# 1AC

### 1AC – Harmonization

#### Conflicting federal antitrust standards on standard essential patents (SEPs) cause DOJ-FTC turf wars – drives industrial and international uncertainty which wrecks harmonization, and decimates growth

McGinnis and Sun, 21 – John O. McGinnis, Professor at Northwestern University and Linda Sun, Associate at Wilmer Pickering Hale & Dorr LLP and J.D. 2020 at Northwestern Pritzker School of Law, Winter, “Unifying Antitrust Enforcement for the Digital Age,” *78 Wash. & Lee L. Rev. 305*, p. Nexis – Iowa

1. Standard-Essential Patents: A Case Study in Incoherence

Turf battles aside, the FTC and the DOJ have promoted directly opposing policies regarding the application of antitrust law to technology.138 The contentious disagreement on the important issue of standard-essential patents shows the divergent treatment and uncertainty already generated by dual enforcement. The FTC believes violation of a SEP licensing agreement is potentially an antitrust violation.139 Standard-setting organizations often require patent holders to license SEPs for free or on fair, reasonable, and non-discriminatory (FRAND) terms.140 The FTC argues that a violation of these licensing terms can violate antitrust laws by enabling a patent holder to “parlay the standardization of its technology into a monopoly in standard-compliant products.”141 The DOJ disagrees, because it believes “it is not the duty or the proper role of antitrust law to referee what unilateral behavior is reasonable for patent holders in this context.”142 The DOJ argues that patent holders enjoy a government-granted monopoly over the item under patent.143 Thus, a violation of a SEP licensing agreement may raise an issue of contract law or other common law right, but not antitrust.144

SEPs are vital to technological innovation and economic growth, with billions of dollars at stake.145 To understand the importance of SEPs to technology, one must first understand the importance of a standard. A standard is a uniform practice around which a technology develops.146 For example, a standard could describe a specific design of a charging port. Once the standard is set, multiple devices, from cell phones to speakers, can be designed to work with that standard charging port. Standards enable uniformity and operability across manufacturers, devices, or platforms.147 We interact with and depend on countless technology standards such as USB, Bluetooth, HTML, and 3G in our everyday life. Their importance cannot be overstated: they provide the foundation for the development and implementation of technology.148

Despite their benefits, standards also present a dilemma: they are most beneficial when there is widespread adoption.149 But most entities, from companies to countries, want to have their own individual designs become standard so as to gain a competitive advantage.150 Thus, there must be some process that encourages collaboration and consensus even among competitors.151

Such collaboration is facilitated by a standards development organization (SDO) or standard setting organization (SSO), which creates, revises, and coordinates technical standards.152 Standards development organizations have rules and criteria to prevent a single interest from dominating the definition of a standard.153 Their rules govern how they approach patented technologies.154 For example, an SDO may require that only unpatented technologies can be adopted as standard. Thus, in deciding what charging port will be the industry standard, the SDO would reject any charging ports that were patented. While this is, in a sense, a procompetitive solution—no entity would have a monopoly over the standard technology that was decided upon—it is largely unrealistic in today’s world where most useful and current inventions are patented. Adopting an unpatented technology that is outdated as standard defeats the purpose of a standard, which is to facilitate the development and adoption of innovative technology.155

As a result, SDOs must contend with standard-essential patents (SEPs), patents that are necessary for the implementation of a standardized technology.156 SDOs typically require that if a proposed standard is encumbered by patents, those patents must be licensed on “fair, reasonable, and non-discriminatory” (FRAND) terms to those seeking to utilize the technology.157 This requirement is thought to facilitate the adoption of the standard in the industry while providing fair terms to all parties involved.158 Because standards are critical to almost everything that touches technology, standard-essential patents are as well. When a patent is essential to a standard, there is no way to comply with the standard without infringing or licensing the patent.159 A dispute over a single SEP can prevent a company from making its product compatible with the internet, computers, or mobile devices.160 For example, a typical cellphone charging port has SEPs that cover every part of its design, from the electronic circuitry to communication protocols. Methods that enable a mobile phone to stay connected to a 4G/LTE network are covered by a multitude of SEPs that are essential to the 4G/LTE standard.161 Qualcomm owns SEPs essential to widely adopted cellular communication standards such as CDMA and LTE.162

A competition problem arises when, despite any agreement made at the time a standard was chosen, SEPs are later not licensed at fair, reasonable, and non-discriminatory terms. When the owner of a SEP bars a competitor from utilizing a SEP and therefore a standard technology, this decision deals a huge blow to the competitor. The FTC believes that when a SEP-owner violates an agreement to license the SEP on fair, reasonable, and non-discriminatory terms, this is an anticompetitive action in violation of antitrust laws.163 In FTC v. Qualcomm,164 the FTC pursued action against Qualcomm under Section 5 of the FTC Act for refusing to license its SEPs to competitors.165

In contrast, the DOJ has taken the stance that SEP owners refusing to license on FRAND terms is not an anticompetitive antitrust violation.166 It is simply a patent owner exercising his or her earned right to exclude competitors. As dictated under patent law doctrine, a patent owner has the right to prevent anyone from utilizing his or her patented technology.167 Going forward, it is uncertain whether the government will pursue antitrust enforcement actions related to the licensing of SEPs.168

This disagreement between the DOJ and the FTC rippled out to cause concern in the legislative branch. Because of the DOJ’s disagreement with the FTC, Senators wrote to the DOJ urging the agency to clarify its policy and provide guidance to stakeholders.169 The uncertainty created by this bifurcated approach creates dissatisfaction in Congress and so undermines support for these agencies among those who control their funding.170

The disagreement between the DOJ and FTC has international implications as well. Divergence in treatment of FRAND agreements among countries already causes difficulties for companies operating under different national standards in the global economy.171 These international challenges are further exacerbated by the different policies of the two domestic antitrust enforcement agencies of the United States, still the most important commercial nation in the world.172 Companies are subject to potentially conflicting standards depending not only on the national identity of the enforcement agency but also on the identity of the agency with the United States. International harmonization becomes more difficult if the United States has internal disagreements. Therefore, the case of SEPs shows how dual enforcement has created uncertainty in the industry, in Congress, and internationally.

B. Dual Enforcement Causes Inefficiencies and Inconsistent Outcomes

Technology did not create, but only exacerbates long-standing problems of dual antitrust enforcement. In this subpart we briefly offer more general arguments against joint enforcement by the FTC and Antitrust Division. It wastes resources, and even in non-technological areas, it creates uncertainty. 173 Both waste and uncertainty are compounded by turf wars, as exemplified by conflicts over mergers. 174

Moreover, Congress never intended for a system of full dual enforcement. 175 Thus, eliminating it would not undermine a fully deliberated scheme. Single enforcement would additionally bring the United States in conformity with industrialized nations worldwide, which generally have a single antitrust enforcer. 176 Finally, we respond to the argument that single agency enforcement would not improve matters much because private actors can enforce antitrust. 177 Private enforcers are subject to heavy restrictions and do not have the same ability to direct antitrust policy as the agencies do.

#### **We’re at an accelerated breaking point**

McGinnis and Sun, 21 – John O. McGinnis, Professor at Northwestern University and Linda Sun, Associate at Wilmer Pickering Hale & Dorr LLP and J.D. 2020 at Northwestern Pritzker School of Law, Winter, “Unifying Antitrust Enforcement for the Digital Age,” *78 Wash. & Lee L. Rev. 305*, p. Nexis – Iowa

Dual antitrust enforcement by the DOJ and the FTC has always created some problems of waste and uncertainty by maintaining overlapping centers of interpretive authority. 402 But technology has made these costs intolerable and added others. Because there are so many difficult questions about how to apply antitrust law to emerging technology, different enforcement agencies confuse companies key to our economic growth as these agencies try to figure out the correct way forward. In the important case of standard-essential patents, the confusion is already rampant, as the DOJ and FTC are locked in fundamental conflict.

#### The US sheltering SEP monopolies from antitrust splinters coordination. Anti-trust prohibitions via SSOs are the best way to harmonize global standards

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In the last decade, the licensing of standard essential patents (SEPs) on fair, reasonable and non-discriminatory (FRAND) terms has been a thorny issue for SEP holders in the US and Europe on the one hand, and major SEP implementers in major Asian economies on the other, such as Japan, Korea, the PRC, Taiwan and even India. With the rise of the Fourth Industrial Revolution, driven by the Internet of Things (IoT), 5G, driverless vehicles, and artificial intelligence (AI), which relies even more on interconnectivity, more and more new standards and SEPs will emerge, and the issue of FRAND licensing of SEPs will be even hotter.

The situation is further exacerbated by national courts’ issuance of anti-suit/enforcement injunctions and even anti-anti-suit/enforcement injunctions. Since Microsoft v. Motorola in 2012, US courts have applied anti-suit injunctions broadly to prohibit litigants from initiating or continuing parallel SEP-related litigation in another jurisdiction. For example, in June 2015 the Northern District Court of California granted InterDigital’s motion for a preliminary injunction requiring Pegatron (a Taiwanese company) to dismiss its suit in Taiwan, and again in April 2018 it issued an anti-enforcement injunction in the Huawei v. Samsung case to enjoin Huawei from enforcing an injunction on Chinese SEPs entered by the Shenzhen Intermediate People’s Court. The England and Wales High Court also held that an anti-suit injunction could be permissible in Conversant (Singaporean company) v. Huawei and ZTE in 2018. Recently, after the Chinese Supreme People’s Court issued within two days an anti-enforcement injunction against Conversant in August 2020, prohibiting it from enforcing a decision rendered by the Dusseldorf District Court, the Wuhan Intermediate People’s Court has taken the whole world by surprise. It issued in September 2020 a global anti-suit injunction against InterDigital in its suit with Xiaomi (Chinese company) and then issued in March 2021 against Ericson in its suit with Samsung (Korean company) a global anti-suit (excluding even other Chinese courts) and anti-administrative complaint injunction.

As a response, the international community has started to look for alternatives. For example, since November 2015, the Munich IP Dispute Resolution Forum has worked on the role of Alternative Dispute Resolution (ADR) in solving disputes surrounding FRAND licensing of SEPs and proposed the “FRAND ADR Case Management Guidelines” in May 2018. The European Commission (EC) in its 2020 IP Action Plan vows to “improve transparency and predictability in SEP licensing via encouraging industry-led initiatives, in the most affected sectors, combined with possible reforms, including regulatory if and where needed, aiming to clarify and improve the SEPs framework and offer effective transparency tools,” to facilitate licensing and sharing of IP. Seemingly, ADR is one of the industry-led initiatives the EC has in mind.

However, ADR has its drawbacks, at least from the perspective of Asian industries, and can only work under a new construction.

One big drawback of ADR is that there is already an arbitration clause in almost every SEP license, which is almost always imposed by SEP holders and almost always designates the home turf of SEP holders or the headquarters of Standard Setting Organizations (SSOs) as the place for arbitration, which are almost always non-Asian. The result of such arbitration tends to take a formalistic and pure contract law approach to interpret SEP licenses; as Lord Justice Birss has said “it is not necessary to rely on competition law to enforce the FRAND undertaking.” Arbitrators will almost certainly ignore the dominant market power possessed by SEP licensors and its abuse. That is the reason why I have suggested that competition authorities in major Asian economies should promulgate guidelines to demand that SEP licensors limit the scope of arbitration to pure contractual disputes, and exclude those related to anti-trust from arbitration. The lack of competition law consideration during arbitration will not be mitigated by simply reminding that ideal candidates for arbitrators “would have specific expertise in the field of standardization and related competition law issues” as proposed by the FRAND ADR Case Management Guidelines. There are few such people, if any at all, and they will hardly be chosen by SEP holders.

The second drawback is that arbitration taking place elsewhere will preempt local antitrust law suits in major Asian economies, which have offered some practical help to SEP implementers. In the last decade, some standards for FRAND licensing of SEPs under antitrust laws have converged in major Asian jurisdictions. There are three Nos and one Yes. “No” to bundling non-SEPs with SEPs, “No” to continual payment of royalties after the expiration of SEPs, “No” to royalty-free cross-licensing, and “Yes” to the provisioning of patent lists by SEP holders. Failure to uphold the three Nos and one Yes by SEP holders could lead to antitrust issues of abuse of dominance by the SEP holders in these Asian jurisdictions.

The three Nos and one Yes standards take a per se illegal approach and might seem rigid. However, they provide bright-line rules and as a result certainty to SEP implementers in Asia. In addition, they mirror or resemble some of the “Nine No-Nos” that reigned in the US from 1970 to 1995, especially “No” mandatory package licenses and “No” royalty provisions not reasonably related to the licensee's sales. It took the US 25 years to transition to the Antitrust Guidelines for the Licensing of Intellectual Property, which looks at these issues from the perspectives of rule of reason. The three Nos and one Yes standards should therefore be treated with equal understanding and tolerance, as Asian economies might need time to evolve according to their changing conditions and mindsets. Why would Asian SEP implementers agree to throw away that level of antitrust law safeguard by embracing arbitration unconditionally?

On top of that, it is worth noting that oftentimes these three Nos and one Yes standards have also been accepted in the form of consented corrective measures and concrete undertakings made by SEP holders to different Asian competition authorities. Since the SEP holders are global conglomerates and operate internationally, these standards could have the potential of transcending national borders to become global standards. Otherwise, they would be “discriminatory” towards businesses located in other jurisdictions. If we were to promote arbitration beyond Asia, should these antitrust standards be not arbitrable?

The third drawback of ADR is that it lacks the positive externality of a litigation. Its results will not be published, and no teaching and research on and oversight over the licensing of SEPs will be possible. Relevant knowledge will not be accumulated for and disseminated to the public. The FRAND ADR Case Management Guidelines take notice of this concern and suggest that “public policy considerations have to be balanced with confidentiality as an established ADR-principle” and “at least the methods and principles adopted by the parties and the arbitral tribunal in the determination of FRAND terms and conditions should be made public.” Whether this will be acceptable to and practicable for ADR institutions remains highly uncertain.

On the contrary, arbitration by SSOs offers the most viable solution and can best avoid the above drawbacks. For three reasons FRAND licensing of SEPs needs ex ante regulation: increasing litigation worldwide indicates massive market failure; SEPs equal monopoly or joint monopoly; and SSOs from the private sector are replacing sovereign states in the development and adoption of new technical standards. The ex ante regulation is through light-handed control over the self-regulation by SSOs. SSOs are closest to all participants in the market, have professional knowledge about the standards and their major contributors, are not limited by national boundaries, and are therefore best positioned to tackle the problem at the roots.

In other words, SSOs should be asked by regulators to provide safeguards for the smooth implementation of the standards embodied in SEPs. Specifically, SSOs should conduct the essentiality check on the declared SEPs, be the depository of FRAND-compliant royalty rates that their members have signed, which will enable SSOs to concretize FRAND-compliant terms, and provide arbitration service to SEP owners and implementers. To be more feasible, SSOs should take the need for collective management of SEPs seriously. They can learn from the examples of the extended collective management of copyright by forming an umbrella organization to coordinate different arbitration cases to avoid royalty stacking and enhance transparency. That way, a global arbitration, as envisioned by Lord Justice Arnold, can be better achievable.

No single national competition agency can deal with all SSOs. Therefore, concerted action across national competition agencies is a must. Given that almost all SSOs are headquartered in the EU and US, and both the USFTC and EC have dealt with SSOs-related issues, coordination between the two would be a good start. More challenging, though, is to integrate competition authorities of other jurisdictions. It is only fair and appropriate to include at least the competition agencies of Taiwan, South Korea and the PRC, as they have dealt with FRAND licensing of SEPs issues, and their economies are leading the ICT industries. These five competition agencies can form a consortium to oversee the self-regulation of SSOs, including the arbitration service, in a way that best addresses the three drawbacks associated with traditional arbitration.

#### **Unified antitrust enforcement of SEP monopolies is make or break for growth**

McGinnis and Sun, 21 – John O. McGinnis, Professor at Northwestern University and Linda Sun, Associate at Wilmer Pickering Hale & Dorr LLP and J.D. 2020 at Northwestern Pritzker School of Law, Winter, “Unifying Antitrust Enforcement for the Digital Age,” *78 Wash. & Lee L. Rev. 305*, p. Nexis – Iowa

1. The Need for Certainty in Antitrust Regulation of Technology

A unified approach to antitrust regulation is especially important when it comes to the technology industry for three reasons. First, the rapidly growing technology industry is at the center of the U.S. economy: in 2018, the internet sector accounted for $2.1 trillion of the economy and 10 percent of the GDP. 48 Uncertainty about antitrust rules created by dual enforcement hinders economic growth.

Second, technological industries are especially sensitive to shifts in antitrust policy because antitrust actions can change the trajectory of fast-changing industries. For instance, the DOJ's antitrust enforcement action against the Bell System broke up the monopoly in telephony. 49 One court later summarized the effect as "an unprecedented flowering of innovation" in the telecom industry. 50 Agency antitrust action also played a large role in the growth of software, browser, and [\*318] web company competition. 51 In anticipation of a Justice Department antitrust suit, 52 IBM unbundled its software and hardware products in the 1960s, 53 dramatically changing the software market. Nearly overnight, software went from a typically free good to a commercial product. 54 Governmental antitrust enforcement is additionally credited for Microsoft's 1997 investment in its rival company Apple, which saved the then-nascent company from the brink of bankruptcy. 55 Microsoft likely acted in self-preservation because it faced antitrust scrutiny that came to a head in a DOJ suit the year after. 56 The [\*319] Microsoft settlement itself is "credited with giving web companies like Google--and browsers like Google Chrome . . . space to grow." 57 These actions changed the technological landscape, and future antitrust decisions regarding technology companies will have just as significant of an impact, if not more.

Moreover, antitrust policy is very important to the research and development that is the heart of innovation in tech, particularly as more research and development has moved from the public sector to the private sector. 58 Private companies are affected more directly by antitrust policies. 59 Even the financing of technology is dependent on antitrust law. Today, as discussed in more detail below, 60 the primary reason a tech start-up receives funding from investors is its acquisition potential; merger and acquisition policies play a significant role. 61 Once again, certainty here is important for investors, and [\*320] possible and actual conflicts between DOJ and the FTC reduce certainty.

Third, a unified approach to antitrust has become more important because the antitrust issues affecting tech are particularly complex; it is difficult to determine how best to apply antitrust law to emerging technologies. 62This challenge makes it more likely that DOJ and the FTC will proceed on different theories, increasing uncertainty. For instance, antitrust scholars and regulators have struggled to apply the traditional small but significant non-transitory increase in prices (SSNIP) test to zero-price tech markets. 63 The SSNIP test, used by both the FTC and DOJ, defines a relevant antitrust market as the "smallest grouping of products for which a hypothetical monopolist could profitably impose a 5% price increase." 64 However, many technology platforms offer their products at no monetary cost to customers. The lack of measurable price renders the SSNIP test difficult to operationalize. 65 This complexity makes it more likely that the DOJ and the FTC will apply the test differently, resulting in uneven and unfair outcomes. SSNIP is only one of many areas of debate regarding how antitrust is to be applied to technology.

#### Growth prevents extinction and the collapse of the rules-based order

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Broadly shared economic prosperity is a bedrock of America’s economic and political strength—both domestically and in the international arena. A strong and equitable recovery from the economic crisis created by COVID-19 would be a powerful testament to the resilience of the American system and its ability to create prosperity at a time of seismic change and persistent global crisis. Such a recovery could attack the profound economic inequities that have developed over the past several decades. Without bold action to help all workers access good jobs as the economy returns, the United States risks undermining the legitimacy of its institutions and its international standing. The outcome will be a key determinant of America’s national security for years to come.

An equitable recovery requires a national commitment to help all workers obtain good jobs—particularly the two-thirds of adults without a bachelor’s degree and people of color who have been most affected by the crisis and were denied opportunity before it. As the nation engages in a historic debate about how to accelerate economic recovery, ambitious public investment is necessary to put Americans back to work with dignity and opportunity. We need an intentional effort to make sure that the jobs that come back are good jobs with decent wages, benefits, and mobility and to empower workers to access these opportunities in a profoundly changed labor market.

To achieve these goals, American policy makers need to establish job growth strategies that address urgent public needs through major programs in green energy, infrastructure, and health. Alongside these job growth strategies, we need to recognize and develop the talents of workers by creating an adult learning system that meets workers’ needs and develops skills for the digital economy. The national security community must lend its support to this cause. And as it does so, it can bring home the lessons from the advances made in these areas in other countries, particularly our European allies, and consider this a realm of international cooperation and international engagement.

Shared Economic Prosperity Is a National Security Asset

A strong economy is essential to America’s security and diplomatic strategy. Economic strength increases our influence on the global stage, expands markets, and funds a strong and agile military and national defense. Yet it is not enough for America’s economy to be strong for some—prosperity must be broadly shared. Widespread belief in the ability of the American economic system to create economic security and mobility for all—the American Dream— creates credibility and legitimacy for America’s values, governance, and alliances around the world.

After World War II, the United States grew the middle class to historic size and strength. This achievement made America the model of the free world—setting the stage for decades of American political and economic leadership. Domestically, broad participation in the economy is core to the legitimacy of our democracy and the strength of our political institutions. A belief that the economic system works for millions is an important part of creating trust in a democratic government’s ability to meet the needs of the people.

The COVID-19 Crisis Puts Millions of American Workers at Risk

For the last several decades, the American Dream has been on the wane. Opportunity has been increasingly concentrated in the hands of a small share of workers able to access the knowledge economy. Too many Americans, particularly those without four-year degrees, experienced stagnant wages, less stability, and fewer opportunities for advancement.

Since COVID-19 hit, millions have lost their jobs or income and are struggling to meet their basic needs—including food, housing, and medical care.1 The crisis has impacted sectors like hospitality, leisure, and retail, which employ a large share of America’s most economically vulnerable workers, resulting in alarming disparities in unemployment rates along education and racial lines. In August, the unemployment rate for those with a high school degree or less was more than double the rate for those with a bachelor’s degree.2 Black and Hispanic Americans are experiencing disproportionately high unemployment, with the gulf widening as the crisis continues.3

The experience of the Great Recession shows that without intentional effort to drive an inclusive recovery, inequality may get worse: while workers with a high school education or less experienced the majority of job losses, nearly all new jobs went to workers with postsecondary education. Inequalities across racial lines also increased as workers of color worked in the hardest-hit sectors and were slower to recover earnings and income than White workers.4

The Case for an Inclusive Recovery

A recovery that promotes broad economic participation, renewed opportunity, and equity will strengthen American moral and political authority around the world. It will send a strong message about the strength and resilience of democratic government and the American people’s ability to adapt to a changing global economic landscape. An inclusive recovery will reaffirm American leadership as core to the success of our most critical international alliances, which are rooted in the notion of shared destiny and interdependence. For example, NATO, which has been a cornerstone of U.S. foreign policy and a force of global stability for decades, has suffered from American disengagement in recent years. A strong American recovery—coupled with a renewed openness to international collaboration—is core to NATO’s ability to solve shared geopolitical and security challenges. A renewed partnership with our European allies from a position of economic strength will enable us to address global crises such as climate change, global pandemics, and refugees. Together, the United States and Europe can pursue a commitment to investing in workers for shared economic competitiveness, innovation, and long-term prosperity.

The U.S. has unique advantages that give it the tools to emerge from the crisis with tremendous economic strength— including an entrepreneurial spirit and the technological and scientific infrastructure to lead global efforts in developing industries like green energy and biosciences that will shape the international economy for decades to come.

#### **Rules-based order caps escalation and is try or die for a range of existential risks**

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This international system, while not perfect, has proven to be more successful than any in human history at providing security, economic prosperity, and freedom. The evidence of this is apparent in the numbers. Before 1945, major powers frequently engaged in direct warfare on a massive scale, as in the Napoleonic Wars, World War I, and World War II. Since 1945, however, there have been zero great-power wars. As shown in Figure 1, the percentage of people killed in armed conflict has drastically declined in the post-World War II era. Armed conflict killed an average of 1–2 percent of the human population from 1600 to 1945. During the Cold War, an average of 0.4 percent of the world’s population perished due to war. Since the year 2000, less than one one-hundredth of 1 percent of people have died this way.8 Under a rules-based system, the world has continued to make progress in reducing deaths from all kinds of war, including often-intractable civil conflicts.9 Turning to economic prosperity, the global gross domestic product (GDP) per capita in 1945 was $4,079.10 Today it is $11,570.11 This drastic increase in global living standards is evident in Figure 2. The share of the global population living in poverty has dramatically decreased. In 1929, the number of people living in extreme poverty (defined as earning less than 1.90 international dollars per day) was 1.35 billion, almost two-thirds of the world population at the time. In 2015, that figure was 733.48 million, or slightly less than 10 percent of the world population.12 China itself has been one of the biggest beneficiaries of this system, as geopolitical stability in Asia and integration into the global economy helped to lift four hundred million Chinese out of poverty. In the realm of good governance, the number of democracies has substantially increased. With the end of World War II and decolonization, the number of democracies increased from seventeen to forty-eight between 1945 and 1989.13 That number further skyrocketed at the end of the Cold War, as countries formerly behind the Iron Curtain rushed to join the West. In the year 1900, there were twelve democracies in the world. Today there are ninety-six.14 The percentage of the world’s population living under democratic governments has also increased from about 12 percent in 1900 to more than 55 percent today.15 This trend is visible in Figure 3. To be sure, these outcomes are the result of an enormous and interconnected range of factors. International-relations scholars, for example, believe that nuclear deterrence and the absence of a multipolar distribution of power also contributed to great-power peace.16 In addition, globalization and economic development have been fueled by new technological developments. Further, global norms on democratic governance and human rights have come a long way since the early twentieth century.17 Still, it is doubtful whether this dramatic improvement in the human condition could have been achieved in the absence of the rules-based international system. Moreover, many of these other driving forces are themselves constitutive of, if not partially the result of, that system. Global bipolarity, and then unipolarity with the United States at its center, was critical for the postwar development of a rules-based system, which may not have been possible in a more multipolar distribution of international power, or with a non-democratic hegemon at the system’s apex. The splitting of the atom could have resulted in widespread nuclear-weapons proliferation and nuclear use had it not been for the NPT and extended US nuclear deterrence in Europe and Asia.18 The most important technological advances for globalization, including the Internet, occurred and flourished in the free world, defended by the United States and its democratic allies and partners.19 Finally, the United States and its democratic partners, along with nongovernmental organizations and individuals operating in these states, were the most important norm entrepreneurs propagating global norms around issues of good governance, democracy, and human rights. In sum, the rules-based international system that has been the defining feature of global order for the past seventy years has coincided with—and was almost certainly essential in bringing about—the most secure, prosperous, and well-governed world humanity has ever known. Despite this record of unprecedented and enduring success, the rules-based international system is currently besieged by a number of challenges unleashed by rapid and dramatic global change. Understanding the current strategic context, including global trends and threats both external and internal to the system’s democratic core, is a necessary first step toward devising a strategy to revitalize, adapt, and defend a rules-based international system. Global Trends The system is currently buffeted by several worldwide trends, including global shifts in the balance of power, the emergence of disruptive technology, the threat of nuclear proliferation, the rise of nonstate actors, and the consequences of climate change. Global Diffusion of Power. The international distribution of power, as defined by relative economic weight, is shifting away from the founders of the post-World War II system to other emerging economies. As recently as the 1990s, nearly 70 percent of global economic activity occurred in Europe and the Americas. By the 2040s, that number is expected to drop to roughly 40 percent. At the same time, the Asian share of global GDP will increase from 32 percent at present to 53 percent in 2050, meaning that, by that time, the majority of all economic activity on Earth will occur in Asia.20 While the United States remains the world’s most powerful state militarily and economically, it is declining relative to other rising powers, particularly China. When corrected for purchasing-power parity (PPP), China’s GDP has already surpassed the United States. The better metric for international power and influence, however, is real GDP; here, too, the US advantage is narrowing, but more slowly.21 At the conclusion of World War II, the United States possessed roughly 50 percent of global GDP.22 From the 1970s through today, that number has held steady at roughly 25 percent.23 Despite a common misperception, the United States’ share of global power is not declining in absolute terms. Rather, other powers—especially China—are rising. China’s share of global GDP rose from 4.6 percent in the 1990s to 15 percent today.24 Many economists predict that China could surpass the United States as the world’s largest economy by 2030. It is noteworthy, however, that in 2009, economists predicted that this transition would happen by 2020. That date has been pushed back a decade as Chinese growth has slowed. Future projections depend entirely on assumptions about growth rates in the United States and China that cannot be known with certainty. Still, most economists expect that China will, at some point, surpass the United States as the world’s largest economy. China is joined by other emerging economies with rapid growth rates, including India, Indonesia, and others. US allies, including Japan, Germany, and the United Kingdom, remain among the wealthiest nations on Earth, but their share of global power is also declining relative to the rise of the rest. This shift is significant because international orders function best when their formal attributes at least roughly reflect the underlying balance of power. While only one measure of global influence, economic power is central given the leverage it provides over trade and investment, and the resources it offers to sustain military and security advantages. It is also important to point out, however, that the United States and its formal treaty allies continue to possess a preponderance of power in the international system. As Figure 4 shows, the United States and its formal allies currently produce 59 percent of global GDP. When including other countries considered to be “democracies” by the widely used Polity scores, that number rises to 75 percent of global GDP. Democracies continue to retain global influence because more countries have transitioned to democracy since the end of the Cold War, and overall economic growth in democratic countries has outpaced that in autocratic states since 1991. The major shift since the dawn of the post-Cold War world, therefore, is not that the power of the United States and its democratic allies and partners has declined substantially. The major difference is that the share possessed by autocratic challengers, especially China, has grown. As Figure 4 shows, the world is approaching a more bipolar distribution of power, with more wealth concentrated in the democracies and in a grouping of autocratic challengers led by China. This means that, if they are able to work together more cohesively, the United States and its democratic allies and partners still have the power and influence necessary to significantly shape international outcomes. Moreover, if they are able to expand their ranks to court other nonaligned democracies like India, Indonesia, and Mexico, their influence on the international system can be even more decisive. Disruptive Technologies. New technologies—including artificial intelligence (AI), robotics, quantum computing, and biotech, among others—are being developed at an exponential pace, and have the promise to transform society. They will determine how people live and function in the twenty-first century, significantly shaping the global economy, international security, and the course of geopolitics. Throughout history, progress has been built on technological innovation, ranging from Thomas Edison’s light bulb to Henry Ford’s assembly line to the silicon chip, the personal computer, and the Internet. While new technology promises improved productivity and quality of life, it will bring serious downside risks, including economic dislocation and weapons proliferation. AI, for example, is already being widely adopted in the private sector to achieve great efficiencies and cost savings.25 At the same time, automation threatens to put millions out of work as jobs once performed by humans are replaced by machines. Moreover, AI is also being introduced into national militaries. A logical next step is fully autonomous weapons that can select and engage targets without a human in the decision-making loop. Some warn that these “killer robots” introduce many ethical and security risks, including the fear that they may turn on their creators and threaten humans’ very existence or, indeed, what it means to be human.26 Henry Kissinger warns, “We are in danger of losing the capacity that has been the essence of human cognition.”27 The existing international system was designed to deal with the most important dual-use technologies of the twentieth century, such as nuclear power, but it must be updated to deal with the technologies of the twenty-first century. As with nuclear energy, the international community needs an entirely new set of international norms, standards, and agreements for responsible uses of new technologies that mitigate their downside risks, while maximizing their upside potential. Since the time of Edison, the United States has been the world’s most innovative country, but it is at risk of losing that title to China and other countries that aim for the first-mover advantage in the next round of technological breakthroughs. Throughout history, technological progress and international leadership have gone hand in hand. Think of roads and aqueducts in ancient Rome, the steam engine in nineteenth-century Great Britain, and the Internet in the United States. If China or another country takes the lead in the new tech arms race, Beijing may be in a better position to rewrite the international system’s rules. Nuclear Proliferation. Even as the world grapples with the technological challenges of the twenty-first century, century-old technological challenges remain. The NPT may be the most successful treaty in history, but its future is uncertain. North Korea has become the only country in history to sign the treaty, withdraw, and build nuclear weapons. If North Korea is allowed to become an accepted nuclear-weapons state, it would pose a severe threat to international peace and security. Other members of the treaty may also reconsider their nuclear options. In particular, South Korea and Japan may be at risk of pursuing nuclear-weapons programs if the program in Pyongyang continues to advance and the United States is unwilling or unable to provide Seoul and Tokyo with adequate security assurances. Iran’s nuclear program was allowed to operate within strict limits according to the terms of the Joint Comprehensive Plan of Action (JCPOA), but the US withdrawal from that agreement may lead Tehran to accelerate its nuclear program or dash to achieve a nuclear weapon. A bomb in Iran could also instigate further regional nuclear proliferation.28 Officials in Saudi Arabia, for example, have declared that if Iran acquires nuclear weapons, Riyadh will follow suit. A proliferation cascade in East Asia or the Middle East would undermine the global nonproliferation regime and fuel regional insecurity. Moreover, new technologies such as additive manufacturing may make it easier for future proliferators to build nuclear-weapons programs, and harder for the international community to catch and stop them.29 The additional spread of a weapon that remains the ultimate instrument of military force could threaten the global security and stability necessary for the smooth functioning of the rules-based international system. Ecological Disaster. As with nuclear war, an ecological disaster could constitute a direct threat to humanity’s very existence. While states have made efforts to address climate change caused by carbon emissions, including in the Paris Climate Agreement, these steps will not be sufficient to keep emissions below the target levels set by leading scientific panels. Higher average global temperatures are leading to rising sea levels, drought, an increased frequency of violent storms, and forced migrations, all of which are threatening vulnerable societies, undermining already-weak national governments, and contributing to conflicts over natural resources.

#### Resolving dual enforcement solves patent holdup, international signaling, and durable global interoperability

Alanko, 20 – Anita, Patent examiner at the United States Patent and Trademark Office and J.D. from The Catholic University of America, Columbus School of Law. “The New Madison Approach to Antitrust Law and Intellectual Property Law,” *28 Cath. U. J. L. & Tech. 219*, Spring, p. Nexis – Iowa

The DOJ-FTC have already issued joint "Antitrust Guidelines for the Licensing of Intellectual Property" in 2017 to guide the public about when anticompetitive conduct can be found in the licensing of intellectual property. 265 The guidelines state that intellectual property is considered the same as any other form of property for the antitrust analysis. 266 While patents can confer market power, market power does not violate antitrust law if that power derives from "a superior product, business acumen, or historic accident." 267 The guidelines describe the markets affected by licensing, and general principles and their application in evaluating license agreements using the rule of reason. 268 With respect to the fourth element of the New Madison Approach, the guidelines state, "Nor does such market power impose on the intellectual property owner an obligation to license the use of that property to others." 269 However, as discussed above, this is not a necessary result and exceptions may be possible. 270 Furthermore, the guidelines do not directly address standard-essential patents within the context of standard-setting organizations. As technology progresses and SSOs become more prevalent, clear policy is needed.

In response to the debate and withdrawal from the 2013 Joint Policy Statement, the USPTO, the National Institute of Standards and Technology [\*251] ("NIST"), and the DOJ Antitrust Division issued a new 2019 Policy Statement. 271 Good-faith negotiations between patent owners and licensees are expected, but injunctions should be available for patent infringement as the facts warrant, with no special rules for standard essential patents. 272 The 2019 Policy Statement reiterates that a balanced approach, accounting for all remedies, will preserve competition and provide incentives to innovate. 273A USPTO press release quotes Under Secretary of Commerce for Intellectual Property and Director of the USPTO Andrei Iancu stating, "The new joint statement effectively takes the government's thumb off the scale" and is meant to "incentivize technological development and growth of standards-based industries." 274

This is a fair debate, but the enforcement agencies are in a unique position to drive the discussion towards the best solution. A faithful effort now to gather public input will help ensure that any guidelines and policy statements are likely to be accepted. 275 That way, policy and guidelines can remain valuable and withstand the test of time. 276

By coming together with the DOJ, stakeholders can send a strong statement to the world that the patent system is strong and open to all inventors in the world. The role of antitrust law in the patent system must be clear. It is not one to be shuttered away but approached on a case-by-case basis, as the facts and circumstances demand.

America's inventors and those who invest in patented technology in America deserve clarity, a strong intellectual property system, and a strong antitrust system. Antitrust enforcers, innovators, and implementers can and must all work together to better our society.

IV. CONCLUSION

Intellectual property law and antitrust law can work together to promote innovation that increases consumer welfare. However, antitrust law should not [\*252] be short-sighted and look for short term rewards. Having a variety of remedies available, including injunctions, ensures that parties will negotiate in good faith and abide by their commitments over time. The New Madison Approach is a necessary debate; further discussion and analysis will ensure that policy and guidelines that stand the test of time can be developed. Innovation is necessary at the cutting edge, creating new products in an unpredictable time frame. This demands flexibility to ensure that the society can reap the greatest benefit possible. Antitrust law should also address patent hold-up and hold-out, injunctions, and unilateral refusal to license with clear policy. Ultimately, society will reap the benefits of an appropriate approach to these bodies of law.

### 1AC – Telecommunications

#### FRAND unraveling now – stricter antitrust application is key to prevent ex post monopolies prevents collapse of wireless telecommunications and US leadership

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Antitrust best achieves its purpose when it takes markets as it finds them, and then protects them from threats to competition. The antitrust tribunal must understand the market before it and the rationales and effects of its various rules. Then it considers whether a challenged restraint might operate anticompetitively so as to cause unnecessary consumer harm. For more than a century, antitrust jurisprudence has approached markets in this way. For example, Justice Brandeis’s opinion in the Board of Trade case3 began by describing the Board’s operation as a market. From that point the Court’s job was to ascertain whether the challenged rule operated anticompetitively to undermine this purpose.4 In the NCAA case nearly seventy years later it did the same thing—acknowledging the valuable market created by this joint venture of colleges to promote amateur intercollegiate athletics. It condemned a restraint on competition that reduced output and harmed consumers and was not central to the NCAA’s purpose.5 The list of cases in which the Supreme Court has followed this template so as to protect the competitive integrity of standard setting or other collaborative market processes is long.6 In a particularly myopic decision involving the FRAND process, the Ninth Circuit made no attempt to understand that process or how the antitrust laws could be used to protect it from anticompetitive restraints.7 That was not entirely the court’s fault. Part of the blame lies with the Antitrust Division of the Justice Department, which intervened in the proceeding and seemed more intent on protecting Qualcomm than the competitive integrity of the FRAND process.8 While the FRAND process has been highly productive, it is also fragile. Firms are tempted to make commitments at the beginning when the incentive to join is large, but renege on them later when they can profit by doing so. At least in this particular case, private FRAND enforcement had not worked very well. Qualcomm had been able to violate FRAND commitments in order to exclude rivals and obtain higher royalties than FRAND would permit, largely with impunity. Other firms will very likely follow Qualcomm’s lead. If that happens the FRAND system will fall apart, doing irreparable injury to the modern wireless telecommunications network or, at the very least, diminishing the leadership role of the United States in preserving effective network competition. While governments can be heavily involved in standard setting,9 the implementation of technical standards in information technologies is largely the work of private actors. Government involvement is limited mainly to enforcement of contract, intellectual property, or antitrust law. As private actors, those involved in standard setting or compliance are fully subject to the federal antitrust laws. This Article addresses one question: when is an SSO participant’s violation of a FRAND commitment an antitrust violation, and if it is, of what kind and what are the implications for remedies? It warns against two extremes. One is thinking that any violation of a FRAND commitment is an antitrust violation as well. In the first instance FRAND obligations are contractual, and most breaches of contract do not violate any antitrust law. The other extreme is thinking that, because a FRAND violation is a breach of contract, it cannot also be an antitrust violation. The question of an antitrust violation does not depend on whether the conduct breached a particular agreement but rather on whether it caused competitive harm. This can happen because the conduct restrained trade under section 1 of the Sherman Act, was unreasonably exclusionary under section 2 of the Sherman Act, or amounted to an anticompetitive condition or understanding as defined by section 3 of the Clayton Act.10 The end goal is to identify practices that harm competition, thereby injuring consumers. The Ninth Circuit’s Qualcomm decision will make antitrust violations in the context of FRAND licensing much more difficult to prove, even in cases where anticompetitive behavior and consumer harm seem clear.11 Indeed, in this case the court itself acknowledged the harm to consumers but appeared to think that they were not entitled to protection.12 If this decision stands, FRAND obligations will to a larger extent have to be settled through private litigation and the federal antitrust enforcement agencies will have a diminished role. Anticompetitive behavior by one firm that is not effectively disciplined will lead others to do the same thing. Not only did the Ninth Circuit reject application of the antitrust laws in this case, it also appeared to repudiate antitrust’s consumer welfare principle, saying: . . . [T]he district court correctly defined the relevant markets as “the market for CDMA modem chips and the market for premium LTE modem chips.” Nevertheless, its analysis of Qualcomm’s business practices and their anticompetitive impact looked beyond these markets to the much larger market of cellular services generally. Thus, a substantial portion of the district court’s ruling considered alleged economic harms to OEMs—who are Qualcomm’s customers, not its competitors—resulting in higher prices to consumers. These harms, even if real, are not “anticompetitive” in the antitrust sense— at least not directly—because they do not involve restraints on trade or exclusionary conduct in “the area of effective competition.”13 The quotation is from the Supreme Court’s decision in Ohio v. American Express Co.,14 where the Supreme Court said only that a relevant market is “the area of effective competition.” The Ninth Circuit panel apparently believed that antitrust harm could occur only to producers inside the relevant market, which typically excludes most customers. The Ninth Circuit did not quote the Supreme Court’s decision one year later in Apple v. Pepper,15 that “Ever since Congress overwhelmingly passed and President Benjamin Harrison signed the Sherman Act in 1890, ‘protecting consumers from monopoly prices” has been “the central concern of antitrust.’”16 The very reason we condemn restraints under the antitrust laws is because they result in lower output and higher prices, harming consumers. The Ninth Circuit panel appeared to believe that higher prices for OEMs—that is, the manufacturer customers who purchase chips for inclusion in their devices— is not the kind of injury that concerns the antitrust laws. Rather, it must be harm to competitors. Customers are often, even typically, not producers in the relevant market. Nevertheless, they are clearly antitrust’s protected class. For example, while exclusive dealing in the first instance might deny selling opportunities to a rival producer, we condemn it because it threatens price increases to their buyers and those who purchase from them. Indeed, the reason we have market power requirements in antitrust cases in the first place is to distinguish harms to rivals that are likely to result in market price increases from those that are not. Competitor exclusion in a competitive market is not an antitrust violation because, while it injures the competitor is does no consumer harm. That is the all-important difference between business torts and antitrust law. Patent holders who participate in SSOs generally agree to provide timely disclosure of their patents or patent applications that are reasonably expected to read on the participants’ technology. 17 They also agree in advance to license their patents thought to be essential to the standard on FRAND terms.18 The Patent Act itself does not impose this obligation. Patentees who are not involved in SSOs have no obligation other than market pressures to submit their patents to a standard or engage in FRAND licensing.19 In networked technologies, however, these market pressures can be substantial. For example, if a patentee refuses to commit its patented technology to an industry standard, the SSO is likely to adopt a different standard that is not believed to infringe those patents.20 Or if a patentee refuses to commit to license a patent to all comers on a nondiscriminatory basis, then the SSO may respond by seeking an alternative standard.21 These actions are driven by the SSO’s goal of competitive creation of a technology when interoperability among diverse producers is a necessary component. Just as any producer, firms involved in the implementation of networked technology seek to minimize their costs by avoiding unnecessary or unnecessarily costly patents. Such avoidance is a socially valuable form of cost minimization. The FRAND obligation generally requires patentees to license freely to all qualified participants, whether or not they are competitors of the patent holder.22 Further, they must settle royalty disputes in a reasonable manner—if necessary, through a third party, such as a court or arbitrator.23 If reference to an arbitrator is contractually specified, such agreements may also be subject to compulsory arbitration under the Federal Arbitration Act.24 The FRAND system facilitates competition by assuring new firms as well as existing ones that they will be able to operate on the networked technology. Royalties to the owners of these patents are generally measured by the value that the contributed patent makes to the standard.25 Importantly, tribunals seek to measure these values “ex ante,” or prior to the patent’s adoption into a standard and at a time when there is a fuller range of competitive alternatives.26 Once the standard is adopted and implementers have incorporated it into their own technologies, a standard essential patent is likely to be in a much stronger position, approaching monopoly in some cases.27 Patents that are committed in this way are described as “standard essential patents” (SEPs), or as being “FRAND encumbered.”28 Qualcomm was able to evade this “ex ante” requirement by insisting on purchaser acceptance of a license on its own terms before it would sell chips.29 Having a patent declared standard essential can increase its value considerably, mainly because the promise of a license at a reasonable rate steers developmental decision making in favor of that particular technology. When a firm makes a commitment to develop its products under a particular standard, it wants assurance that it will have a durable right to operate under that standard at reasonable royalty rates. This process naturally leads to the creation of considerable path dependence in standards. It encourages firms to develop their own technology in ways that ensure interoperability but that can be costly to reverse after the fact.30 This phenomenon of increased value for SEPs also motivates patent owning firms to “over-claim”—that is, to assert that patents are standard essential when subsequent litigation or evaluation determines that they are not. While FRAND agreements require participants to declare relevant patents thought to be essential, the rate of actual declaration far exceeds any rational boundary. As many as one-third to more than half of declared SEPs are very likely not essential to the standard for which they were declared,31 and allegations about the practice of over-declaring are currently being litigated as potential antitrust violations.32 In fact, overall infringement rates for SEP patents are not materially different from those for non-SEP patents.33 A declaration of non-infringement means that, although the patent might be valid, it does not in fact read on the defendant’s particular device or process. In effect, the patent is not a part of the defendant’s technology, and thus cannot be essential. The problem is exacerbated by the fact that, for the most part, SSOs have no process up front for reviewing or questioning individual participants’ declarations that a patent they are offering is in fact both valid and standard essential.34 Ex ante, a patent may offer one of many alternative technological paths to a certain goal. However, ex post, after a standard has been adopted and others have developed their technologies in reliance, the range of acceptable alternatives can decrease dramatically. As a result, the patent whose path is adopted becomes much more valuable.35 In that case, a firm’s ability to evade the FRAND obligation by charging selectively higher royalties to some licensees or conditioning licenses on the purchase of other technology can be extremely lucrative for the patentee but costly to implementers of the standard and disruptive of the SSO’s developmental goals.36 In its Qualcomm decision noted above, the Ninth Circuit did not indicate any awareness of these motivations or their potential for harm.37 In general, the goal of FRAND is to make patents available to participants at a price equivalent to what the patent would have been worth in the more competitive market prior to the time it was declared essential. The relevant question is what was the value of the patent’s contribution to the standard at a time when competitive alternatives may have been available, as opposed to a later time when other firms have dedicated themselves to the standard?38 This approach is simply a variant of the proposition that even a monopoly market can be made competitive if we require competing firms to bid for the opportunity to be the monopolist.39 Even though a natural monopoly entity such as a public utility has the market power of any monopolist, someone must still choose who gets to be the monopolist.40 The winner will be the firm that promises the most competitive behavior, provided that it can be held to that commitment. Once the auction is over and the winner has been selected, however, it will have an incentive to renege on its auction promise and charge whatever price its newly acquired monopoly status provides. FRAND creates similar incentives, as the Qualcomm case illustrates. Alternative proposals to the effect that the FRAND patentee and the licensee should split the difference between value to the patentee and value to the implementer41 improperly take an ex post rather than ex ante view of value and asks the royalty tribunal to divide evenly the difference between the seller’s (patentee’s) willingness to accept and the buyer’s (licensee’s) willingness to pay after FRAND status has been established. That may be a useful way of thinking about price in a bilateral monopoly,42 but only after the bilateral monopoly has formed. The competitive solution is to give the seller the price it would have obtained in a competitive market, which is manifestly not an even division of the surplus. Rather, it is a competitive return to the seller.43

#### US tech leadership via collaboration and the IOT is try or die for confronting several existential risks

Khan, 19 – Dr. Mehmood Khan is chair of the U.S. Council on Competitiveness and Vice Chairman and Chief Scientific Officer for Global Research & Development, PepsiCo. “MAINTAINING U.S. LEADERSHIP IN SCIENCE AND TECHNOLOGY,” excerpted from Dr. Mehmood Khan’s testimony before the House Committee on Science, Space and Technology on 6 March 2019. <https://insight.ieeeusa.org/articles/maintaining-u-s-leadership-in-science-and-technology/> -- Iowa

Given the profound impact of science and technology on U.S. prosperity, standards of living, national security, modern society and geopolitical standing, every American should be concerned with the nation’s ability to lead in science, technology and innovation. More than any country in history, the United States has been the greatest driver and beneficiary of technology, innovation and a vibrant entrepreneurial spirit. In the 19th century, entrepreneurship and innovations surrounding agriculture, rail, oil, steel and electricity turned the United States into an industrial and economic powerhouse, laying the foundation for a manufacturing sector that provided middle class jobs and a higher standard of living for millions of Americans. In the 20th century, American inventions and advancements in vehicle and aircraft technology revolutionized transportation and changed society and the geographic face of the country. American-born digital technologies unleashed a revolutionary new age of computing, communications and information mobility, disrupting industries and business models, changing society and culture around the world, and creating enormous new wealth. This continuum of innovation has delivered prosperity and rising standards of living to Americans, and propelled the United States to global leadership. As we enter the third decade of the 21st Century, a new urgency, a new innovation reality, a new imperative faces the nation. Notwithstanding a currently robust economy – rising and strong economic, productivity and job growth; historically low unemployment; wage increases; an improved tax environment; etc. – the Council on Competitiveness believes U.S. leadership in technology and long-term competitiveness is under threat. This potential demands the urgent attention of our nation’s leaders, and a focused examination of our capabilities, investments and policies related to science, technology development and innovation. The Case for Ongoing Investment While the United States is enjoying an economic upswing on many fronts, U.S. leadership in technology is under renewed threat. In 1960, the United States dominated global research and development (R&D), accounting for 69 percent share of the world’s R&D investment. The United States could drive developments in technology globally by virtue of the size of its investment. Today, we have evolved into a multipolar science and technology world. As other nations have increased their R&D investments and capacity for innovation, the U.S. share of global R&D expenditures has dropped to 28 percent in 2016, diminishing the U.S. dominance and leverage over the direction of technology advancement. At the same time, China has risen to the account for a quarter of global R&D spending. In addition, America’s lead in venture capital is shrinking, further diminishing its role as a driver of technology and innovation globally. In 1992, U.S. investors represented 97 percent of the $2 billion in venture finance, and accounted for about three-quarters just a decade ago. However, in 2017, U.S. investors led 44 percent of a record $154 billion in venture finance, with Asian investors (with China leading) accounting for 40 percent. Moreover, while the absolute level of venture capital coming to the United States has increased substantially, the U.S. share of the growing global pool of venture capital – which has increased more than 200 percent since 2010 – has dropped sharply from 95 percent in the early 1990s to about half in 2017. While traditional U.S. competitors – such as Germany, Japan, France and the U.K. – continue to be strong R&D performers working at the leading edge of technology, many emerging economies seek to follow the path of the world’s innovators, transform to knowledge-based economies, and drive their economic growth with technology and innovation. A growing number of emerging economies are establishing government organizations and ministries focused on technology and innovation, adopting innovation-based growth strategies, boosting government R&D investments, and developing research parks and regional centers of innovation. Some of these economies are also working to increase their production of scientists and engineers. These actions are raising technology and development capabilities and innovation capacity around the world. A nation’s R&D intensity expressed as R&D expenditures as a percentage of GDP provides another gauge of national R&D performance. In this measure, the U.S. position globally has lagged in recent years, as other countries have expanded the range and scope of their R&D activities. Notably, South Korea, one of the world’s largest R&D performers and another formidable U.S. competitor, ranks at the top in this metric. At the same time, key U.S. science and technology infrastructure is eroding. Much like roads, rails and power plants were essential for the Industrial Age, infrastructure that supports knowledge creation and technology development is vital for the 21st century knowledge economy and U.S. success in innovation-based global competition. This includes laboratories, research and technology demonstration centers, supercomputers, test-beds, wind tunnels, propulsion and combustion facilities, simulators, accelerators and other user facilities. America’s national laboratory system is considered a distinctive and globally unique competitive asset. But, across the system, core scientific and technological capabilities are potentially at risk due to deficient and degrading infrastructure and repair hamstrung by chronic underfunding, and maintenance backlogs in the hundreds of millions of dollars. New Disrupters At the same time that competition in technology and innovation is rising around the world, and U.S. technology leadership is under threat, we are witnessing accelerated advancement of the greatest revolutions in science and technology; a new phase of the digital revolution characterized by vast deployment of sensors, the internet of things, artificial intelligence (AI), and the big data tsunami; biotechnology and gene editing; nanotechnology; and autonomous systems. Each of these technologies has numerous applications that cut-across industry sectors, society and human activities. Each is revolutionary; each is game-changing in its own right. But they are now colliding and converging on the global economy and society simultaneously, with profound implications for U.S. economic and national security. These technologies are crucial drivers of productivity and economic growth, altering the patterns of society and many dimensions of everyday life. For countries and companies, the ability to leverage these technologies for economic impact is fundamental to their competitiveness and economic success. In addition to their economic potential, these technologies could solve many of the world’s critical challenges surrounding areas such as health, energy and sustainability, clean water and the global food supply. Optimizing the Environment for Innovation Systems Since the early 2000s, new models of innovation have emerged, and others have matured in response to the transformation of the global competitive landscape that began in the 1980s. Multiple technology revolutions and their convergence, and the nature of global challenges require models of innovation built on internal resources, external collaboration and a larger, more diverse innovation skill set. For example, in a recent survey of U.S. manufacturing firms, of those firms that had innovated, 49 percent reported that the invention underlying their most important new product had originated from an outside source. These models of innovation have expanded the scope of participants in the innovation ecosystem, and the ways in which companies, innovators, and entrepreneurs pursue innovation. As companies have moved away from exploratory research toward nearer-term applied research and technology development that support business units, foundational technology breakthroughs increasingly come from universities, national laboratories and small start-up companies that are disproportionately supported by public R&D investments. While the public role in the innovation ecosystem has increased in importance, U.S. public investment has not kept pace. This government investment plays a key role as the seed for future applied research and technology development, and for training the next generation of scientists and engineers. However, with increasing democratization of innovation, a growing pool of innovators and problem solvers are largely disconnected from the research, development and training institutions this public investment supports. There are many factors that affect a country’s ability to innovate and compete. This includes levels of investment in R&D, the availability of capital including venture capital to fuel start-ups and innovation at critical stages, the availability of talent, the environment for entrepreneurship, and the general business environment including taxes and the level of business regulation. These elements are different in countries around the world, and can play a significant role in a country’s competitiveness and capacity for innovation. U.S. competitors around the world seek to build and strengthen knowledge and technology-based economies as the basis for advancing productivity, job creation, raising standards of living and, in some cases, advancing geopolitical goals. As a result, many deploy policies and programs to harness science, technology and innovation, and to create a business environment to achieve this impact. These countries are instituting their own distinctive innovation ecosystems, which may not be compatible or friendly with the U.S. innovation system. Can the U. S. Compete? We are seeing changes in technology, competition and the global economy, historic in terms of their size, speed and scope. The U.S. faces hyper competition, a potential new global superpower competitor in China, and the prospect of economic and social disruption brought about by the unrelenting and accelerating march of technology. Nevertheless, in a global economy ever more driven by technology and innovation, an enabling environment for innovation remains the advantage of only a few economies, with the United States in a position of significant strength: The U.S. remains the world’s epicenter for disruptive innovation, thanks to its exceptional research infrastructure and low barriers to entrepreneurs and start-ups. The U.S. remains the world leader in high-tech manufacturing. It has a 31-percent global share and its output is growing. China is closing the gap with a 24-percent share and its output is also growing, surpassing Japan and the EU. The U.S. remains the world’s largest investor in R&D for 28 percent of global R&D spending. It now invests half a trillion in R&D per year and has built up a globally unparalleled national stock of science and technology. Because the U.S. is by far the world’s largest innovator in basic research, it dominates patenting, sowing the seeds of future innovation, representing about one quarter of all international patent applications filed in 2016. The U.S. has distinctive assets – its national laboratories and top research universities. In the U.S. innovation ecosystem, industry, start-ups, national labs and universities collaborate on R&D across the spectrum of science and technology. Vast amount of venture capital is pouring in to commercialize advanced technologies. The U.S. is seen as the global technology leader. A recent survey asked researchers across the world which country they considered to be the global leader in 12 advanced industries. The U.S. was named most often in 11 of the 12 industries. Despite these significant U.S. strengths, the competitiveness of a wide range of nations – not to mention economic and technological change – is dynamic and ever transforming. A country’s comparative position can change rapidly. Conclusion The United States is at a critical moment in time in national innovation systems research and action. New, transformational models driven by the democratization and self-organization of innovation are emerging and taking root across the nation. But, at the same time, U.S. leadership is under threat. The United States faces now what are perhaps existential challenges to its global leadership in innovation. America’s role in technology advancement is diminishing globally—now accounting for only one-quarter of global research & development investments, down from two-thirds in 1960. Competitors are increasing their capacity for innovation. And rapid technological change and disruption have impacted the workforce and communities. When the U.S. controlled the direction of technology, we were positioned to control our economic destiny. That is no longer guaranteed. The United States must take stock. We must assess if our innovation ecosystems and investments are enough to maintain our global economic and technological leadership. And, as technology seeps into nearly every aspect of American life, our national leaders and our government at every level must bolster their knowledge and response capabilities to match the strengthening competition, technological change and disruptions that are coming.

#### Lack of FRAND certainty decks 5G, IoT, Autonomous Vehicles

Borgogno and Colangelo 2021, Giuseppe Colangelo University of Basilicata, Department of Mathematics, Computer Science and Economics; Stanford Law School; LUISS Guido Carli, Department of Business and Management Oscar Borgogno Bank of Italy, (4/16/2021 “SEPs licensing across the supply chain: an antitrust perspective” https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=3766118)//ellie

The seemingly endless issue of the legal treatment of standard essential patents (SEPs) is clearly one of the most complex matters currently at the heart of intellectual property and competition law. At present, the standards are set to reinforce even further their role as building blocks of the modern global economy, playing a key role in ensuring interoperability and technical compatibility across a broad range of industries. Standards can facilitate the creation and integration of markets, foster positive feedback loops, reduce uncertainty in the marketplace, and lower costs and prices for downstream products.1 By ensuring interoperability, they make networks more valuable. As the holder of a patent included within a standard benefits from a significant increase in value of its legal title, if the standard is successfully adopted, firms may be incentivised to act opportunistically to influence the design of a standard and to maximise their resulting ex post benefits. Indeed, whereas at an early stage of standard definition alternative technologies compete for inclusion in the standard, once the selection has been carried out implementers are locked into the standard. Further, in some industries implementers invest into their products before the standard is chosen or before it is known whether a technology will violate an existing patent. This makes in turn switching prohibitively costly or impractical. High switching costs may create market power for the owners of patents that cover the standard. As a result, they can leverage their position demanding a royalty that reflects not only the value of the technology compared to alternatives, but also the value associated with investments made by producer to implement the standard. This issue is commonly known as hold-up problemand refers to the difference between patent holders’ pricing incentives ex ante (i.e. before the standard is set) and their pricing incentives ex post. At the same time, licensees may also engage in strategic practices refusing to agree on patent holders’ offers and exacerbating litigation in order to escape the payment of royalties or depress prices (reverse hold-up or hold-out). Until recently, the debate has centred on the nature of fair, reasonable and nondiscriminatory (FRAND) commitments and the mechanisms to avoid hold-up and reverse hold-up (or hold-out) problems between licensors and licensees. In order to prevent, or at least credibly reduce, the risks of patent hold-up and to increase the willingness of firms to participate in the development of a standard, Standard Setting Organisations (SSOs) typically adopt disclosure and licensing rules. Notably, with regard to the latter, SSOs require SEP holders to accept FRAND commitments. In general, by requiring a licence to be provided on fair and reasonable terms, the goal is to make SEPs available at a price equivalent to what the patents would have been worth on the market prior to being declared essential. Hence, the FRAND commitment aims to avoid or to reduce the extent of monopoly pricing by SEP holders. Similarly, the non-discrimination requirement is intended to prevent SEP holders from extracting monopoly premiums through selective licensing or “migrating their monopoly power from the FRAND-regulated market to unregulated standard-implementing product markets by licensing to only one or a few implementers or licensing to selected implementers on discriminatorily favorable terms.”2 However, it is debatable whether FRAND commitments can effectively prevent SEP holders from imposing excessive royalty obligations upon licensees, largely due to the unclear economic meaning of the FRAND acronym.3 In fact, there are no generally accepted tests to determine whether or not a particular licence satisfies a FRAND commitment. Furthermore, no consensus exists over its legal effects, notably in relation to whether or not FRAND commitments should imply a waiver of general legal remedies (more specifically, injunctions and other extraordinary remedies). Hence, while the implications of FRAND commitments are undoubtedly significant, their meaning is inherently ambiguous from both an economic and a legal perspective. It comes as no surprise that such broad uncertainty has led to a vast wave of litigation proceedings worldwide in recent years. Against this background, the rise of the Internet of Things (IoT) and the development of 5G are set to add an additional layer of complexity to the current practice of SEP licensing. Indeed, as new technologies are facilitating widespread interconnection between all sorts of devices, the smooth implementation of the 5G standard is crucial to the economic potential of the IoT. For instance, many of the impending disruptive technologies, such as AI-driven robots, personalised healthcare, autonomous driving, and augmented reality, would not be possible without the interconnection between physical and virtual objects enabled by the 5G standard. Therefore, in a break from the past, new standard implementers - which do not belong consistently to the ecosystem of mobile communications - will find themselves having to deal with the intellectual property complexities of this industry. For instance, the automotive industry is taking centre stage as the ecosystem in which the issue of FRAND licensing levels is raised to the highest degree. The market viability of new generation vehicles is closely dependent on their embedded connectivity with third parties and application platforms (such as Android and iOS).5 Therefore, as the industry's evolution hinges on advanced mobile telecommunication standards, automakers have been pledging to install connectivity solutions in all their new vehicles in the coming years. Notably, 5G-compliant mobile technologies are expected significantly to enhance the safety and functionality of vehicles, including vehicle-toeverything communication, allowing data to be transmitted from a car to another entity, including nearby vehicles.

#### Smooth 5g implementation allows for autonomous vehicles but maintaining FRAND standards are key

Woo et el 2019, Darryl M. Woo is an IP litigation partner at Goodwin Procter LLP in San Francisco, CA; and Raymond Millien is Vice President and Global Chief IP Counsel at Volvo Car Group in Gothenburg, Sweden, Darryl M. Woo, Goodwin Procter and Raymond Millien, Volvo Car Group (April 02, 2019 “5G and Autonomous Vehicles: Is FRAND Grand?” https://www.law.com/legaltechnews/2019/04/02/5g-and-autonomous-vehicles-is-frand-grand/)//ellie

With 5G, the promise of autonomous vehicles safely and efficiently gliding down roads and highways everywhere can become a reality. Such a promise, however, can only be achieved through the thoughtful setting of technology standards so that every vehicle is on the same page of a very complicated playbook of vehicle-to-vehicle, vehicle-to-network, vehicle-to-infrastructure, and vehicle-to-pedestrian communications, much of which will be covered by thousands and thousands of patents. If, for example, one OEM’s self-driving vehicle could not seamlessly and reliably communicate with another OEM’s self-driving vehicle, the promise of safer and more efficient personal transportation quickly falls apart. The questions of which patents cover the technology necessary to run this complicated communications playbook and how to license them represent a major issue for the automotive industry. Reminiscent of nineteenth-century settlers of Oklahoma, companies are already stockpiling patents on inventions that may be used to comply with 5G-related technical standards, positioning themselves for a modern-day land rush. In exchange for a standard setting body’s adoption of a company’s suite of patents, the company must contractually bind itself to refrain from seeking to enjoin unlicensed implementers, in favor of licensing them on terms deemed Fair, Reasonable and Non-Discriminatory (FRAND). FRAND by its literal terms suggests a desirable even-handedness. In a technology ecosystem that must implement standards to enable the ultimate goal of a network where vehicles communicate with each other as well as with road surfaces, traffic controls and other connected endpoints, FRAND licensing of standard essential patents (SEP) is an unquestionable prerequisite. If the past decade’s smartphone patent wars and the evolution of the mobile telephone market have taught us anything, it is that what is “fair” or “reasonable” to some, may be the antithesis of that to others. Non-discrimination sounds good until it is invoked to charge everyone—from an inexpensive 5G fitness bracelet to a more expensive autonomous drive vehicle—the same percentage of net sales. In the 4G LTE world of today, dominated by smartphones, tablets and handhelds, such a disparity among devices is not the issue it will be when 5G standards will be applicable to a much broader range of connected products. And yet, fights already exist between SEP owners and SEP implementers over a range of issues, including how to determine the essentiality of an alleged SEP, the reasonableness of a “reasonable” royalty, and what it means to be “non-discriminatory.”

#### **IOT-driven autonomous vehicle interoperability powers green mobility, which mitigates existential warming and environmental degradation**

Bahr et al, 8-26-21 – Roy Bahr, SINTEF Digital AS, Oslo, Norway, along with Reiner John (AVL List GmbH, Graz, Austria), Patrick Pype (NXP Semiconductors, Leuven, Belgium), Gerhard Mitic and Kai Kriegel (Siemens AG, Munich, Germany), Vincent Lorentz, Stefan Waldhör, and Steffen Bockrath (Fraunhofer IISB, Erlangen, Germany), Hans Erik Sand (NxTech AS, Fredrikstad, Norway). “Automotive Intelligence Embedded in Electric Connected Autonomous and Shared Vehicles Technology for Sustainable Green Mobility,” *Front. Future Transp.*, 26 August 2021, https://doi.org/10.3389/ffutr.2021.688482

Abstract

The automotive sector digitalization accelerates the technology convergence of perception, computing processing, connectivity, propulsion, and data fusion for electric connected autonomous and shared (ECAS) vehicles. This brings cutting-edge computing paradigms with embedded cognitive capabilities into vehicle domains and data infrastructure to provide holistic intrinsic and extrinsic intelligence for new mobility applications. Digital technologies are a significant enabler in achieving the sustainability goals of the green transformation of the mobility and transportation sectors. Innovation occurs predominantly in ECAS vehicles’ architecture, operations, intelligent functions, and automotive digital infrastructure. The traditional ownership model is moving toward multimodal and shared mobility services. The ECAS vehicle’s technology allows for the development of virtual automotive functions that run on shared hardware platforms with data unlocking value, and for introducing new, shared computing-based automotive features. Facilitating vehicle automation, vehicle electrification, vehicle-to-everything (V2X) communication is accomplished by the convergence of artificial intelligence (AI), cellular/wireless connectivity, edge computing, the Internet of things (IoT), the Internet of intelligent things (IoIT), digital twins (DTs), virtual/augmented reality (VR/AR) and distributed ledger technologies (DLTs). Vehicles become more intelligent, connected, functioning as edge micro servers on wheels, powered by sensors/actuators, hardware (HW), software (SW) and smart virtual functions that are integrated into the digital infrastructure. Electrification, automation, connectivity, digitalization, decarbonization, decentralization, and standardization are the main drivers that unlock intelligent vehicles' potential for sustainable green mobility applications. ECAS vehicles act as autonomous agents using swarm intelligence to communicate and exchange information, either directly or indirectly, with each other and the infrastructure, accessing independent services such as energy, high-definition maps, routes, infrastructure information, traffic lights, tolls, parking (micropayments), and finding emergent/intelligent solutions. The article gives an overview of the advances in AI technologies and applications to realize intelligent functions and optimize vehicle performance, control, and decision-making for future ECAS vehicles to support the acceleration of deployment in various mobility scenarios. ECAS vehicles, systems, sub-systems, and components are subjected to stringent regulatory frameworks, which set rigorous requirements for autonomous vehicles. An in-depth assessment of existing standards, regulations, and laws, including a thorough gap analysis, is required. Global guidelines must be provided on how to fulfill the requirements. ECAS vehicle technology trustworthiness, including AI-based HW/SW and algorithms, is necessary for developing ECAS systems across the entire automotive ecosystem. The safety and transparency of AI-based technology and the explainability of the purpose, use, benefits, and limitations of AI systems are critical for fulfilling trustworthiness requirements. The article presents ECAS vehicles’ evolution toward domain controller, zonal vehicle, and federated vehicle/edge/cloud-centric based on distributed intelligence in the vehicle and infrastructure level architectures and the role of AI techniques and methods to implement the different autonomous driving and optimization functions for sustainable green mobility.

Introduction

Climate change, global warming, ecological and environmental degradation are global existential threats. Consequently, the new European Green Deal (European Commission, 2019a) roadmap entails a growth strategy to transform Europe into a modern, resource-efficient, and competitive economy. The roadmap aims to transform the economy to achieve climate neutrality by 2050. The transformation can be done by “turning climate and environmental challenges into opportunities across all policy areas and making the transition just and inclusive for all” (European Commission, 2019a).

The European Green Deal is an essential part of the EC's strategy to implement the UN’s 2030 Agenda (United Nations, 2015a) and its sustainable development goals (United Nations, 2015b). To implement this strategy, the European Union has adopted a mobility action plan based on the Vision Zero and Safe System approach (European Commission, 2019b) (zero accidents, zero pollution, and zero congestion). The Green Deal defines four critical elements for sustainable mobility and the automotive industry: climate neutrality, zero pollution Europe, sustainable transport, and the transition to a circular economy. The circular economy action plan (European Commission, 2020) has detailed measures to make sure that sustainable products are the norm in the EU. This plan puts a primary focus on “digital technologies” such as electronics, ICT, and energy storage systems (e.g., batteries, supercapacitors, fuel cells, etc.), which can result in an increase in the lifetime, availability and usage of future vehicles based on AI-enabled technologies.

Digital technologies are a significant enabler for attaining the European Green Deal’s sustainability goals in many different sectors, including mobility and transportation. Digital technologies such as edge computing, IoT, AI, cellular/wireless connectivity, DTs, VR/AR and DLTs can accelerate and maximize the impact of policies that deal with climate change and protect the environment by developing new sustainable electronic component and systems technologies for future vehicles. Expanding automotive intelligence at the vehicle and mobility system level allows the Internet of Vehicles (IoV) and Internet of Energy (IoE) (Vermesan et al., 2011) to become the key enabling technologies to realize future autonomous driving scenarios that embed cognition and autonomous functions.

#### Warming causes extinction

Bryce, 20 – Emma, citing Nelson, Roman, and Kemp---Cassidy *Nelson* is Co-lead of the biosecurity team at Oxford), Sabin *Roman* earned a PhD in Complex Systems Simulation from the University of Southampton, and both Roman and Luke *Kemp* are research associates at the Cambridge University. "What Could Drive Humans to Extinction?" Real Clear Science, 7-27-2020, <https://www.realclearscience.com/articles/2020/07/27/what_could_drive_humans_to_extinction.html> -- Iowa

Nuclear war

An existential risk is different to what we might think of as a "regular" hazard or threat, explained Luke Kemp, a research associate at the Centre for the Study of Existential Risk at Cambridge University in the United Kingdom. Kemp studies historical civilizational collapse and the risk posed by climate change in the present day. "A risk in the typical terminology is supposed to be composed of a hazard, a vulnerability and an exposure," he told Live Science. "You can think about this in terms of an asteroid strike. So the hazard itself is the asteroid. The vulnerability is our inability to stop it from occurring — the lack of an intervention system. And our exposure is the fact that it actually hits the Earth in some way, shape or form."

Take nuclear war, which history and popular culture have etched onto our minds as one of the biggest potential risks to human survival. Our vulnerability to this threat grows if countries produce highly-enriched uranium, and as political tensions between nations escalate. That vulnerability determines our exposure.

As is the case for all existential risks, there aren't hard estimates available on how much of Earth's population a nuclear firestorm might eliminate. But it's expected that the effects of a large-scale nuclear winter — the period of freezing temperatures and limited food production that would follow a war, caused by a smoky nuclear haze blocking sunlight from reaching the Earth — would be profound. "From most of the modeling I've seen, it would be absolutely horrendous. It could lead to the death of large swathes of humanity. But it seems unlikely that it by itself would lead to extinction." Kemp said.

Pandemics The misuse of biotechnology is another existential risk that keeps researchers up at night. This is technology that harnesses biology to make new products. One in particular concerns Cassidy Nelson: the abuse of biotechnology to engineer deadly, quick-spreading pathogens. "I worry about a whole range of different pandemic scenarios. But I do think the ones that could be man-made are possibly the greatest threat we could have from biology this century," she said. As acting co-lead of the biosecurity team at the Future of Humanity Institute at the University of Oxford in the United Kingdom, Nelson researches biosecurity issues that face humanity, such as new infectious diseases, pandemics and biological weapons. She recognizes that a pathogen that's been specifically engineered to be as contagious and deadly as possible could be far more damaging than a natural pathogen, potentially dispatching large swathes of Earth's population in limited time. "Nature is pretty phenomenal at coming up with pathogens through natural selection. It's terrible when it does. But it doesn't have this kind of direct 'intent,'" Nelson explained. "My concern would be if you had a bad actor who intentionally tried to design a pathogen to have as much negative impact as possible, through how contagious it was, and how deadly it was.” But despite the fear that might create — especially in our currently pandemic-stricken world — she believes that the probability that this would occur is slim. (It's also worth mentioning that all evidence points to the fact that COVID-19 wasn't created in a lab.) While the scientific and technological advances are steadily lowering the threshold for people to be able to do this, "that also means that our capabilities for doing something about it are rising gradually," she said. "That gives me a sense of hope, that if we could actually get on top [of it], that risk balance could go in our favor." Still, the magnitude of the potential threat keeps researchers' attention trained on this risk.

From climate change to AI

A tour of the threats to human survival can hardly exclude climate change, a phenomenon that (is) already driving the decline and extinction of multiple species across the planet. Could it hurl humanity toward the same fate?

The accompaniments to climate change — food insecurity, water scarcity, and extreme weather events — are set to increasingly threaten human survival, at regional scales. But looking to the future, climate change is also what Kemp described as an "existential risk multiplier" at global scales, meaning that it amplifies other threats to humanity's survival. "It does appear to have all these relationships to both conflict as well as political change, which just makes the world a much more dangerous place to be." Imagine: food or water scarcity intensifying international tensions, and triggering nuclear wars with potentially enormous human fatalities.

This way of thinking about extinction highlights the interconnectedness of existential risks. As Kemp hinted before, it's unlikely that a mass extinction event would result from a single calamity like a nuclear war or pandemic. Rather, history shows us that most civilizational collapses are driven by several interwoven factors. And extinction as we typically imagine it — the rapid annihilation of everyone on Earth — is just one way it could play out.

#### Balanced antitrust approach is key

Hovenkamp 2020, Herbert J. a Fellow of the American Academy of Arts and Sciences, and in 2008 won the Justice Department’s John Sherman Award for his lifetime contributions to antitrust law (University of Pennsylvania Carey Law School “FRAND and Antitrust” https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=3095&context=faculty\_scholarship)//ellie

While these various attempts to evade FRAND obligations very likely breach the patentee’s contractual obligations, only a subset also constitute antitrust violations. This does not mean that the standard-setting and FRAND process in which the conduct occurred is irrelevant to antitrust analysis. To the contrary, as in any antitrust case, it forms part of the market environment in which conduct must be evaluated. In her 2019 Qualcomm decision, Judge Lucy Koh addressed tying and exclusive dealing claims under general antitrust principles, and refusal to deal claims under the standards that the Supreme Court had developed in its Aspen47 and Trinko48 decisions.49 Although her opinion devoted considerable space to the importance of standard essential patents and the relevance of FRAND commitments, she addressed the antitrust claims by applying well established antitrust principles that require a showing of restraint of trade or anticompetitive exclusion.50 Nevertheless, anticompetitive effects become more transparent when one views the extent to which they undermined an output- and innovation-enhancing joint enterprise whose social value was not being called into question. SSOs operated by multiple firms are joint ventures.51 For bona fide joint ventures that are not simply fronts for cartels, the purpose of the antitrust laws is not to destroy the venture or undermine its purpose, but rather to evaluate how the challenged restraint operates within the venture and condemn unreasonably harmful restraints.52 For example, when the Supreme Court struck down the NCAA joint venture’s limitation on nationally televised football games, the purpose and effect were to make the NCAA behave more competitively, in the process increasing its output.53 SSOs should be addressed in the same manner. The goal of the standard setting venture is to facilitate competitive operation and entry, interoperability, as well as preserve appropriate competitive incentives for research and development. Antitrust analysis necessarily involves testing conduct against these goals, but only to the extent of looking for practices that are anticompetitive. This means it must identify practices that reduce market wide output unreasonably and increase prices, or that are unnecessarily exclusionary or harmful to consumers in other ways. A firm’s violation of its FRAND commitment is very likely a breach of contract, as several decisions have held.54 The FRAND contract is incomplete, in the sense that not every term is specified in detail. But participants are subject to a contractual duty to bargain in good faith, with some terms being filled in by courts or other tribunals as necessary. The breach of contract question does not depend on whether the conduct reduced market output or excluded a rival unreasonably. It certainly does not depend on the existence of any party’s market power. Remedies are ordinarily contract damages or an injunction. Nonparties to the contract will typically be able to obtain relief only to the extent that they are third-party beneficiaries. However, the courts have had little difficulty concluding that participating members of the SSO are third-party beneficiaries of FRAND commitments.55 In all events, challengers will not be able to obtain antitrust law’s treble damages unless they can prove an antitrust violation. Whether a firm’s breach of a FRAND commitment also violates the antitrust laws depends on whether the conduct in question causes competitive harm of a sort that the antitrust laws recognize.56 In the case of section 1 of the Sherman Act57 this requires a showing of a relevant agreement that is likely to reduce market output. If the conduct is reasonably ancillary to other arguably procompetitive activity, the court must also assess market power and anticompetitive effects. In the case of section 2 of the Sherman Act or section 3 of the Clayton Act, which reach mainly tying and exclusive dealing, it will require a showing of market power plus conduct that is unreasonably exclusionary. The antitrust harm results, not from the breach of the FRAND obligation per se. Rather, it results from the creation of monopoly and higher prices for consumers. The Ninth Circuit got this issue precisely wrong, holding that the district court incorrectly focused on downstream harm to buyers when it should have looked at harm to rivals.58 That confuses contract or tort law with antitrust law.

### 1AC – Plan

#### The United States federal government should increase prohibitions on anticompetitive business practices by standard-essential patent (SEP) owners by mandating that standard-setting organizations (SSOs) are in violation of the Sherman Act if the SSO fails to adopt and enforce rules that are effective to prevent SEP owners from exploiting the ex post monopoly power created by the standard.

### 1AC – Solvency

#### Applying Section 1 of Sherman prohibits patent holdup

Melamed and Shapiro, 18 – A. Douglas Melamed is Professor of the Practice of Law at Stanford Law School. Carl Shapiro is Professor of Business Strategy at the University of California at Berkeley. “How Antitrust Law Can Make FRAND Commitments More Effective,” Yale Law Journal 127:2110, <https://www.yalelawjournal.org/pdf/MelamedShapiro_12wf7fof.pdf> -- Iowa

Much attention has been paid in recent years to legal issues arising from standard setting, assertion of standard-essential patents, and the requirements imposed by standard-setting organizations that standard-essential patents be licensed on reasonable terms. This Feature argues that a fundamental aspect of the antitrust laws, heretofore overlooked in this context, can play an important role in ensuring that the rules established by standard-setting organizations are effective in preventing owners of standard-essential patents from engaging in patent holdup. It has long been a basic principle of antitrust law that when firms collaborate to engage in conduct that has efficiency benefits, like standard-setting, they violate the antitrust laws if their collaboration also harms competition more than necessary to obtain the efficiency benefits. Both standard-setting organizations and their members can violate Section 1 of the Sherman Act if the organization’s rules are ineffective in preventing owners of standard-essential patents from exploiting the monopoly power they gain as a result of the standard.

#### Flexible application of core antitrust law is a floor that checks monopolies but not a ceiling that caps innovation

Melamed and Shapiro, 18 – A. Douglas Melamed is Professor of the Practice of Law at Stanford Law School. Carl Shapiro is Professor of Business Strategy at the University of California at Berkeley. “How Antitrust Law Can Make FRAND Commitments More Effective,” Yale Law Journal 127:2110, <https://www.yalelawjournal.org/pdf/MelamedShapiro_12wf7fof.pdf> -- Iowa

As always, antitrust law can and should be flexible and attentive to the specific factual circumstances of each case. The best set of rules governing FRAND commitments for one SSO might not be best for another. Experience in the marketplace and the creativity of SSOs and their members can best determine which measures are most effective and efficient in any given case. Because one size does not fit all when it comes to FRAND rules, antitrust law should welcome competition among SSOs to solve the problem of ex post opportunism by SEP holders. The role of antitrust law is not to prescribe how SSOs should solve this problem, but simply to require that they solve it to the extent reasonably possible. Fundamental antitrust principles require SSOs and their members to implement effective solutions that minimize ex post opportunism based on market power they create, to the extent they can do so without sacrificing the many benefits associated with standard setting.

#### Section 2 of Sherman thumps but does not solve

Melamed and Shapiro, 18 – A. Douglas Melamed is Professor of the Practice of Law at Stanford Law School. Carl Shapiro is Professor of Business Strategy at the University of California at Berkeley. “How Antitrust Law Can Make FRAND Commitments More Effective,” Yale Law Journal 127:2110, <https://www.yalelawjournal.org/pdf/MelamedShapiro_12wf7fof.pdf> -- Iowa

Courts have already recognized that, in some situations, antitrust cases can be brought against SEP holders under Section 2 of the Sherman Act.44 For example, a SEP holder that makes a FRAND commitment without intending to comply, and thereby induces the SSO to include its technology in the standard, unlawfully obtains its monopoly and thus violates Section 2.45 In that situation, the SEP holder could be liable for damages to patent holders on technologies wrongfully excluded from the standard, and to implementers harmed by the SEP holder’s subsequent exercise of the unlawfully obtained monopoly power. 46 However, these kinds of Section 2 cases are unlikely to have a significant impact on the efficacy of measures designed to prevent ex post opportunism. This is because they require the plaintiff to prove both that the FRAND commitment was fraudulent when made and that it caused the inclusion of the patented technology in the standard and, thus, created the SEP holder’s monopoly. Both of these prongs are problematic and difficult to prove: a well-counseled firm can avoid creating discoverable materials showing that it never intended to abide by its FRAND commitment, and a plaintiff will have a difficult time proving at the time of trial several years later that a given standard would not have been adopted absent the SEP holder’s FRAND commitment.

#### **Interoperable standards via Section 1 of Sherman are key to every internal**

Melamed and Shapiro, 18 – A. Douglas Melamed is Professor of the Practice of Law at Stanford Law School. Carl Shapiro is Professor of Business Strategy at the University of California at Berkeley. “How Antitrust Law Can Make FRAND Commitments More Effective,” Yale Law Journal 127:2110, <https://www.yalelawjournal.org/pdf/MelamedShapiro_12wf7fof.pdf> -- Iowa

Compatibility standards comprise a critical part of the information and communications technology sector. From Wi-Fi and 4G cell phone standards to the ubiquitous JPEG and MPEG file formats, many of the benefits generated by the recent and dramatic advances in information technology would have been difficult or impossible to achieve without compatibility standards.

For the past twenty years, antitrust enforcement related to standard setting has focused largely on the interpretation and implementation of the commitments made by patent holders as part of the standard-setting process to license their Standard-Essential Patents (SEPs) on Fair, Reasonable and Non-Discriminatory (FRAND) terms. The Department of Justice (DOJ) and the Federal Trade Commission (FTC) devoted an entire chapter to this topic in their 2007 report on antitrust enforcement and intellectual property rights.1 The debate over FRAND commitments has continued undiminished in the ten years since the publication of that report.

With respect to SEPs, the most significant and immediate commercial and antitrust concern centers on the SEP owners’ command of substantial market power once the standard in question becomes widely adopted. Put simply: without some checks, SEP owners could opportunistically engage in patent holdup, taking advantage of the fact that the firms and users adopting the standard become individually and collectively locked in to the standard over time. Of course, it is precisely this danger of ex post opportunism that motivates market participants and standard-setting organizations (SSOs) to require participants in the standard-setting process to make FRAND commitments in the first place.

By its nature, standard setting involves collaboration among competitors and thus raises core antitrust issues. In this Feature, we argue that existing antitrust laws have an important role to play in ensuring that SSO rules are effective to prevent ex post opportunism. In Part I, we set forth the pertinent background regarding standard setting and the competitive process. In Part II, we explain why effective FRAND rules are needed to prevent exploitation by SEP holders of market power created by the standard-setting process, and we refute arguments that SEP-holder market power and holdup are not a serious problem. In Part III, we explain the important role that antitrust law can play in preventing and remedying anticompetitive violations of FRAND commitments and in ensuring that SSOs adopt effective FRAND rules. We explain in particular a heretofore overlooked reason why SSOs and their members can violate Section 1 of the Sherman Act2 if the SSO fails to adopt and enforce rules that are effective to prevent SEP owners from exploiting the ex post monopoly power created by the standard. This Section 1 liability facing SSO participants and SSOs works alongside liability under Section 2 of the Sherman Act for unilateral conduct by SEP owners.

#### **The aff has a ripple effect – solving patent hold-up drives interoperability, standardization, and innovation**

Singh, 20 – Dr. Manveen Singh is an Associate Professor and Associate Dean at Jindal Global Law School. “TRACING THE EVOLUTION OF STANDARDS AND STANDARD-SETTING ORGANIZATIONS IN THE ICT ERA,” 24 Marq. Intell. Prop. L. Rev. 217, 239-240, p. Nexis – Iowa

VI. Conclusion

From railway gauges to the most recent 5G technology, standards have come a long way in the past century and a half. Under the umbrella of SSOs, collaborative standard-setting has remodeled itself into an indomitable force in the innovation landscape, with standards acting as building blocks, fundamental in facilitating product compatibility and interoperability. 201 However, the success of any SSO or the standards coming through its ranks is largely governed by the care and caution exercised in structuring it from its very inception. 202 Whether it is a classic corporation or one with limited liability, an SSO must provide an effective platform supporting standardization activities, rather than impeding them. 203 Since the standard-setting process at SSOs involves participants from competing industries coming together to select interoperable technical standards, 204 there is an inherent risk of collusion on the part of certain market players in using the standardization process to drive their rivals out of the market. 205 Furthermore, technology included in standards is often the subject of patents, 206 thereby affording patent holders the opportunity to abuse the standardization process and assert their patents covering standardized technology, over implementers of such technology, and in the process, attracting scrutiny by competition agencies. 207 Despite the SSOs requiring patent holders to license their technologies on FRAND terms, competition concerns have arisen time and again, with patent holders likely to indulge in activities such as hold-up, royalty stacking and patent ambush, while at the same time, having to face the likelihood of hold-out from the implementers.

[\*240] Although collaborative standard-setting runs the risk of antitrust violation, the role of SSOs in driving technological innovation has been duly recognized by antitrust agencies. 208 Having said that, the task of balancing the varied interests of stakeholders is entrusted upon SSOs, which necessitates the creation of internal IPR policies. These policies are the focal point of all the standardization activity taking place in SSOs and play a key role in incentivizing the development of new technologies. 209 With changing standards, the SSOs also end up amending their IPR policies from time to time. Sometimes, these IPR policy amendments might come in the way of standardization and cause the standardization process to slow down, while on other occasions, they might run the risk of attracting antitrust scrutiny. In the era of highly complex telecommunications industries, various viewpoints have been put forward vis-a-vis IPR policies of SSOs, without any consensus being achieved. Since IPR policy changes have the potential of a ripple effect across innovation circles, it is essential to analyze these changes at a microscopic level.

# 2ac

### T – Prohibitions

#### It forbids action

People’s Law Dictionary, 2

[Gerald Hill, former Executive Director of the California Governor's Housing Commission, has drafted legislation, taught at Golden Gate University Law School, & Kathleen Hill, former Fellow in Public Affairs with the prestigious Coro Foundation, Law.com, “Prohibition”, https://dictionary.law.com/Default.aspx?selected=1636, accessed 5-30-21, AFB]

prohibition

n. forbidding an act or activity. A court order forbidding an act is a writ of prohibition, an injunction or a writ of mandate (mandamus) if against a public official.

#### C/I---“Expand” requires increasing the extent of the scope of antitrust.

Merriam Webster, No Date, "expand," Merriam Webster, https://www.merriam-webster.com/dictionary/expand

ex·​pand | \ ik-ˈspand  \

expanded; expanding; expands

Definition of expand

[transitive verb](https://www.merriam-webster.com/dictionary/transitive)

1: to open up : [UNFOLD](https://www.merriam-webster.com/dictionary/unfold)

2: to increase the extent, number, volume, or scope of :

[ENLARGE](https://www.merriam-webster.com/dictionary/enlarge)

3 a: to express at length or in greater detail

b: to write out in full

//expand all abbreviations

c: to subject to mathematical [expansion](https://www.merriam-webster.com/dictionary/expansion)

//expand a function in a power series

#### C/I---Scope is the extent of the area or subject matter that antitrust deals with.

Oxford Languages 21 (Oxford Languages, 2021, accessible via Google, “scope,” https://www.google.com/search?q=scope+definition&rlz=1C1GCEB\_enUS961US961&sxsrf=AOaemvKDcVc2Ak4LwXnA66Yv\_O40pSkDyw%3A1631333557327&ei=tSw8YeGqE66k\_QblsI2IBA&oq=scope+definition&gs\_lcp=Cgdnd3Mtd2l6EAMyBAgjECcyBAgjECcyBQgAEIAEMgUIABCABDIFCAAQgAQyBQgAEIAEMgUIABCABDIFCAAQgAQyBQgAEIAEMgUIABCABDoHCCMQsAMQJzoHCAAQRxCwAzoHCAAQsQMQQzoKCAAQsQMQgwEQQzoECAAQQzoECC4QQ0oLCJFOEgY0Niw0ODRKBAhBGABQpZkBWNuhAWD0ogFoAXACeACAAWmIAdIHkgEEMTAuMZgBAKABAcgBCrgBAsABAQ&sclient=gws-wiz&ved=0ahUKEwih2caJh\_byAhUuUt8KHWVYA0EQ4dUDCA4&uact=5)

noun

1.

the extent of the area or subject matter that something deals with or to which it is relevant.

"we widened the scope of our investigation"

### FTC CP

#### No impact to disease – best studies

Cotton-Barratt 17 – Owen Cotton-Barratt is a PhD in Pure Mathematics from Oxford, Lecturer in Mathematics at Oxford, and Research Associate at the Future of Humanity Institute. (“Existential Risk: Diplomacy and Governance,” 2/3/17, https://www.fhi.ox.ac.uk/wp-content/uploads/Existential-Risks-2017-01-23.pdf)//jkuffour

For most of human history, natural pandemics have posed the greatest risk of mass global fatalities.37 However, there are some reasons to believe that natural pandemics are very unlikely to cause human extinction. Analysis of the International Union for Conservation of Nature (IUCN) red list database has shown that of the 833 recorded plant and animal species extinctions known to have occurred since 1500, less than 4% (31 species) were ascribed to infectious disease.38 None of the mammals and amphibians on this list were globally dispersed, and other factors aside from infectious disease also contributed to their extinction. It therefore seems that our own species, which is very numerous, globally dispersed, and capable of a rational response to problems, is very unlikely to be killed off by a natural pandemic. One underlying explanation for this is that highly lethal pathogens can kill their hosts before they have a chance to spread, so there is a selective pressure for pathogens not to be highly lethal. Therefore, pathogens are likely to co-evolve with their hosts rather than kill all possible hosts.39

### States 2ac

#### Agency inconsistency decks solvency

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United States Senators Thom Tillis (R-NC) and Chris Coons (D-DE) recently sent a bipartisan letter to the U.S. Department of Justice (DOJ) requesting clarity surrounding the DOJ’s antitrust enforcement policy against holders of standard essential patents (SEPs), specifically around the licensing of such patents on fair, reasonable and nondiscriminatory (FRAND) terms. According to the senators, inconsistencies in how different agencies enforce antitrust actions against patent holders has created an uncertain, volatile environment for holders of SEPs. The senators have requested that the DOJ work with the U.S. Patent and Trademark Office (USPTO) to develop a new policy statement surrounding the licensing of such patents. The patent system exists to encourage the disclosure of innovation in exchange for a limited “monopoly” for the disclosed (and claimed) invention. Specifically, patent ownership provides exclusive right to the holding party to use, make, distribute, import or sell the claimed technology within the patent for 20 years from the date the patent was filed, although foreign countries may have their own temporal and other patent law nuances. SEPs claim technologies that are essential to meet technological standards set by standard setting organizations. These organizations choose such standards based in part on the agreement of the patent holder to license the required patents on FRAND terms, without necessarily disclosing the exact terms beyond the statement that the terms are fair, reasonable and nondiscriminatory. Once the standard is set, negotiation related to the exact definition of the FRAND terms begins between the SEP holder and the organizations requiring licenses. The patent system alone creates tension with U.S. antitrust policies. SEPs exacerbate this tension because the technology claimed within an SEP is required to meet the set standard, giving SEP holders significant leverage when negotiating the licensing of these technologies. However, the DOJ and Federal Trade Commission (FTC) may find that SEP holders violate antitrust laws, under the Sherman Act and other competition laws, when refusing to license their patents to competitors or charging exceedingly high fees for such licenses (in other words, when they do not license the patent on FRAND terms after making a commitment to do so). The policies surrounding SEPs tend to vary between, and even within, antitrust agencies. The FTC and the DOJ often have expressed incompatible positions. In 2013, the USPTO and DOJ issued joint SEP guidance that was rescinded by the DOJ alone last year for suggesting that an SEP holder’s constitutional rights related to exclusion may be negatively impacted by FRAND commitments. The DOJ has expressed concern that antitrust actions will stifle innovation, while the FTC has stated a much more aggressive approach in enforcement policy against SEP holders. Recently, the DOJ has suggested that antitrust law should not govern SEP licensing, but instead that such enforcement is better suited under contract law. The current division between agencies surrounding the licensing of SEPs creates an uncertain environment for SEP holders and the competitors of SEP holders alike. Until all involved agencies agree upon, issue and consistently enforce an SEP policy, the FTC and the DOJ likely will continue to hold opposing positions and act individually on antitrust enforcement against SEP holders for FRAND-related licensing issues.

#### **Pre-emption – it’s inevitable absent a change to federal statutes**

Samp 14—Richard A. Samp, Chief Counsel, Washington Legal Foundation (“The Role of State Antitrust Law in the Aftermath of *Actavis*,” *Minnesota Journal of Law, Science & Technology*, Vol. 15, No. 1, Article 14, https://scholarship.law.umn.edu/cgi/viewcontent.cgi?article=1062&context=mjlst)

As noted above, there is precedent for a finding that state antitrust law is preempted to the extent that it conflicts with the policy underlying a federal statute.76 Moreover, in the context of patent law, federal courts have not hesitated to preempt state laws that the courts deem to stand as an obstacle to accomplishing Congress’s objectives (i.e., encouraging efforts to develop new and useful products).77 To the extent that any portions of Actavis’s holding can be deemed to reflect the Court’s perception of Congress’s new-product-development objectives, a state law is preempted if it is inconsistent with that holding and seeks to impose a greater degree of antitrust liability on the parties to a reverse payment settlement.

Actavis’s treatment of settlements involving a compromise entry date appears to meet that description. Actavis held that federal antitrust liability could not arise from a settlement in which the generic manufacturer agrees not compete for a number of years and in return is rewarded with an exclusive license to market its product several years in advance of the patent’s expiration date.78 Accordingly, states are not permitted to impose antitrust liability under similar circumstances because doing so would upset the balance that, according to Actavis, Congress sought to achieve between antitrust and patent law.

### 2AC cap

#### Cap is awesome and sustainable

Brook, et al, 15—professor of environmental sustainability at the University of Tasmania (Barry, with John Asafu-Adjaye, University of Queensland, Linus Blomqvist, Breakthrough Institute, Stewart Brand, Long Now Foundation, Ruth DeFries, Columbia Univeristy, Erle Ellis, University of Maryland, Baltimore County, Christopher Foreman, University of Maryland School of Public Policy, David Keith, Harvard University School of Engineering and Applied Sciences, Martin Lewis, Stanford University, Mark Lynas, Cornell University, Ted Nordhaus, Breakthrough Institute, Roger Pielke, Jr., University of Colorado, Boulder, Rachel Pritzker, Pritzker Innovation Fund, Joyashree Roy, Jadavpur University, Mark Sagoff, George Mason University, Michael Shellenberger, Breakthrough Institute, Robert Stone, Filmmaker, and Peter Teague, Breakthrough Institute, “AN ECOMODERNIST MANIFESTO,” <http://www.ecomodernism.org/manifesto/>, dml)

Intensifying many human activities — particularly farming, energy extraction, forestry, and settlement — so that they use less land and interfere less with the natural world is the key to decoupling human development from environmental impacts. These socioeconomic and technological processes are central to economic modernization and environmental protection. Together they allow people to mitigate climate change, to spare nature, and to alleviate global poverty. Although we have to date written separately, our views are increasingly discussed as a whole. We call ourselves ecopragmatists and ecomodernists. We offer this statement to affirm and to clarify our views and to describe our vision for putting humankind’s extraordinary powers in the service of creating a good Anthropocene. 1. Humanity has flourished over the past two centuries. Average life expectancy has increased from 30 to 70 years, resulting in a large and growing population able to live in many different environments. Humanity has made extraordinary progress in reducing the incidence and impacts of infectious diseases, and it has become more resilient to extreme weather and other natural disasters. Violence in all forms has declined significantly and is probably at the lowest per capita level ever experienced by the human species, the horrors of the 20th century and present-day terrorism notwithstanding. Globally, human beings have moved from autocratic government toward liberal democracy characterized by the rule of law and increased freedom. Personal, economic, and political liberties have spread worldwide and are today largely accepted as universal values. Modernization liberates women from traditional gender roles, increasing their control of their fertility. Historically large numbers of humans — both in percentage and in absolute terms — are free from insecurity, penury, and servitude. At the same time, human flourishing has taken a serious toll on natural, nonhuman environments and wildlife. Humans use about half of the planet’s ice-free land, mostly for pasture, crops, and production forestry. Of the land once covered by forests, 20 percent has been converted to human use. Populations of many mammals, amphibians, and birds have declined by more than 50 percent in the past 40 years alone. More than 100 species from those groups went extinct in the 20th century, and about 785 since 1500. As we write, only four northern white rhinos are confirmed to exist. Given that humans are completely dependent on the living biosphere, how is it possible that people are doing so much damage to natural systems without doing more harm to themselves? The role that technology plays in reducing humanity’s dependence on nature explains this paradox. Human technologies, from those that first enabled agriculture to replace hunting and gathering, to those that drive today’s globalized economy, have made humans less reliant upon the many ecosystems that once provided their only sustenance, even as those same ecosystems have often been left deeply damaged. Despite frequent assertions starting in the 1970s of fundamental “limits to growth,” there is still remarkably little evidence that human population and economic expansion will outstrip the capacity to grow food or procure critical material resources in the foreseeable future. To the degree to which there are fixed physical boundaries to human consumption, they are so theoretical as to be functionally irrelevant. The amount of solar radiation that hits the Earth, for instance, is ultimately finite but represents no meaningful constraint upon human endeavors. Human civilization can flourish for centuries and millennia on energy delivered from a closed uranium or thorium fuel cycle, or from hydrogen-deuterium fusion. With proper management, humans are at no risk of lacking sufficient agricultural land for food. Given plentiful land and unlimited energy, substitutes for other material inputs to human well-being can easily be found if those inputs become scarce or expensive. There remain, however, serious long-term environmental threats to human well-being, such as anthropogenic climate change, stratospheric ozone depletion, and ocean acidification. While these risks are difficult to quantify, the evidence is clear today that they could cause significant risk of catastrophic impacts on societies and ecosystems. Even gradual, non-catastrophic outcomes associated with these threats are likely to result in significant human and economic costs as well as rising ecological losses. Much of the world’s population still suffers from more-immediate local environmental health risks. Indoor and outdoor air pollution continue to bring premature death and illness to millions annually. Water pollution and water-borne illness due to pollution and degradation of watersheds cause similar suffering. 2. Even as human environmental impacts continue to grow in the aggregate, a range of long-term trends are today driving significant decoupling of human well-being from environmental impacts. Decoupling occurs in both relative and absolute terms. Relative decoupling means that human environmental impacts rise at a slower rate than overall economic growth. Thus, for each unit of economic output, less environmental impact (e.g., deforestation, defaunation, pollution) results. Overall impacts may still increase, just at a slower rate than would otherwise be the case. Absolute decoupling occurs when total environmental impacts — impacts in the aggregate — peak and begin to decline, even as the economy continues to grow. Decoupling can be driven by both technological and demographic trends and usually results from a combination of the two. The growth rate of the human population has already peaked. Today’s population growth rate is one percent per year, down from its high point of 2.1 percent in the 1970s. Fertility rates in countries containing more than half of the global population are now below replacement level. Population growth today is primarily driven by longer life spans and lower infant mortality, not by rising fertility rates. Given current trends, it is very possible that the size of the human population will peak this century and then start to decline. Trends in population are inextricably linked to other demographic and economic dynamics. For the first time in human history, over half the global population lives in cities. By 2050, 70 percent are expected to dwell in cities, a number that could rise to 80 percent or more by the century’s end. Cities are characterized by both dense populations and low fertility rates. Cities occupy just 1 to 3 percent of the Earth’s surface and yet are home to nearly four billion people. As such, cities both drive and symbolize the decoupling of humanity from nature, performing far better than rural economies in providing efficiently for material needs while reducing environmental impacts. The growth of cities along with the economic and ecological benefits that come with them are inseparable from improvements in agricultural productivity. As agriculture has become more land and labor efficient, rural populations have left the countryside for the cities. Roughly half the US population worked the land in 1880. Today, less than 2 percent does. As human lives have been liberated from hard agricultural labor, enormous human resources have been freed up for other endeavors. Cities, as people know them today, could not exist without radical changes in farming. In contrast, modernization is not possible in a subsistence agrarian economy. These improvements have resulted not only in lower labor requirements per unit of agricultural output but also in lower land requirements. This is not a new trend: rising harvest yields have for millennia reduced the amount of land required to feed the average person. The average per-capita use of land today is vastly lower than it was 5,000 years ago, despite the fact that modern people enjoy a far richer diet. Thanks to technological improvements in agriculture, during the half-century starting in the mid-1960s, the amount of land required for growing crops and animal feed for the average person declined by one-half. Agricultural intensification, along with the move away from the use of wood as fuel, has allowed many parts of the world to experience net reforestation. About 80 percent of New England is today forested, compared with about 50 percent at the end of the 19th century. Over the past 20 years, the amount of land dedicated to production forest worldwide declined by 50 million hectares, an area the size of France. The “forest transition” from net deforestation to net reforestation seems to be as resilient a feature of development as the demographic transition that reduces human birth rates as poverty declines. Human use of many other resources is similarly peaking. The amount of water needed for the average diet has declined by nearly 25 percent over the past half-century. Nitrogen pollution continues to cause eutrophication and large dead zones in places like the Gulf of Mexico. While the total amount of nitrogen pollution is rising, the amount used per unit of production has declined significantly in developed nations. Indeed, in contradiction to the often-expressed fear of infinite growth colliding with a finite planet, demand for many material goods may be saturating as societies grow wealthier. Meat consumption, for instance, has peaked in many wealthy nations and has shifted away from beef toward protein sources that are less land intensive. As demand for material goods is met, developed economies see higher levels of spending directed to materially less-intensive service and knowledge sectors, which account for an increasing share of economic activity. This dynamic might be even more pronounced in today’s developing economies, which may benefit from being late adopters of resource-efficient technologies. Taken together, these trends mean that the total human impact on the environment, including land-use change, overexploitation, and pollution, can peak and decline this century. By understanding and promoting these emergent processes, humans have the opportunity to re-wild and re-green the Earth — even as developing countries achieve modern living standards, and material poverty ends. 3. The processes of decoupling described above challenge the idea that early human societies lived more lightly on the land than do modern societies. Insofar as past societies had less impact upon the environment, it was because those societies supported vastly smaller populations. In fact, early human populations with much less advanced technologies had far larger individual land footprints than societies have today. Consider that a population of no more than one or two million North Americans hunted most of the continent’s large mammals into extinction in the late Pleistocene, while burning and clearing forests across the continent in the process. Extensive human transformations of the environment continued throughout the Holocene period: as much as three-quarters of all deforestation globally occurred before the Industrial Revolution. The technologies that humankind’s ancestors used to meet their needs supported much lower living standards with much higher per-capita impacts on the environment. Absent a massive human die-off, any large-scale attempt at recoupling human societies to nature using these technologies would result in an unmitigated ecological and human disaster. Ecosystems around the world are threatened today because people over-rely on them: people who depend on firewood and charcoal for fuel cut down and degrade forests; people who eat bush meat for food hunt mammal species to local extirpation. Whether it’s a local indigenous community or a foreign corporation that benefits, it is the continued dependence of humans on natural environments that is the problem for the conservation of nature. Conversely, modern technologies, by using natural ecosystem flows and services more efficiently, offer a real chance of reducing the totality of human impacts on the biosphere. To embrace these technologies is to find paths to a good Anthropocene. The modernization processes that have increasingly liberated humanity from nature are, of course, double-edged, since they have also degraded the natural environment. Fossil fuels, mechanization and manufacturing, synthetic fertilizers and pesticides, electrification and modern transportation and communication technologies, have made larger human populations and greater consumption possible in the first place. Had technologies not improved since the Dark Ages, no doubt the human population would not have grown much either. It is also true that large, increasingly affluent urban populations have placed greater demands upon ecosystems in distant places –– the extraction of natural resources has been globalized. But those same technologies have also made it possible for people to secure food, shelter, heat, light, and mobility through means that are vastly more resource- and land-efficient than at any previous time in human history. Decoupling human well-being from the destruction of nature requires the conscious acceleration of emergent decoupling processes. In some cases, the objective is the development of technological substitutes. Reducing deforestation and indoor air pollution requires the substitution of wood and charcoal with modern energy. In other cases, humanity’s goal should be to use resources more productively. For example, increasing agricultural yields can reduce the conversion of forests and grasslands to farms. Humans should seek to liberate the environment from the economy. Urbanization, agricultural intensification, nuclear power, aquaculture, and desalination are all processes with a demonstrated potential to reduce human demands on the environment, allowing more room for non-human species. Suburbanization, low-yield farming, and many forms of renewable energy production, in contrast, generally require more land and resources and leave less room for nature. These patterns suggest that humans are as likely to spare nature because it is not needed to meet their needs as they are to spare it for explicit aesthetic and spiritual reasons. The parts of the planet that people have not yet profoundly transformed have mostly been spared because they have not yet found an economic use for them — mountains, deserts, boreal forests, and other “marginal” lands. Decoupling raises the possibility that societies might achieve peak human impact without intruding much further on relatively untouched areas. Nature unused is nature spared. 4. Plentiful access to modern energy is an essential prerequisite for human development and for decoupling development from nature. The availability of inexpensive energy allows poor people around the world to stop using forests for fuel. It allows humans to grow more food on less land, thanks to energy-heavy inputs such as fertilizer and tractors. Energy allows humans to recycle waste water and desalinate sea water in order to spare rivers and aquifers. It allows humans to cheaply recycle metal and plastic rather than to mine and refine these minerals. Looking forward, modern energy may allow the capture of carbon from the atmosphere to reduce the accumulated carbon that drives global warming. However, for at least the past three centuries, rising energy production globally has been matched by rising atmospheric concentrations of carbon dioxide. Nations have also been slowly decarbonizing — that is, reducing the carbon intensity of their economies — over that same time period. But they have not been doing so at a rate consistent with keeping cumulative carbon emissions low enough to reliably stay below the international target of less than 2 degrees Centigrade of global warming. Significant climate mitigation, therefore, will require that humans rapidly accelerate existing processes of decarbonization. There remains much confusion, however, as to how this might be accomplished. In developing countries, rising energy consumption is tightly correlated with rising incomes and improving living standards. Although the use of many other material resource inputs such as nitrogen, timber, and land are beginning to peak, the centrality of energy in human development and its many uses as a substitute for material and human resources suggest that energy consumption will continue to rise through much if not all of the 21st century. For that reason, any conflict between climate mitigation and the continuing development process through which billions of people around the world are achieving modern living standards will continue to be resolved resoundingly in favor of the latter. Climate change and other global ecological challenges are not the most important immediate concerns for the majority of the world's people. Nor should they be. A new coal-fired power station in Bangladesh may bring air pollution and rising carbon dioxide emissions but will also save lives. For millions living without light and forced to burn dung to cook their food, electricity and modern fuels, no matter the source, offer a pathway to a better life, even as they also bring new environmental challenges. Meaningful climate mitigation is fundamentally a technological challenge. By this we mean that even dramatic limits to per capita global consumption would be insufficient to achieve significant climate mitigation. Absent profound technological change **there is no credible path to meaningful climate mitigation**. While advocates differ in the particular mix of technologies they favor, we are aware of no quantified climate mitigation scenario in which technological change is not responsible for the vast majority of emissions cuts. The specific technological paths that people might take toward climate mitigation remain deeply contested. Theoretical scenarios for climate mitigation typically reflect their creators’ technological preferences and analytical assumptions while all too often failing to account for the cost, rate, and scale at which low-carbon energy technologies can be deployed. The history of energy transitions, however, suggests that there have been consistent patterns associated with the ways that societies move toward cleaner sources of energy. Substituting higher-quality (i.e., less carbon-intensive, higher-density) fuels for lower-quality (i.e., more carbon-intensive, lower-density) ones is how virtually all societies have decarbonized, and points the way toward accelerated decarbonization in the future. Transitioning to a world powered by zero-carbon energy sources will require energy technologies that are power dense and capable of scaling to many tens of terawatts to power a growing human economy. Most forms of renewable energy are, unfortunately, incapable of doing so. The scale of land use and other environmental impacts necessary to power the world on biofuels or many other renewables are such that we doubt they provide a sound pathway to a zero-carbon low-footprint future. High-efficiency solar cells produced from earth-abundant materials are an exception and have the potential to provide many tens of terawatts on a few percent of the Earth’s surface. Present-day solar technologies will require substantial innovation to meet this standard and the development of cheap energy storage technologies that are capable of dealing with highly variable energy generation at large scales. Nuclear fission today represents the only present-day zero-carbon technology with the demonstrated ability to meet most, if not all, of the energy demands of a modern economy. However, a variety of social, economic, and institutional challenges make deployment of present-day nuclear technologies at scales necessary to achieve significant climate mitigation unlikely. A new generation of nuclear technologies that are safer and cheaper will likely be necessary for nuclear energy to meet its full potential as a critical climate mitigation technology. In the long run, next-generation solar, advanced nuclear fission, and nuclear fusion represent the most plausible pathways toward the joint goals of climate stabilization and radical decoupling of humans from nature. If the history of energy transitions is any guide, however, that transition will take time. During that transition, other energy technologies can provide important social and environmental benefits. Hydroelectric dams, for example, may be a cheap source of low-carbon power for poor nations even though their land and water footprint is relatively large. Fossil fuels with carbon capture and storage can likewise provide substantial environmental benefits over current fossil or biomass energies. The ethical and pragmatic path toward a just and sustainable global energy economy requires that human beings transition as rapidly as possible to energy sources that are cheap, clean, dense, and abundant. Such a path will require sustained public support for the development and deployment of clean energy technologies, both within nations and between them, though international collaboration and competition, and within a broader framework for global modernization and development. 5. We write this document out of deep love and emotional connection to the natural world. By appreciating, exploring, seeking to understand, and cultivating nature, many people get outside themselves. They connect with their deep evolutionary history. Even when people never experience these wild natures directly, they affirm their existence as important for their psychological and spiritual well-being. Humans will always materially depend on nature to some degree. Even if a fully synthetic world were possible, many of us might still choose to continue to live more coupled with nature than human sustenance and technologies require. What decoupling offers is the possibility that humanity’s material dependence upon nature might be less destructive. The case for a more active, conscious, and accelerated decoupling to spare nature draws more on spiritual or aesthetic than on material or utilitarian arguments. Current and future generations could survive and prosper materially on a planet with much less biodiversity and wild nature. But this is not a world we want nor, if humans embrace decoupling processes, need to accept. What we are here calling nature, or even wild nature, encompasses landscapes, seascapes, biomes and ecosystems that have, in more cases than not, been regularly altered by human influences over centuries and millennia. Conservation science, and the concepts of biodiversity, complexity, and indigeneity are useful, but alone cannot determine which landscapes to preserve, or how. In most cases, there is no single baseline prior to human modification to which nature might be returned. For example, efforts to restore landscapes to more closely resemble earlier states (“indigeneity”) may involve removing recently arrived species (“invasives”) and thus require a net reduction in local biodiversity. In other circumstances, communities may decide to sacrifice indigeneity for novelty and biodiversity. Explicit efforts to preserve landscapes for their non-utilitarian value are inevitably anthropogenic choices. For this reason, all conservation efforts are fundamentally anthropogenic. The setting aside of wild nature is no less a human choice, in service of human preferences, than bulldozing it. Humans will save wild places and landscapes by convincing our fellow citizens that these places, and the creatures that occupy them, are worth protecting. People may choose to have some services — like water purification and flood protection — provided for by natural systems, such as forested watersheds, reefs, marshes, and wetlands, even if those natural systems are more expensive than simply building water treatment plants, seawalls, and levees. There will be no one-size-fits-all solution. Environments will be shaped by different local, historical, and cultural preferences. While we believe that agricultural intensification for land-sparing is key to protecting wild nature, we recognize that many communities will continue to opt for land-sharing, seeking to conserve wildlife within agricultural landscapes, for example, rather than allowing it to revert to wild nature in the form of grasslands, scrub, and forests. Where decoupling reduces pressure on landscapes and ecosystems to meet basic human needs, landowners, communities, and governments still must decide to what aesthetic or economic purpose they wish to dedicate those lands. Accelerated decoupling alone will not be enough to ensure more wild nature. There must still be a conservation politics and a wilderness movement to demand more wild nature for aesthetic and spiritual reasons. Along with decoupling humankind’s material needs from nature, establishing an enduring commitment to preserve wilderness, biodiversity, and a mosaic of beautiful landscapes will require a deeper emotional connection to them. 6. We affirm the need and human capacity for accelerated, active, and conscious decoupling. Technological progress is not inevitable. Decoupling environmental impacts from economic outputs is not simply a function of market-driven innovation and efficient response to scarcity. The long arc of human transformation of natural environments through technologies began well before there existed anything resembling a market or a price signal. Thanks to rising demand, scarcity, inspiration, and serendipity, humans have remade the world for millennia. Technological solutions to environmental problems must also be considered within a broader social, economic, and political context. We think it is counterproductive for nations like Germany and Japan, and states like California, to shutter nuclear power plants, recarbonize their energy sectors, and recouple their economies to fossil fuels and biomass. However, such examples underscore clearly that technological choices will not be determined by remote international bodies but rather by national and local institutions and cultures. Too often, modernization is conflated, both by its defenders and critics, with capitalism, corporate power, and laissez-faire economic policies. We reject such reductions. What we refer to when we speak of modernization is the long-term evolution of social, economic, political, and technological arrangements in human societies toward vastly improved material well-being, public health, resource productivity, economic integration, shared infrastructure, and personal freedom. Modernization has liberated ever more people from lives of poverty and hard agricultural labor, women from chattel status, children and ethnic minorities from oppression, and societies from capricious and arbitrary governance. Greater resource productivity associated with modern socio-technological systems has allowed human societies to meet human needs with fewer resource inputs and less impact on the environment. More-productive economies are wealthier economies, capable of better meeting human needs while committing more of their economic surplus to non-economic amenities, including better human health, greater human freedom and opportunity, arts, culture, and the conservation of nature. Modernizing processes are far from complete, even in advanced developed economies. Material consumption has only just begun to peak in the wealthiest societies. Decoupling of human welfare from environmental impacts will require a sustained commitment to technological progress and the continuing evolution of social, economic, and political institutions alongside those changes. Accelerated technological progress will require the active, assertive, and aggressive participation of private sector entrepreneurs, markets, civil society, and the state. While we reject the planning fallacy of the 1950s, we continue to embrace a strong public role in addressing environmental problems and accelerating technological innovation, including research to develop better technologies, subsidies, and other measures to help bring them to market, and regulations to mitigate environmental hazards. And international collaboration on technological innovation and technology transfer is essential in the areas of agriculture and energy.

#### Warming irreversible – only growth solves through CCS and a bridge to renewables – link turns every neg impact

Graciela 9/1/16 – Professor of Economics and of Statistics at Columbia University and Visiting Professor at Stanford University, and was the architect of the Kyoto Protocol carbon market (being interviewed by Marcus Rolle, freelance journalist specializing in environmental issues and global affairs, “Reversing Climate Change: Interview with Graciela Chichilnisky,” http://www.globalpolicyjournal.com/blog/01/09/2016/reversing-climate-change-interview-graciela-chichilnisky)//cmr

GC: Green capitalism is a new economic system that values the natural resources on which human survival depends. It fosters a harmonious relationship with our planet, its resources and the many species it harbors. It is a new type of market economics that addresses both equity and efficiency. Using carbon negative technology™ it helps reduce carbon in the atmosphere while fostering economic development in rich and developing nations, for example in the U S., EU, China and India. How does this work? In a nutshell Green Capitalism requires the creation of global limits or property rights nation by nation for the use of the atmosphere, the bodies of water and the planet’s biodiversity, and the creation of new markets to trade these rights from which new economic values and a new concept of economic progress emerges updating GDP as is now generally agreed is needed. Green Capitalism is needed now to help avert climate change and achieve the goals of the 2015 UN Paris Agreement, which are very ambitious and universally supported but have no way to be realized within the Agreement itself. The Carbon Market and its CDM play critical roles in the foundation of Green Capitalism, creating values to redefine GDP. These are needed to remain within the world’s “CO2 budget” and avoid catastrophic climate change. As I see it, the building blocks for Green Capitalism are then as follows; (1) Global limits nation by nation in the use of the planet’s atmosphere, its water bodies and biodiversity - these are global public goods. (2) New global markets to trade these limits, based on equity and efficiency. These markets are relatives of the Carbon Market and the SO2 market. The new market create new measures of economic values and update the concept of GDP. (3) Efficient use of Carbon Negative Technologies to avert catastrophic climate change by providing a smooth transition to clean energy and ensuring economic prosperity in rich and poor nations. These building blocks have immediate practical implications in reversing climate change and can assist the ambitious aims of Paris COP21 become a reality. MR: What is the greatest advantage of the new generation technologies that can capture CO2 from the air? GC: These technologies build carbon negative power plants, such as Global Thermostat, that clean the atmosphere of CO2 while producing electricity. Global Thermostat is a firm that is commercializing a technology that takes CO2 out of air and uses mostly low cost residual heat rather than electricity to drive the capture process, making the entire process of capturing CO2 from the atmosphere very inexpensive. There is enough residua heat in a coal power plant that it can be used to capture twice as much CO2 as the plant emits, thus transforming the power plant into a “carbon sink.” For example, a 400 MW coal plant that emits 1 million tons of CO2 per year can become a carbon sink absorbing a net amount of 1 million tons of CO2 instead. Carbon capture from air can be done anywhere and at any time, and so inexpensively that the CO2 can be sold for industrial or commercial uses such as plastics, food and beverages, greenhouses, bio-fertilizers, building materials and even enhanced oil recovery, all examples of large global markets and profitable opportunities. Carbon capture is powered mostly by low (85°C) residual heat that is inexpensive, and any source will do. In particular, renewable (solar) technology can power the process of carbon capture. This can help advance solar technology and make it more cost-efficient. This means more energy, more jobs, and it also means economic growth in developing nations, all of this while cleaning the CO2 in the atmosphere. Carbon negative technologies can literally transform the world economy. MR: One final question. You distinguish between long-run and short-run strategies in the effort to reverse climate change. Would carbon negative technologies be part of a short-run strategy? GC: Long-run strategies are quite different from strategies for the short-run. Often long-run strategies do not work in the short run and different policies and economic incentives are needed. In the long run the best climate change policy is to replace fossil fuel sources of energy that by themselves cause 45% of the global emissions, and to plant trees to restore if possible the natural sources and sinks of CO2. But the fossil fuel power plant infrastructure is about 87% of the power plant infrastructure and about $45-55 trillion globally. This infrastructure cannot be replaced quickly, certainly not in the short time period in which we need to take action to avert catastrophic climate change. The issue is that CO2 once emitted remains hundreds of years in the atmosphere and we have emitted so much that unless we actually remove the CO2 that is already there, we cannot remain long within the carbon budget, which is the concentration of CO2 beyond which we fear catastrophic climate change. In the short run, therefore, we face significant time pressure. The IPCC indicates in its 2014 5th Assessment Report that we must actually remove the carbon that is already in the atmosphere and do so in massive quantities, this century (p. 191 of 5th Assessment Report). This is what I called a carbon negative approach, which works for the short run. Renewable energy is the long run solution. Renewable energy is too slow for a short run resolution since replacing a $45-55 trillion power plant infrastructure with renewable plants could take decades. We need action sooner than that. For the short run we need carbon negative technologies that capture more carbon than what is emitted. Trees do that and they must be conserved to help preserve biodiversity. Biochar does that. But trees and other natural sinks are too slow for what we need today. Therefore, negative carbon is needed now as part of a blueprint for transformation. It must be part of the blueprint for Sustainable Development and its short term manifestation that I call Green Capitalism, while in the long run renewable sources of energy suffice, including Wind, Biofuels, Nuclear, Geothermal, and Hydroelectric energy. These are in limited supply and cannot replace fossil fuels. Global energy today is roughly divided as follows: 87% is fossil, namely natural gas, coal, oil; 10% is nuclear, geothermal, and hydroelectric, and less than 1% is solar power — photovoltaic and solar thermal. Nuclear fuel is scarce and nuclear technology is generally considered dangerous as tragically experienced by the Fukushima Daichi nuclear disaster in Japan, and it seems unrealistic to seek a solution in the nuclear direction. Only solar energy can be a long term solution: Less than 1% of the solar energy we receive on earth can be transformed into 10 times the fossil fuel energy used in the world today. Yet we need a short-term strategy that accelerates long run renewable energy, or we will defeat long-term goals. In the short term as the IPCC validates, we need carbon negative technology, carbon removals. The short run is the next 20 or 30 years. There is no time in this period of time to transform the entire fossil infrastructure — it costs $45-55 trillion (IEA) to replace and it is slow to build. We need to directly reduce carbon in the atmosphere now. We cannot use traditional methods to remove CO2 from smokestacks (called often Carbon Capture and Sequestration, CSS) because they are not carbon negative as is required. CSS works but does not suffice because it only captures what power plants currently emit. Any level of emissions adds to the stable and high concentration we have today and CO2 remains in the atmosphere for years. We need to remove the CO2 that is already in the atmosphere, namely air capture of CO2 also called carbon removals. The solution is to combine air capture of CO2 with storage of CO2 into stable materials such as biochar, cement, polymers, and carbon fibers that replace a number of other construction materials such as metals. The most recent BMW automobile model uses only carbon fibers rather than metals. It is also possible to combine CO2 to produce renewable gasoline, namely gasoline produced from air and water. CO2 can be separated from air and hydrogen separated from water, and their combination is a well-known industrial process to produce gasoline. Is this therefore too expensive? There are new technologies using algae that make synthetic fuel commercially feasible at competitive rates. Other policies would involve combining air capture with solar thermal electricity using the residual solar thermal heat to drive the carbon capture process. This can make a solar plant more productive and efficient so it can out-compete coal as a source of energy. In summary, the blueprint offered here is a private/public approach, based on new industrial technology and financial markets, self-funded and using profitable greenmarkets, with securities that utilize carbon credits as the “underlying” asset, based on the KP CDM, as well as new markets for biodiversity and water providing abundant clean energy to stave off impending and actual energy crisis in developing nations, fostering mutually beneficial cooperation for industrial and developing nations. The blueprint proposed provides the two sides of the coin, equity and efficiency, and can assign a critical role for women as stewards for human survival and sustainable development. My vision is a carbon negative economy that represents green capitalism in resolving the Global Climate negotiations and the North–South Divide. Carbon negative power plants and capture of CO2 from air and ensure a clean atmosphere together innovation and more jobs and exports: the more you produce and create jobs the cleaner becomes the atmosphere. In practice, Green Capitalism means economic growth that is harmonious with the Earth resources.

#### Cap is sustainable and the alt gets wrecked

Craig Calhoun 16. Director of the London School of Economics and Political Science, “The future of capitalism,” Socio-Economic Review, 2016, Vol. 14, No. 1.

Does capitalism have a future? Of course, it does. But it is not necessarily pretty. Wealth can be generated in evermore extensive and intensive ways even in a world full of crises and challenges. And because capitalism is the dominant economic system in the world, it could continue to contribute to climate change, conflict, inequality and instability. But this does not mean it will collapse. The USSR collapsed as a state following a long period of stagnant growth and expensive arms race. This was bracing, perhaps a warning to other states, but not necessarily a model for the end of capitalism. Much critical engagement with capitalism has focused on its internal contradictions and potential collapse. Contradictions are real and collapse is possible, but the language is misleading. We speak of the collapse of the Roman Empire, but this took 300 years of decline, instability and conflict. We speak of the collapse of feudalism, but it would again be more accurate to see a long process of transformation as feudal structures were less able to organize social, economic and even military life, and less able to reproduce key elements of their power structure while gradually states and what we now call capitalism grew. Capitalism has already proved that although it is prone to generating crises, it is not merely a short episode between feudalism and socialism, as the Communist Manifesto implied. It has endured much longer than Marx and Engels thought, and along with the nation-state system dominated global geopolitics and economics for some 400 years. It may well last much longer—but this continued existence could be marked by both growing systemic diffi- culties internal to capitalism and upheavals beyond capitalism that are exacerbated by it and pose challenges to it. Capitalism is more than just markets or economics in general. It is a system of production based on ever more intensive deployment of capital and pursuit of productivity (and profit)— and hence a driver of both expansion and technological and organizational innovation. It is a system of relations between states and other economic actors in which states guarantee forms of property, security of contract and regimes of accumulation. Together these make it a system that drives not only expansion, but also accumulation and concentration of capital. But capitalism is not always the same. In the first place, it always exists in social and political contexts, not in a ‘pure’, abstract form. In the real world, capitalism is always shaped by state support, regulation and mediation of conflicts; states may carry the costs of capitalism’s negative externalities. In addition, capitalism’s internal character varies. Of most immediate importance, since the 1970s, capitalism has seen a dramatic ascendancy of both finance and service work. Industry has not disappeared any more than land lost all value during the industrial revolution. But where perhaps a quarter of capital was held in the form of financial assets 40 years ago, the figure now is about three-quarters. There has been similar proportionate growth in service employment. There may yet be a productivity revolution in service work— though in what proportion that will bring freedom and opportunity ( probably only for an elite) or only low wages and unemployment (for the rest of us) remains to be seen. The claim that we are moving into a ‘sharing economy’ points to some new developments, but fails to address basic structural dimensions of capitalism. To be sure, there is also variation in the forms of enterprise. The development, expansion and international spread of corporations have been remarkable innovations. Corporations may be organized through legal fictions—as artificial persons ‘without a soul to damn or body to kick’—but also as basic social institutions. Firms are almost as important as states. So ubiquitous are corporations (even though legal regimes vary) that it is now hard to recall capitalism before corporate capitalism. More recently, however, corporations have themselves have become commodities bought and sold. From IPOs to mergers and acquisitions, this has enriched financial institutions. It has also made both capital markets and labour markets less stable. And it has brought a real cost in social solidarity. This is shaped by a decline in longterm employment, undermining of ties between firms and their localities, and financial pressures—ever more intensive and short-term—against the provision of health care, pension and other benefits to employees. Likewise, capitalism in any one time or place may be shaped more or less by entrepreneurs and the formation of new enterprises. Entrepreneurs were crucial to the rise of merchant capitalism and in the industrial revolution. They were important in the ‘gilded age’, not just among the robber barons but also in launching a host of family businesses. And entrepreneurs played a central role in the rise of new industries in the last 40 years. There should be appreciation for the creative, enterprising spirit of entrepreneurs. But we should not be blinded by either the hagiography of individuals or the celebration of entrepreneurship in general to think that entrepreneurial successes are quite as individualistic as the ideology suggests. Entrepreneurs depend on social networks and whole ecologies of support from universities to venture capitalists. Much of the achievement of technology firms in the last 40 years has been grounded in commercializing scientific advances that were funded by governments during the cold war—and then, quite remarkably, made publicly available with no claim to property rights by the government on behalf of citizens. The term entrepreneur can be used so elastically as to encompass both those acquiring great fortunes by building companies in Silicon Valley and those working at a near subsistence level as contractors in new service economy businesses—like drivers organized through online booking agencies. Typically paid a fee for each service, these are entrepreneurs only in the same sense that ‘independent’ knitters and weavers were during the industrial revolution. As mechanization of spinning and expansion of markets drove up demand, knitters set up shop in their own homes, often enlisting family members as assistants. They provided their own equipment, sometimes bought on credit, including knitting frames (machines that were human-powered but able to produce much more than simple handwork). They sold their work to intermediaries who ran ‘putting out’ businesses, distributing thread to knitters and collecting finished cloth. As intermediaries, these were arguably the 18th and early 19th century counterparts to Uber and other firms organizing services through ‘apps’. Framework knitting was initially a good occupation, requiring only modest skill though intense concentration and physical labour. But it was an easy business to enter and knitters were eventually driven to work longer and longer hours both to repay their capital costs and to support their families. The creators of self-exploiting tiny businesses, more stable small businesses and ‘start-ups’ that might grow with venture capital and successful public offerings are all important. However, lumping them under the single term ‘entrepreneurs’ can be misleading as can an overly rosy picture of the ‘sharing economy’. Not least of all, states may themselves pursue capitalist ends like expansion of markets and accumulation of capital. They may either own capitalist firms or actively try to manage capitalist enterprise and finance. Even countries in which liberal capitalist separation of state from market was celebrated have used such models. The US accomplished projects like rural electrification partly through state-owned enterprises and partly through preferential financing and state-guaranteed monopolies. Railroads that were initially private ventures were in many countries consolidated as public service companies. Only rarely was there clarity about whether to run them as for-profit firms (thus subsidized the state) or as services funded partly by the state. Still, they demanded investment and generally became more capital-intensive. More strikingly, the Soviet Union was arguably as much an example of state capitalism as of socialism. And today, China is arguably the model for a capitalist future in which the boundary between state and economy is not celebrated—as it has been in the ideology of liberal capitalism. State-related enterprises and direct state organization of finance may be as basic to the near-term future of capitalism as, say, entrepreneurs. Still, capitalism works. Certainly it only works more or less, and not always as well or in the ways we might wish. But it works well enough that it need not reach an end at any specific point. It is a good bet that it will still dominate global economics tomorrow, next year, and when the next crisis comes. But, capitalism is not an order of nature. It is a humanly created historical system. So, it will change. It will likely end, change beyond recognition or continue to exist. It will almost certainly lose its capacity to dominate. Capitalism is good at some things, not others, and actively bad at some. It is good at creating wealth and driving innovation, indeed extraordinarily good. Even Marx and Engels praised capitalism for this (though they thought it was important at some point to say ‘we have enough, let’s concentrate on how wealth is shared’). Capitalism’s capacity to create wealth is why less developed countries are betting on it today. But by comparison, capitalism is bad at equitable distribution. It is not necessarily worse than all other systems: feudalism and slave societies are hardly models of equitable distribution of wealth. But arguably because capitalism depends on consumer markets it needs distribution of wealth to survive. It thus operates in an uneasy (or outright denied) collusion with trade unions and other mechanisms that increase returns to labour and with states that ensure some levels of distribution of wealth. High employment industries may make distribution of wealth (and thus funding of consumer markets) easier; the erosion of industrial employment makes this harder, at least temporarily. Of course, capitalism’s extraordinary ability to generate wealth is not counterbalanced only by problems of distribution. Capitalism also produces the opposite of wealth—which is not poverty but what John Ruskin called ‘illth’. Illth is bad stuff: accumulation of waste, pollution of air and water and even climate change offer good examples. But so do erosions of social solidarity and mutual support systems. States often step in to deal with illth and other negative externalities of capitalism. This is what Karl Polanyi analysed as the ‘double-movement’ of capitalism that led to the rise of the welfare-state. There are also market-based solutions, however, like insurance companies. And philanthropy is also sometimes important, channelling privately accumulated capital to public purposes. But one way or another, illth and negative externalities demand attention. So, what challenges capitalism now? There is still risk—indeed high probability—of systemic financial crises. Addicted to finance and growth, the world continues to hope that the source of so much recent upheaval can become the source of salvation from it. The dominance of finance in contemporary capitalism ties every country into a global system that has risks built into its very architecture. Some apparent solutions—like the spreading of risk through markets for derivatives—create new and intensified risks. So far, ‘financial engineering’ has helped create great fortunes but it has not produced the equivalent of bridges that do not collapse. And when financial crises have come, the prevailing pattern of response is to turn private problems into public ones— for example by nationalizing the toxic assets of failing banks. And yet we do not know what to do except invest. Risk can be mitigated, though this depends on both good analyses and organizational will. Financial markets, instruments and contractual agreements are extraordinarily complex. Unfortunately, the financial system is poorly understood even though it is the product and object of brilliant research. This reflects not just complexity, but the extent to which the study of finance is bound up with the production of ‘financial engineering’ products that can actually work in practice. For example, unrealistic assumptions like unlimited liquidity are embedded into algorithms that price derivatives (and indeed to some extent organize derivatives markets). This is not an error; it is a way of accomplishing effective pricing—except in those times where liquidity limits do become significant, in which cases the system is prone to crisis. Both the complexity of the global financial system and its systemic risk are increased by organizational factors. The system is not the product of some moment of rational planning. It grew by accretion and incremental if rapid change. Different actors set out to solve different problems: expanding mortgage availability to expand home ownership, for example, or attracting funding to new business ventures, or building transportation and communication infrastructures. These are organized through different firms and government agencies. There is innovation in law (derivatives are contracts) as well as in finance per se, so different professions are involved with their different perspectives. The development of regulation usually lags, but so does the development of organizational competence even in private firms. Senior executives may not have full understanding of what subordinates—say traders—are doing and how it creates risks. ‘Silos’ separate different functions within firms, for example, and give different knowledge and incentives to traders, risk officers and general managers. The risk is also exacerbated when international regulation and risk management is weak. This can also be a problem of inadequate understanding (and inadequate access to information, which is largely in the hands of firms with proprietary interests in it). But there is a deeper problem. International cooperation is weak on a number of different dimensions and policy areas, even while it is as crucial as ever. The financial crisis showed how difficult it was to generate effective cooperation for changes to financial processes, not just at the global level but even within Europe—which found its institutions unexpectedly inadequate even after decades of development. The Bretton Woods institutions face new challenges, including a proliferation of alternative mediators of global finance from the BRICs bank to the Asian Infrastructure Investment Bank led by China and the US development of alternative regional trade agreements. But insufficient international cooperation in finance is mirrored by weaknesses in other areas: refugee and security policies are notable examples at the moment. In any case, difficulty organizing effective and efficient regulation and support institutions for global finance multiplies risks. But the risks do not just concern financial collapse. They concern the possibility that no solutions will be found to paying for the costs externalized by capitalist firms. Another challenge for capitalism, also made evident in the financial crisis, is the huge scale of what we might call ‘unofficial capitalism’. This is wealth and flows of wealth that are unrecorded or incompletely recorded, and perhaps more importantly unregulated or ineffectively regulated. Some of this derives from organized crime, including trafficking in drugs, arms and people. But some of it derives simply from tax evasion. Whatever the provenance of illicit capital, it amounts to trillions of euros trading in dark or at least obscure markets, and sometimes mingling with more legitimate capitalism in destabilizing ways. The flow of Russian money into Cyprus before the crisis of 2012–2013 was an example. Of course, unofficial economic activity helped many people survived financial crisis and austerity policies. There are relatively benign, small-scale forms of off-the-books enterprise in certain businesses and ‘alternative economies’. Even these, however, deprive states of revenues that could be used to finance social expenditure. The impact of large-scale illicit capitalism is much greater. Diversion of funds into illicit capitalism and weak international cooperation are both factors in widespread destruction of the political and social conditions for capitalism. Even more basically, this is driven by financial capitalism itself and accompanying market fundamentalist ideology. There has been a weakening of welfare states. This is often a matter of explicit state policy. Privatization may be driven by pro-market views, but also by criticism of inefficiencies in actual bureaucracies. It is also often driven by state fiscal challenges, which are in turn shaped by difficulty collecting taxes (not least where it is easy for money to flow across borders). Another way of looking at this is that it costs a lot of money to deal with capitalism’s externalities. There are the costs of coping with illth, and there are the costs of providing education, health care, unemployment benefits and community services that not only sustain national populations and thus stabilize society, but also lower costs to capitalist firms—e.g., of skilled and healthy workers. The weakening of welfare states is only one example of much more pervasive institutional deficits. Corporations themselves can be important social institutions that provide their members with what amount to welfare benefits and even some sense of community. But long-term corporate employment and benefit structures are in decline, subjected to shortterm financial market pressures influenced by the ideology of ‘shareholder value’. In other words, institutions of basic social importance are being made responsive only to one class of interests—those of investors. Assertions of value for other stakeholders are generally less effective. Other directly economic factors also challenge capitalism, such as unemployment, inequality and slow (or negative) growth. These are potentially disruptive to the capacity to realize profits, but also to social solidarity. At the same time, we should not underestimate how hard people try to make existing systems work, to find their way to enough material resources and social integration for their own lives. They do this in part by continuing to participate in capitalist system. It is a source of frustration for many, though they do not always identify their personal problems with this systemic source. It also a widespread source of hope—not least in many poorer and developing countries. People continue to seek jobs and start businesses. And this is a matter of emotional attachments as well as economic practicality. To those optimistic about revolutions, I would stress that these do not often turn out very well. In addition, one distinctive feature of the recent and in some ways continuing financial crisis has been the near-absence of anti-systemic movements. There have been occupations of public spaces, though these have been focused more on failures of government and power of global finance than on capitalism as such. There are populists on both Left and Right, but almost no real socialist mobilization. There are remarkable experiments in local-level alternative economies of barter and mutual support. But there are not large-scale movements for truly transcending capitalism and replacing it by an alternative scalable economic system. So, what could happen? Well, yes, capitalism could collapse. If this happens, purely economic calamity will likely be entwined with war and environmental disaster. If any historians survive this apocalypse, they will argue over whether capitalism caused the catastrophe, or only exacerbated other problems like climate change failures of international cooperation or decline in social solidarity. There could also be technological or other innovation that reinvigorates aspects of capitalism and deals with some of its costly externalities. Opportunities for expansion of capitalism’s reach are shrinking as it reaches the whole world. Still, there could be indefinite continued intensification. The liberal hope that capitalism and democracy are somehow naturally linked is likely to be proven specious. Capitalist democracies may persist, but more state-authoritarian versions of capitalism are at least as likely to prosper. Global integration will not bring homogeneity, but diversity of political, economic and social arrangements. Governments will attempt to compensate for problems created by capitalist development. This may bring aspects of Polanyi’s double movement, but probably not a renewal of the welfare state project—and ( perhaps ironically) particularly not in democratic states. How much states can do and how well will depend on how they are linked in international cooperation, at regional as well as global levels. In any case, though, it is important to look at whether compensation for illth and positive virtues of solidarity may be produced in other ways, including in business institutions, philanthropy and social entrepreneurship. Small achievements in mitigating problems are worth the effort and worth cherishing. But neither reducing inequality nor stemming climate change is easy, and neither is likely without trade-offs with freedom or growth. What seems very unlikely is a pure collapse or revolutionary transformation creating socialism. If capitalism is to be replaced by a new dominant economic form, this is likely to come about through a prolonged period of ambiguity, difficulty and conflict. The end of capitalism may be more like the end of the Roman Empire or of feudalism than like the end of the Soviet Union. In this context, creating and defending islands of civility, solidarity and relative social justice may be a challenging but crucial project.

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#### Patent holdup decks innovation

Carrier 2021, Distinguished Professor of Law, leading authority in antitrust and intellectual property law with expertise in the pharmaceutical, high-technology, and music industries (Michael A. Carrier, 1/26/21 “Rescuing Antitrust’s Role in Patent Holdup” https://www.pennlawreview.com/2021/02/05/rescuing-antitrusts-role-in-patent-holdup/)//ellie

Standards, common platforms allowing products to work together, are ubiquitous in our economy. They allow consumers to know that their plugs will fit into outlets and that their phones will connect to wireless networks. But imagine that a company (1) has a patent needed to use a standard, (2) promises to license the patent on reasonable terms, and then (3) reverses course, seeking to block the product or charge an exorbitant price. In such a case, the users of the standard are stuck. They have invested in technologies based on the standard. And they may be forced to pay a price reflecting not the added value of the technology but the costs of switching to a new technology. In other words, they are subject to “patent holdup.” The concerns threatened by patent holdup have consistently been acknowledged by officials in Republican and Democratic administrations. A unanimously adopted 2007 report of the antitrust agencies explained the difference between a patentee’s power ex ante—when “multiple technologies may compete to be incorporated into the standard”—and ex post—when “the chosen technology may lack effective substitutes,” allowing patentees to “extract higher royalties.” Similarly, the Federal Trade Commission (FTC) unanimously endorsed a 2011 report that highlighted how “an entire industry” could be “susceptible” to the “particularly acute” concern of holdup, which can result in “higher prices” and “discourage standard setting activities and collaboration, which can delay innovation.”

#### Aff k2 innovation

Hovenkamp 2020, Herbert J. a Fellow of the American Academy of Arts and Sciences, and in 2008 won the Justice Department’s John Sherman Award for his lifetime contributions to antitrust law (University of Pennsylvania Carey Law School “FRAND and Antitrust” https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=3095&context=faculty\_scholarship)//ellie

Oversight of FRAND obligations is one area where it is critical for the courts to keep an eye on longer run concerns for innovation. FRAND has evolved into a highly successful but nevertheless vulnerable mechanism for facilitating joint innovation and product development. Indeed, for networked technologies such as cellular phones it is difficult to see how coordinated development by numerous competitive firms could be achieved without the significant coordination and technology sharing that FRAND enables. That system will be undermined, however, if one firm is able to renege on its voluntarily entered obligations, because others will then do the same. The regime of collaborative innovation that FRAND contemplates would very likely fall apart, and at great harm to competition and economic welfare. The Ninth Circuit’s 2020 Qualcomm decision indicates that this fear is more than fanciful. Unless corrected, Congress may have to intervene in order to protect a system that has been an important driver of innovation and economic growth. Among the various legal tools for policing the FRAND process antitrust is only one, but it is an important one and has its own unique requirements and tools for analysis. As a result, the existence of FRAND obligations is hardly irrelevant to antitrust claims. Antitrust law takes markets as it finds them. For example, in the numerous antitrust decisions involving the NCAA,301 a very large joint venture, the antitrust courts do not pretend that the joint venture does not exist. Rather, they assume that the venture itself performs a socially valuable function. Then they begin with its rules and the investments and commitments that its structure creates and considers how antitrust can be used to make the market function competitively on those assumptions. FRAND is no different. While it has its flaws, the standard setting process and the use of standard essential patents is well settled and has produced significant benefits within a competitive environment. In that case the best use of antitrust law is to police the competitive process within that system.

### FTC

#### Biden’s executive order on anti-trust non-uniques the Disads:

White House.gov, 7/9/2021 (“FACT SHEET: Executive Order on Promoting Competition in the American Economy,” <https://www.whitehouse.gov/briefing-room/statements-releases/2021/07/09/fact-sheet-executive-order-on-promoting-competition-in-the-american-economy/>, Retrieved 8/6/2021)

The economy is booming under President Biden’s leadership. The economy has gained more than three million jobs since the President took office—the most jobs created in the first five months of any presidency in modern history. Today, the President is building on this economic momentum by signing an Executive Order to promote competition in the American economy, which will lower prices for families, increase wages for workers, and promote innovation and even faster economic growth. For decades, corporate consolidation has been accelerating. In over 75% of U.S. industries, a smaller number of large companies now control more of the business than they did twenty years ago. This is true across healthcare, financial services, agriculture and more. That lack of competition drives up prices for consumers. As fewer large players have controlled more of the market, mark-ups (charges over cost) have tripled. Families are paying higher prices for necessities—things like prescription drugs, hearing aids, and internet service. Barriers to competition are also driving down wages for workers. When there are only a few employers in town, workers have less opportunity to bargain for a higher wage and to demand dignity and respect in the workplace. In fact, research shows that industry consolidation is decreasing advertised wages by as much as 17%. Tens of millions of Americans—including those working in construction and retail—are required to sign non-compete agreements as a condition of getting a job, which makes it harder for them to switch to better-paying options. In total, higher prices and lower wages caused by lack of competition are now estimated to cost the median American household $5,000 per year. Inadequate competition holds back economic growth and innovation. The rate of new business formation has fallen by almost 50% since the 1970s as large businesses make it harder for Americans with good ideas to break into markets. There are fewer opportunities for existing small and independent businesses to access markets and earn a fair return. Economists find that as competition declines, productivity growth slows, business investment and innovation decline, and income, wealth, and racial inequality widen. When past presidents faced similar threats from growing corporate power, they took bold action. In the early 1900s, Teddy Roosevelt’s Administration broke up the trusts controlling the economy—Standard Oil, J.P. Morgan’s railroads, and others—giving the little guy a fighting chance. In the late 1930s, FDR’s Administration supercharged antitrust enforcement, increasing more than eightfold the number of cases brought in just two years—enforcement actions that saved consumers billions in today’s dollars and helped unleash decades of sustained, inclusive economic growth. Today President Biden is taking decisive action to reduce the trend of corporate consolidation, increase competition, and deliver concrete benefits to America’s consumers, workers, farmers, and small businesses. Today’s historic Executive Order established a whole-of-government effort to promote competition in the American economy. The Order includes 72 initiatives by more than a dozen federal agencies to promptly tackle some of the most pressing competition problems across our economy. Once implemented, these initiatives will result in concrete improvements to people’s lives. Among other things, they will: Make it easier to change jobs and help raise wages by banning or limiting non-compete agreements and unnecessary, cumbersome occupational licensing requirements that impede economic mobility. Lower prescription drug prices by supporting state and tribal programs that will import safe and cheaper drugs from Canada. Save Americans with hearing loss thousands of dollars by allowing hearing aids to be sold over the counter at drug stores. Save Americans money on their internet bills by banning excessive early termination fees, requiring clear disclosure of plan costs to facilitate comparison shopping, and ending landlord exclusivity arrangements that stick tenants with only a single internet option. Make it easier for people to get refunds from airlines and to comparison shop for flights by requiring clear upfront disclosure of add-on fees. Make it easier and cheaper to repair items you own by limiting manufacturers from barring self-repairs or third-party repairs of their products. Make it easier and cheaper to switch banks by requiring banks to allow customers to take their financial transaction data with them to a competitor. Empower family farmers and increase their incomes by strengthening the Department of Agriculture’s tools to stop the abusive practices of some meat processors. Increase opportunities for small businesses by directing all federal agencies to promote greater competition through their procurement and spending decisions. The Order also encourages the leading antitrust agencies to focus enforcement efforts on problems in key markets and coordinates other agencies’ ongoing response to corporate consolidation. The Order: Calls on the leading antitrust agencies, the Department of Justice (DOJ) and Federal Trade Commission (FTC), to enforce the antitrust laws vigorously and recognizes that the law allows them to challenge prior bad mergers that past Administrations did not previously challenge. Announces a policy that enforcement should focus in particular on labor markets, agricultural markets, healthcare markets (which includes prescription drugs, hospital consolidation, and insurance), and the tech sector. Establishes a White House Competition Council, led by the Director of the National Economic Council, to monitor progress on finalizing the initiatives in the Order and to coordinate the federal government’s response to the rising power of large corporations in the economy.

#### Chinese development inevitable in the SQ – the US wins the race by focusing on domestic revitalization not by cutting out China

Gjoza 2020, Enea Gjoza is a Senior Fellow at Defense Priorities (The Diplomat February 18, 2020 “The US Is Losing the 5G Fight, But Hampering China Is Not the Solution” https://thediplomat.com/2020/02/the-us-is-losing-the-5g-fight-but-hampering-china-is-not-the-solution/)//ellie

U.S. alliance relationships can foster political and military cooperation, but they can’t fundamentally reshape allies’ economic interests — which they will inevitably prioritize over allegiance to the United States. Huawei’s cheap 5G hardware allows Britain, which has aspirations of becoming a tech hub post-Brexit, to build next generation communications infrastructure on the cheap. This and other interests overshadow espionage concerns and fears of potential U.S. reprisal. With even the U.K. willing to defy the U.S. on such a sensitive issue, it is easy to imagine other nations will be far less cooperative. Depending on the nation and issue, the United States will at times find willing partners who are alarmed at China’s economic power, but will just as often find other states readily willing to piggyback off of China’s growth. Sound policy should promote cooperation where interests align, and seek to smooth tensions where they diverge. There is a growing acknowledgment in Washington that China has moved beyond simply being “the world’s factory” to legitimately challenging U.S. firms in sectors higher up the value chain. This has accelerated efforts to prepare for economic competition with China. Unfortunately, these efforts have hinged on a simplistic, heavy-handed strategy of denial that seeks to lock Chinese firms out of foreign markets, ignoring other nations’ interests, including those of allies. For the United States to thrive, it must instead regain its competitive edge in the industries of the future. Seeking to undermine China’s economic development will engender hostility between the U.S. and China and make any cooperation more difficult, even where the two nations’ goals align. Delivering continued economic growth is a key plank of the Chinese Communist Party’s domestic legitimacy, and there is no doubt the Chinese government will lash out if its rule is threatened. China is already taking steps to deter nations from banning Huawei, threatening Germany — which is currently undecided about allowing the Chinese company access to the 5G network — with the expulsion of German automakers from the Chinese market. Moreover, denying China market access can’t compensate for an inability to deliver goods and services customers want. It is a truism that you can’t beat something with nothing; in the case of 5G development, the U.S. currently has nothing to offer states that ban Huawei from their markets, recent efforts notwithstanding. U.S. companies play a negligible role in the wireless networking industry, and no U.S. firm currently produces alternatives to Huawei’s technology. For this reason, despite the geopolitical blowback, Huawei’s revenue hit a record high in 2019, and its European competitors — Nokia and Ericsson — have failed to capture any of its market share. To preserve its economic dominance, the U.S. must prioritize policies that enable domestic revitalization. This requires greater investment in domestic R&D, a favorable regulatory and tax climate, and education reform to produce more STEM talent. The United States should also aggressively confront Chinese theft of U.S. IP and attempts to exploit U.S. educational and research institutions. Ultimately however, U.S. success will not hinge on denying the world access to Chinese products — an approach that has failed to persuade even our closest ally — but on the competitiveness of American products and the American economy. Fortunately, that is something we can control.

# 1ar

#### Capitalism is progressive, self-correcting, and wealth-generating – ensures sustainability – that takes out their resource war claims

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Environmentalists and globalization foes are united in their fear that greater population and consumption of energy, materials, and chemicals accompanying economic growth, technological change and free trade—the mainstays of globalization—degrade human and environmental well-being. Indeed, the 20th century saw the United States’ population multiply by four, income by seven, carbon dioxide emissions by nine, use of materials by 27, and use of chemicals by more than 100. Yet life expectancy increased from 47 years to 77 years. Onset of major disease such as cancer, heart, and respiratory disease has been postponed between eight and eleven years in the past century. Heart disease and cancer rates have been in rapid decline over the last two decades, and total cancer deaths have actually declined the last two years, despite increases in population. Among the very young, infant mortality has declined from 100 deaths per 1,000 births in 1913 to just seven per 1,000 today. These improvements haven’t been restricted to the United States. It’s a global phenomenon. Worldwide, life expectancy has more than doubled, from 31 years in 1900 to 67 years today. India’s and China’s infant mortalities exceeded 190 per 1,000 births in the early 1950s; today they are 62 and 26, respectively. In the developing world, the proportion of the population suffering from chronic hunger declined from 37 percent to 17 percent between 1970 and 2001 despite a 83 percent increase in population. Globally average annual incomes in real dollars have tripled since 1950. Consequently, the proportion of the planet's developing-world population living in absolute poverty has halved since 1981, from 40 percent to 20 percent. Child labor in low income countries declined from 30 percent to 18 percent between 1960 and 2003. Equally important, the world is more literate and better educated than ever. People are freer politically, economically, and socially to pursue their well-being as they see fit. More people choose their own rulers, and have freedom of expression. They are more likely to live under rule of law, and less likely to be arbitrarily deprived of life, limb, and property. Social and professional mobility have also never been greater. It’s easier than ever for people across the world to transcend the bonds of caste, place, gender, and other accidents of birth. People today work fewer hours and have more money and better health to enjoy their leisure time than their ancestors. Man’s environmental record is more complex. The early stages of development can indeed cause some environmental deterioration as societies pursue first-order problems affecting human well-being. These include hunger, malnutrition, illiteracy, and lack of education, basic public health services, safe water, sanitation, mobility, and ready sources of energy. Because greater wealth alleviates these problems while providing basic creature comforts, individuals and societies initially focus on economic development, often neglecting other aspects of environmental quality. In time, however, they recognize that environmental deterioration reduces their quality of life. Accordingly, they put more of their recently acquired wealth and human capital into developing and implementing cleaner technologies. This brings about an environmental transition via the twin forces of economic development and technological progress, which begin to provide solutions to environmental problems instead of creating those problems. All of which is why we today find that the richest countries are also the cleanest. And while many developing countries have yet to get past the “green ceiling,” they are nevertheless ahead of where today’s developed countries used to be when they were equally wealthy. The point of transition from "industrial period" to "environmental conscious" continues to fall. For example, the US introduced unleaded gasoline only after its GDP per capita exceeded $16,000. India and China did the same before they reached $3,000 per capita. This progress is a testament to the power of globalization and the transfer of ideas and knowledge (that lead is harmful, for example). It's also testament to the importance of trade in transferring technology from developed to developing countries—in this case, the technology needed to remove lead from gasoline. This hints at the answer to the question of why some parts of the world have been left behind while the rest of the world has thrived. Why have improvements in well-being stalled in areas such as Sub-Saharan Africa and the Arab world? The proximate cause of improvements in well-being is a “cycle of progress” composed of the mutually reinforcing forces of economic development and technological progress. But that cycle itself is propelled by a web of essential institutions, particularly property rights, free markets, and rule of law. Other important institutions would include science- and technology-based problem-solving founded on skepticism and experimentation; receptiveness to new technologies and ideas; and freer trade in goods, services—most importantly in knowledge and ideas. In short, free and open societies prosper. Isolation, intolerance, and hostility to the free exchange of knowledge, technology, people, and goods breed stagnation or regression.

#### CCS solves – we’re on the cusp of breakthroughs and commercialization – markets key.

**GE Reports 15** (“CCS to Play a Big Role in Climate Solution, IPCC Says,” Nov 30, [https://gereports.ca/ccs-play-big-role-climate-solution-ipcc-says/)//cmr](https://gereports.ca/ccs-play-big-role-climate-solution-ipcc-says/)/cmr)

The new head of the **I**nternational **P**anel on **C**limate **C**hange is calling for a new era of collaboration with the energy industry in a vision of the future where carbon capture and storage (CCS) plays a central role in reducing global temperatures. Hoesung Lee, an economist and professor at Korea University, was appointed chair of the IPCC in October. He says that the world now knows more than enough about the science of climate change to take action. “We need to increase our focus on solutions,” Lee said in the November issue of the World Energy Council’s World Energy Focus. “Industry in general, and the energy sector in particular, need to be part of the solution to climate change. For example, **we need more investment in c**arbon **c**apture and **s**torage technology…. **It will be very difficult to reach zero carbon emissions without it**. And this is clearly an area where energy companies have a **vested interest** in ensuring that the technology is further developed and implemented.” There are CCS projects around the world that have been operating for decades, including the Sleipner field off the coast of Norway where, according to project partner ExxonMobil, over one million tonnes of CO2 have been reinjected each year since 1998. However, CCS technology is very much **still in evolution**, and some applications are brand new. The oilsands industry marked a major milestone in early November with the official opening of Shell Canada’s $1.35-billion Quest CCS project, the first to operate using CO2 from oilsands operations. The project, which captures CO2 from Shell’s Scotford oilsands upgrader, has $745 million in funding from the Alberta government and $120 million in funding from Ottawa, and is viewed as pivotal for ongoing development of CCS technology. At Quest, as with many other CCS operations globally, the project owners have chosen an amine absorption system to anchor the project. Although many different technologies can be used to separate CO2 from flue gases, amine absorption is the most mature and economical technology for large-scale applications. In the amine absorption process, the flue gas from a power plant or refinery is injected into a column of amine-rich water, which selectively absorbs the CO2. The mixture is then heated in a separate chamber, where the CO2 is released from the liquid, captured and shipped to a sequestration site. The amine can be recycled and used again. There are several amine absorption CCS facilities in operation around the world, including at Snøhvit offshore Norway, where LNG has been produced since 2006. The gas from the field contains approximately eight per cent CO2 by volume, and approximately 700,000 tonnes per year are removed using amine technology. Amine technology has some disadvantages; it uses a large amount of water, and the amine can degrade into volatile compounds that have the potential to harm equipment, people and the environment. As a potential alternative, GE has developed an amino silicone compound that can attach to and essentially wash out CO2 gas from a power plant flue stack. Amino silicones are chemically stable and benign to both humans and the environment. Common usages include hair conditioners, window caulking and fabric softeners. GE chemists have been working with silicone compounds for several decades and have an extensive knowledge of their properties, including CO2 absorption. At temperatures of around 40 degrees Celsius, the CO2 gas attaches to amino silicone materials. When the heat is increased another 100 degress Celsius, it releases the carbon and can then be re-used to capture more. One of the big advantages of GE’s technology is that it does not require any water, which substantially reduces the energy required to capture the carbon, and does not degrade to potentially harmful compounds. “For decades, scientists from around the world have focused their efforts on finding more effective, less expensive ways to reduce CO2 emissions in the atmosphere,” says Phil DiPietro, technical manager, CO2 capture and separation at GE’s Oil and Gas Technology Center in Oklahoma City. “GE scientists have developed an innovative solution to realize both goals.” John Zhou, chief technical officer with Alberta Innovates – Energy and Environment Solutions, sees potential in GE’s innovation. “The GE system is waterless, which means you can reduce energy consumption,” he says. “Also, the release temperature, where pure CO2 dissociates from the capture liquid, is lower, which also saves energy.” As researchers know, however, a process that works well in the lab needs to be tested on a larger scale to confirm its **commercial viability**. Thanks to a new US$1-million grant from the U.S. Department of Energy’s National Energy Technology Laboratories, GE is partnering with the CO2 Technology Center (TCM) at Mongstad, Norway to launch a large-scale pilot test. TCM, a US$1-billion joint venture of Statoil, Shell and Sasol, is recognized as the largest facility for testing and improving CO2 capture. TCM is fully instrumented and designed to provide researchers with the infrastructure to subject their technologies to all the stresses that real-time operations would entail. “Through this project, we will have the opportunity to perform tests at a much larger scale to learn how to make it work in a power plant,” says DiPietro. And the oilsands has power plants aplenty. The region has approximately 2,100 megawatt of electrical cogeneration capacity dedicated to producing, processing and upgrading bitumen. Suncor alone has 425 megawatt of electrical cogeneration capacity. The power is generated through the burning of natural gas, which emits less CO2 than coal or crude fuels, but still accounts for a sizeable portion of the sector’s carbon footprint. Tests of GE’s amino-silicone capture technology will aim to provide final confidence in the system for commercial deployment. A central consideration in pilot testing, which is expected to be underway by mid-2016, will be cost reduction. According to Zhou, researchers are looking for technologies that reduce the cost of carbon capture by half. “CCS is very critical to the oilsands,” he says. “**It will take sustained investment** and sustained effort **to make CCS happen,** and we welcome additions to the global effort.”