by dual-use facilities since it is often impractical to situate them outside populated areas.

result in too little protection for the civilian population from the consequences of attacks on dual-use infrastructure.

At the same time, the standard we propose would not preclude all attacks on essential infrastructure.⁵⁷ Such a preclusive standard would not only be impractical—states with significant air forces would reject it out of hand—but it would also place too rigid a restriction on the conduct of warfare. In some conflicts, attacking power plants and other basic infrastructure may be essential to the timely and successful conduct of war. In dealing with modern industrial states, where power can be shifted easily from civilian to military needs and where attacks on power stations can drastically impede an adversary's command and control capabilities, a blanket prohibition on such attacks might prolong a conflict to the detriment of the civilian population or change the outcome of the conflict altogether. Our purpose in proposing a "compelling military advantage" standard is to strike a better balance between an unacceptably high level of protection and what amounts to very little protection of civilians from harms caused by attacks on infrastructure.

Under our approach, if the advantage of attacking an indispensable object cannot be viewed as compelling in relation to the anticipated direct and indirect civilian harm, the military functions served by the indispensable object may still be thwarted, but must be thwarted by some other means. For example, if the electricity plant serves command and control, as well as water-purification, the attacks will need to target the command and control facilities directly rather than indirectly by way of the facilities' energy source. Alternatively, our proposed test might be satisfied by a more limited form of attack, such as the use of weapons designed to disrupt power only temporarily.⁵⁸

While our suggestion would, if adopted, alter the existing balance between the protection of civilians and the pursuit of military advantage, it does not, in its purpose at least, go beyond what seems reasonable to at least some experts within the U.S. Air Force. Critics of our proposal are likely to object that it is "unrealistic" to expect that "lucrative" targets that are central to an adversary's economy as a whole should be intentionally spared.⁵⁹ Writers in the Air Force today, however, are far from lumping

57. Gardam, *supra* note 16, at 405-06 (arguing that "[o]ne possible solution [is] . . . to revise the definition of military objectives so that objects whose destruction will inevitably involve large-scale civilian casualties, a relatively easy calculation to make, are designated as civilian in nature and thus illegitimate targets").

58. See Crawford, *supra* note 19, at 113 (noting that "[a]rguably, in the fast-paced, synchronized environment of twenty-first-century battlespace, the temporary interruption of electrical power could potentially accomplish a given military objective without the attendant devastation suffered by Iraq").

59. Reference is frequently made to controversial claims about the effectiveness of the Combined Bomber Offensive in the Second World War. A careful recent assessment is in TAMI DAVIS BIDDLE, *RHETORIC AND REALITY IN AIR WARFARE: THE EVOLUTION OF BRITISH AND AMERICAN IDEAS ABOUT STRATEGIC BOMBING, 1914-45*, 270-88 (2002). Writing prior to NATO's bombing of Serbia, Robert A. Pape has argued powerfully that strategic bombing has never been the decisive factor in any war. See generally ROBERT A. PAPE, *BOMBING TO WIN: AIR POWER AND COERCION IN WAR* (1996). For the argument that

together all civilian targets. For example, United States Air Force Colonel Charles Dunlap has made a provocative package of suggestions, most of which we do not accept, but one of which provides an instructive comparison with our recommendation.⁶⁰

Drawing upon various arguments of others, Col. Dunlap advises: "use ruinous force not upon people (to even include combatants if possible), but upon *objects*" (emphasis in original).⁶¹ Col. Dunlap's reference to avoiding the killing even of combatants when possible reflects his interesting contentions that "citizen soldiers" are non-combatants in uniforms and that "the American military ethos is largely built on the sanctity of all human life, combatant and noncombatant alike."⁶² We have grave doubts about the suggestion that combatants can be accorded greater protection without according non-combatants less protection. But Col. Dunlap's proposal for the greater protection of all persons, including combatants, provides an essential context for his other proposal for the greater destruction of objects, including many currently classified as civilian objects. Observing that "American air power today is virtually unstoppable," Col. Dunlap offers this proposal:

We need a new paradigm when using force against societies with malevolent propensities. We must hold at risk the very way of life that sustains their depredations, and we must threaten to destroy the world as they know it if they persist. This means the air weapon should be unleashed against entirely new categories of property that current conceptions of LOAC put off-limits.⁶³

Once again we have serious misgivings, which range beyond our topic here, concerning both Col. Dunlap's conclusion and the grounds offered for it.

The element of the package of proposals that we want to focus on, however, is a sharp limit that Col. Dunlap nevertheless advocates placing on civilian targets that might be bombed: "What kind of civilian objects would be added to target lists? None that are genuinely *indispensable* to the survival of the noncombatant population" (emphasis in original).⁶⁴ And from the fullest statement of his suggestion:

Slobodan Milosevic acceded to NATO's demands in June 1999 in part because of his expectations about unconstrained future bombing if he did not, see STEPHEN T. HOMER, *THE CONFLICT OVER KOSOVO: WHY MILOSEVIC DECIDED TO SETTLE WHEN HE DID* 91-107 (2001). Hosmer notes, however, that Milosevic was also concerned by a possible future ground invasion. *Id.* at 109-14; see also Schmitt, *supra* note 24, at 174 (noting that "nearly universal agreement exists among military experts that harm to civilians or civilian property during an international armed conflict is usually counterproductive").

60. Col. Charles J. Dunlap, Jr., *The End of Innocence: Rethinking Noncombatancy in the Post-Kosovo Era*, 28 STRATEGIC REV. 9, 9-17 (2000).

61. *Id.* at 14 (emphasis in original). We have come a long way since the erstwhile "neutron bomb," some of whose critics called it the "capitalist bomb," since it was supposed to kill people without damaging property.

62. Charles J. Dunlap, Jr., *Kosovo, Casualty Aversion, and the American Military Ethos: A Perspective*, 10 A.F. J. LEGAL STUD. 95, 99 (2000).

63. Dunlap, *supra* note 60, at 14.

64. *Id.* at 14 (emphasis in original).

This proposal does not endorse infrastructure attacks intended solely to deny the civilian population water, power, and other indispensable necessities of life because, in addition to ethical and legal concerns, such strikes can be *militarily* counter-productive. Whatever tolerance the American public may have for the destruction of property, it does not appear to extend to acts that kill noncombatants, even unintentionally.⁶⁵

Col. Dunlap continues by providing his primary reasons and contrasting his position with other positions:

[M]ounting reports of civilian casualties during the Yugoslav conflict paralleled a progressive drop in public support for the air campaign. From a frankly Machiavellian perspective, scenes of enemy noncombatants dying from the effects of infrastructure loss would undermine the ability of a democracy to make war.

Additionally, the proposal must not be confused with the kind of indiscriminate bombing campaign the Russians are reported to have conducted in Chechnya. There, objects indispensable to noncombatant survival apparently were destroyed. . . . Nor should it be confused with “bomb them back to the Stone Age” efforts apocryphally attributed to Vietnam-era strategies. Both approaches violate the proposal’s central principle that calls for discrimination between objects that are indispensable to noncombatants, and property superfluous to human survival.⁶⁶

In important respects, Col. Dunlap and we are headed in opposite directions. Generally speaking, we are advocating that fewer objects be classified as eligible to be bombed, while Col. Dunlap is advocating that more objects be eligible for bombing, although he defends this critical exclusion for indispensable objects. We are primarily concerned about what makes moral sense, while Dunlap is primarily concerned about what makes military sense, although several times he contends that “[f]rom a moral perspective a change that seeks to replace the killing of people with the destruction of objects would seem to represent a positive step toward reducing human suffering in armed conflicts.”⁶⁷ Nevertheless, for all our differences we agree with Col. Dunlap that it makes neither moral nor military sense “to deny the civilian population water, power, and other indispensable necessities of life.”

Col. Dunlap hedges his point carefully—the words just quoted are preceded by the word “solely,” which may be a reference to the “for the specific purpose” language in Article 54 of Protocol I: “this proposal does not endorse infrastructure attacks intended solely to deny the civilian population. . . .” The word “solely” leaves an opening for Col. Dunlap to defend attacks upon dual-use infrastructure that is indispensable for civilians if it is at the same time highly valuable to the adversary’s military efforts, although the logic of his position, especially his contention that it would reduce human suffering, seems to require that he would, at the very least, set the threshold for the destruction of indispensable infrastructure very

65. *Id.* at 15 (emphasis in original). Importantly, Col. Dunlap would thus disallow destruction that might be allowable on a double-effect moral analysis.

66. *Id.*

67. *Id.* at 16.

high.⁶⁸ On this key point Col. Dunlap's position, like ours, is more restrictive than the current permissive reading of Article 52(2) and the proportionality principle, which sets no effective threshold for military advantage in the case of any facility with any significant military function besides its civilian function.

While we start from different premises, it is precisely our goal to create a higher threshold for the justification of attacks on infrastructure indispensable for the survival of the civilian population. Whatever military purpose could be accomplished by destroying such infrastructure ought, in all but exceptional cases, to be accomplished in some other way compatible with the preservation of minimally adequate conditions for civilian life. There are many ways to skin a cat: radar can be neutralized indirectly, perhaps, by destroying all sources of electric power for the entire country, including power to all hospitals, schools, homes, and sanitation plants—provided the radar does not have its own separate power source. But radar can also be neutralized by a direct attack, or if that is not feasible, by more limited attacks on power sources that help preserve life-saving surgery, water-purification, and other essential human services requiring electrical power. We doubt that in practice Col. Dunlap and we would actually disagree about very many specific cases of indispensable objects, his hedge allowing a theoretical loophole notwithstanding.

Consequently, we do not believe that our recommendation that the permissive reading of Article 52(2) and proportionality be replaced by our selectively protective reading need be unacceptable to military thinkers. Neither Col. Dunlap nor Major Meyer, for example, expresses any wish to see indispensable objects attacked even though they strongly favor expanding the range of civilian objects that could permissibly be attacked in other respects an expansion that would clearly require revision of the current LOAC. Although we do not embrace the other expansions recommended by Col. Dunlap and Major Meyer, which we have not explored here, we believe that the overlap between their views and ours on the point of protecting indispensable objects is at the very least an indication that our recommendation is not militarily infeasible.⁶⁹

On the other hand, our selectively protective reading, which would exclude many and perhaps most dual-use facilities that perform indispen-

68. Col. Dunlap already emphasizes the second of the two necessary conditions [in 52(2)] that this Article does not address: not only would the infrastructure need to make an effective contribution to the adversary's military action but its destruction in the current circumstances would need to offer a definite military advantage, in the strict sense, to one's own side.

69. In this respect, we note that Commander Crawford, a professor of international law at the Naval War College, advocates incorporation of indirect effects into proportionality calculations, and concludes that "it is neither impractical nor insensitive to strategic concerns to urge that targeting concepts and the law that governs them keep pace with technology." Crawford, *supra* note 19, at 114. We note also that in its early 2003 war plan for Iraq, the United States intended "to limit damage to Iraqi infrastructure" as much as possible to facilitate post-war efforts at reconstruction. See Eric Schmitt & Thom Shanker, *War Plan Calls for Precision Bombing Wave to Break Iraqi Army*, N.Y. TIMES, Feb. 2, 2003 at A12.

sable civilian functions from the range of permissible attack, is an essential minimum element for any version of the LOAC that is to prevent total war. Those who sing the praises of precision-guided munitions (PGMs) note that PGMs have greatly diminished the risk of "collateral damage," because these weapons are more likely to hit their object of attack. But to the extent that they are more likely to hit their object, it is all the more important what their object is. This makes the definition of military objectives and application of the principle of proportionality supremely important.

If the definition of military objectives and the principle of proportionality are given a permissive rather than a protective reading, then facilities performing the functions that are most vital to civilian society are fair game for attack provided that they perform a military function of some consequence. But this permissive reading would fail to protect the minimum essentials of civilian life. Even those least involved and least threatening to any adversary—infants, the aged, the wounded, and the ill—could be deprived of essential services, like the purification of water and the preservation of food, that depend most notably on electricity. We cannot forget that "it is simply not possible to segregate the electricity that powers a hospital from 'other' electricity in the same lines that powers a biological weapons facility."⁷⁰ This is correct: if attacks are to be indirect by way of power sources, the only choice is between "both" or "neither." We suggest that in many cases only "neither" provides minimal protection for civilians. The biological weapons facility may have to be found and attacked directly. Finding biological weapons facilities is not easy, but the easy way of attacking indirectly, by destroying the power sources for everything, is indiscriminate.

We began from the understanding that the LOAC must be a compromise between military requirements and civilian needs. We hold to that position. But any reading of the LOAC that leaves vital necessities for the most vulnerable and least responsible unprotected is not a compromise, it is a betrayal. The fundamental requirement that warfare should distinguish between combatants and noncombatants by providing minimal protection for noncombatants is abandoned by such a reading. We do not believe that this is how the relevant provisions of Protocol I are most reasonably read. The permissive reading that allows destruction of facilities performing indispensable civilian functions undermines the primary purpose of the Protocol. The selectively protective reading affords a bare minimum of immunity from attack for noncombatants—this is the least that the LOAC can reasonably be expected to provide.

70. Daniel T. Kuehl, *Airpower vs. Electricity: Electric Power as a Target for Strategic Air Operations*, 18 J. STRATEGIC STUD. 254 (1995).

