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Model Law on Lighting for Developing Countries

Lakshman Guruswamy

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Model Law on Lighting for Developing Countries

Keywords

Developing Countries, Casinos, Hotels

DEVELOPMENT AND DISSEMINATION OF CLEAN LIGHTING

MODEL LAW ON LIGHTING FOR DEVELOPING COUNTRIES

A Bill

To promote the development and deployment of clean lighting to save lives, improve livelihoods, empower women, and combat global warming by creating a thriving global market for clean, affordable, and efficient household, commercial and community lighting, and for other purposes.

Be it enacted by the [legislative organ] of the [developed country] assembled,

Short Title

This Act may be cited as the “*Development and Dissemination of Clean Lighting Act* of [year].”

Effective Date. This Act becomes effective on [date].

§ 1. Findings

(a) [Name of country] is a member of the community of nations that has accepted well-recognized principles of international law and policy establishing the right of developing countries to sustainable development.

(b) [Name of country] seeks to support sustainable development pertaining to energy poverty and access to safe and sustainable lighting products through this Act.

(c) It is estimated that of the 1.3 billion people worldwide without access to electricity, most rely on kerosene for illumination.

(d) The use of kerosene for lighting generates indoor air pollution, contributing to the deaths of 1.8 million people per year. Kerosene fires kill more than 1 million people per year.

(e) [Number of people] in [name of country] currently use kerosene for lighting.

(f) Kerosene fires and indoor air pollution cause the deaths of [number of

people] in [*name of country*] per year.

(g) Children are disproportionately vulnerable to the dangers of kerosene. Accidental ingestion of kerosene leads to fever, cough, abdominal discomfort, or death.

(h) Light generated by kerosene lamps is poor and inefficient, rendering it virtually impossible for people, especially women and children, to accomplish household and social tasks, or engage in economic activity after nightfall.

(i) Lighting costs for kerosene are 325-1625 times higher than those for electric light bulbs, and are borne by some of the world's poorest people.

(j) Kerosene is fossil fuel-based, thus a nonrenewable energy source. Kerosene lamps consume an estimated 77 billion liters of fuel per year. Each year, the burning of kerosene for lighting emits 240 million tons of carbon dioxide into the atmosphere, thus contributing to global climate change.

(k) Safe, sustainable lighting positively impacts the quality of life and environment by:

(i) Allowing women, children, and men to engage in educational and economic endeavors after nightfall,

(ii) Promoting gender equality and women's empowerment,

(iii) Improving household health and safety,

(iv) Alleviating the financial burden presented by kerosene,

(v) Advancing environmental stability by reducing use of kerosene, and

(vi) Reducing contributions to global climate change.

§ 2. Policy

The House of Parliament hereby declares it is the national policy of [*name of country*] to:

(a) Appropriate financial resources towards the research and development of the most appropriate and sustainable energy technologies for improved indoor lighting products that advance the objectives of this Act in [*name of country*];

(b) Foster the growth of a domestic indoor lighting manufacturing industry by supporting entrepreneurs through tax incentives, loans, and micro- and other forms of financing that advance the objectives of this Act;

(c) Ensure that all indoor lighting products meet relevant standards for physical durability, product life-span, and light output;

(d) Install and distribute indoor lighting products in a manner that emphasizes accessibility while encouraging the recipient to contribute to the cost in currency, exchange, and/or sweat equity;

(e) Stimulate community participation in the financing, manufacturing, distribution, and promotion of the objectives of this Act;

(f) Seek the assistance, expertise, guidance, and experience of non-governmental organizations (NGOs) and community advocacy groups in all aspects of the implementation of the Act;

(g) Promote awareness and education about indoor air pollution caused by

kerosene lamps and lanterns;

(h) Promote the involvement of current kerosene lamp and lantern users, *inter alia*, in the research, design, development, manufacturing, distribution, monitoring, maintenance, evaluation, and marketing of improved indoor lighting products; and

(i) Conduct training on use and maintenance to indoor lighting product users and community members.

§ 3. Definitions

For the purposes of this Act:

(a) “Administrator” means the administrator of the Lighting Agency.

(b) “Agency” means the Lighting Agency (“LA”).

(c) “Certification” or “certified” refers to certification by an entity or organization in the country of origin, which is authorized by the LA.

(d) “Endangerment” means the exposure, voluntary, or involuntary, of individuals to conditions harmful to their physical health, and includes circumstances arising from willful or negligent misrepresentation.

(e) “Lighting” refers to artificial indoor or outdoor lighting.

(f) “Lighting products,” refers to indoor or outdoor lighting suitable for off-grid applications.

(g) “Local conditions” means the socioeconomic conditions in the area, based on an overall assessment of economic factors including the ability to pay, cultural factors including a willingness to change patterns or behavior in use of lighting products, and social factors, including the identification of primary decision-makers in households, those who are affected most by lack of beneficial lighting, and the primary social agents in communities.

(h) “Micro-financing” refers to loans that are granted for design, production, marketing, distribution, sale, maintenance, and repair of lighting products.

(i) “Minister of Energy” includes other executive branch equivalent administrators found in a non-parliamentary system (*e.g.* Secretary).

(j) “Organization” means an entity other than a governmental body, which was established or organized for any purpose relevant to this Act. The term refers, *inter alia*, to a corporation, company, guild, association, partnership, NGO, local community advocacy organization, trust, or trade union.

(k) “PAO,” a provincial assessment officer, is defined in Section 4(a) of the Act.

(l) “Sweat equity” includes the labor, skill, goods, or community services offered as consideration by recipients, in part or in full, for lighting products. Sweat equity is transferable among households. Sweat equity includes, but is not limited to, the following activities:

(i) Labor provided in producing, installing or publicizing solar based lighting products;

(ii) Transportation of materials for lighting products; and

(iii) Participation in public education and community outreach.

§ 4. Establishment of Agency

The Lighting Agency (LA) is hereby established to implement the provisions of this Act. The Administrator of the Agency shall administer this statute by, *inter alia*:

(a) Conducting Needs Assessments and Developing Specifications

Within 120 days of the adoption of this Act, the LA shall deploy [*N (the number of provinces or sub-national governments)*] provincial assessment officers (PAOs), one in each of the country's [*N*] provinces. PAOs shall, within 6 months of designation, in collaboration with [*name of appropriate NGO or NGOs*] and local health personnel, conduct needs assessments that will identify and investigate:

- (i) Types of household lighting currently being used in the province;
- (ii) Typical expenses associated with household lighting in the province;
- (iii) The needs and receptivity of the populace with respect to modern lighting products, with an emphasis on the needs of women and children;
- (iv) Local aesthetics and its relationship to the desirability of lighting products;
- (v) Any potential barriers to adoption of such lighting products, including cultural and geographic barriers and physical and environmental conditions;
- (vi) Exposure to indoor air pollution and other hazards from fuel-based lighting;
- (vii) The financial status and market infrastructure of local communities; and
- (viii) The feasibility of decentralized power generations that can supply electricity for each community.
- (ix) The practicability of installing charging units for batteries

(b) Lighting Product Selection

The LA, in collaboration with the Minister of Energy and the PAOs, will assist in the marketing of lighting products that suit the needs of [*name of country*].

(c) Pilot Programs

The PAOs, under the direction of the Administrator and with the assistance of [an appropriate organization], shall carry out pilot programs in each province, which can be replicated in the rest of the country, for the purpose of identifying challenges and developing procedures in advance of full national implementation. The communities selected for the pilot programs by the Agency shall be the ones in which:

- (i) Electricity is not widely available;
- (ii) Surveys and Needs Assessments, carried out by the PAOs, reveal that a majority in the community want to participate in the Pilot Project;
- (iii) There are not more than 500 households
- (iv) Individuals are willing and able to pay for lighting products through sweat equity, currency, or other forms of exchange.

(v) The population is demographically representative of the [*number of people in the country*] that do not have access to modern lighting.

(d) Completion and Review of the Pilot Projects

At least two Pilot Projects shall be completed within targeted communities for each province before attempting the widespread installation of lighting products in the rest of the province. The data revealed by each Pilot Project and the lessons learned shall be analyzed and reviewed in a Pilot Project Report generated by the LA which will, among other things, clarify the goals of the pilot projects, and whether these goals were met. This report, as well as the projects themselves, shall be open to scrutiny by the public, NGOs, and by other government officials.

§ 5. Administrative Discretion

After holding a public hearing, the Administrator may reasonably phase in implementation of the Act over a period of time in accordance with an area's Local Conditions, but this period may not exceed 3 years.

§ 6. Implementation and Administration

(a) Implementation

The Administrator shall use the information revealed by the Pilot Projects to implement this Act by:

Consulting and collaborating, with the Ministers of (1) Health and Human Wellness, (2) Energy, (3) Environment & Natural Resources, (4) Education, and (5) Industry & Commerce, and within reasonable time constraints, receive their inputs.

(ii) Encourage public participation in the implementation of the provisions of this Act, by incorporating:

(1) Notice and comment prior to the adoption of any major rules implementing the provisions of this Act, as governed by the [*name of country's administrative procedure act, if applicable*];

(2) Open meetings whenever the LA has a quorum present for a meeting in which the LA discusses any regular business of the agency concerning this Act;

(3) A community liaison, answerable to the PAO, in all aspects of implementation of the Act; and

(4) Providing accessible means for the public to offer input and feedback regarding the implementation of this Act's provisions.

(iii) Where appropriate, seeking international aid assistance in the form of technological assistance and expertise for monitoring and evaluation from, *inter alia*, intergovernmental organizations, other states, NGOs, community advocacy groups, corporations, private individuals, and charitable trusts.

(iv) Creating and implementing a system whereby end users can acquire lighting products by sweat equity or exchange;

(v) Creating and implementing a program for recycling used batteries, which may require lighting product distributors, retailers, and charging stations to collect

used batteries;

(vi) Using innovation, affordable and appropriate sustainable energy technologies, and/or techniques that provide greater economic benefits, at a limited cost to the end-user;

(vii) Using technologies and organizational methods, which have been successfully tried, tested, and demonstrated by other developing countries;

(b) Strategic National Lighting Plan (3-Year Plan)

After a widespread, open, and public consultation process, the LA shall draw up renewable strategic 3-Year Plans with annual targets and objectives that shall be publicly announced and publicized. The first Plan shall be completed within one year of the coming into operation of this Act. Once a 3-Year Plan has been completed, the LA shall issue annual reports that are announced and publicized on the actions taken pursuant to the 3-Year Plan and the extent to which the targets or objectives have or have not been met. The annual reports will be examined annually by the Parliament of [name of country] through hearings and used as necessary to pass or amend laws.

(c) Stimulate the Lighting Product Industry and Market

The LA shall stimulate and encourage the creation of a robust domestic lighting product industry, by engaging, *inter alia*, in the following:

(i) Improving access to capital for new businesses by providing tax incentives and loans, and by removing restrictions on foreign investment in the lighting product industry. To this extent, the LA shall encourage the growth of markets that benefit the rural energy poor;

(ii) Establishing certification and standardization protocols for lighting product parts and equipment as described in Section 8; and

As stated in Section 9, collaborating with the Ministry of Energy to disburse grants for research and development to qualified universities in [name of country], which are able to undertake research and development.

(d) Monitoring and Inspection

In order to ensure that lighting product distribution requirements have been properly met, through collaboration with PAOs, the Administrator shall, with immediate effect, begin the following activities towards implementation of this Act:

(i) *Assessment.* Ascertain the rate and severity of accidents associated with kerosene before the installation of lighting products, and determine the rate at which members of households, notably women and children, are able to engage in educational or other productive activity after dark.

(ii) *Post-Installation Monitoring.* Monitor accidents, and after-dark activities (as described in (i), above) of the homes referred to in Section 6(c), above, after lighting products are installed within the following time-frames:

Phase 1 – within 1 year of installation;

Phase 2 – within 18 months of installation;

Phase 3 – within 3 years of installation; and

Annual monitoring once every year, thereafter.

(iii) *Charging Station and Use Monitoring.* If applicable, inspecting centralized charging facilities and end-user sites to ensure they are being used and are working properly.

Economic Sustainability Monitoring. Procedures to monitor the financial performance of the program to ensure its economic sustainability.

Protocol for Testing. Negotiating and finalizing with laboratories on a protocol for testing based on the provisions of this law.

Reporting. Submitting to Parliament a report (Administrator's Report) on the findings of the monitoring and inspection efforts under this Section, 2 years after this Section comes into force and annually thereafter.

Applicability in relation to Pilot Projects. The monitoring and inspection requirements here are applicable to final projects subsequent to the pilot project.

(e) Statistics and Communication

The Lighting Agency shall consult data obtained under Article 4 to aid in implementation, in addition to other sources.

The Lighting Agency shall accurately report its findings for implementing final projects to the public and other government agencies, and keep administrative records.

§ 7. Authorization and Appropriations

[*Appropriated amount (national currency or currency of choice)*] shall be authorized and appropriated every year, beginning in [*year*], continuing for the next 5 years (or until the Act is adopted), and allocated as follows:

(a) [*Appropriated amount (national currency or currency of choice)*] to the Administrator for the administrative costs of implementing this Act.

(b) [*Appropriated amount (national currency or currency of choice)*] for needs assessments and pilot programs pursuant to this Act and implementation of the required programs. These funds may be provided in part to appropriate NGOs for implementation of the required programs. These NGOs may also provide funding of their own.

(c) [*Appropriated amount (national currency or currency of choice)*] to the Ministry of Energy to administer a program for the research and development of appropriate lighting technologies. This funding shall remain available until expended.

(d) Pursuant to the effort to maximize adoption of lighting products within a 5-year period, the Administrator shall endeavor to acquire at least [*appropriate amount*] of annual funding from domestic and international sources to be invested directly in national and NGO-sponsored programs involving the provision of illumination.

(e) [*Appropriated amount (national currency or currency of choice)*] to the Ministry of Health to carry out its duties under Section 10.

§ 8. National Minimum Standards, Testing and Certification

(a) **Establishing Quality and Performance Standards.** The Agency shall establish mandatory minimum quality and performance standards for lighting products, informed by internationally agreed standards. All lighting products marketed or sold in [*name of country*] shall be certified as meeting the standards established by the Agency.

(b) Quality standards shall require:

(i) That the brightness and luminosity of lighting be adequate for the purposes for which they are intended, such as domestic, commercial or community uses;

(ii) Durability standards for batteries, bulbs, PVC panels, circuit boards, charge converters, inverters, the casing, other equipment or mechanical parts of lighting products;

(iii) That spare parts are adequate;

(iv) Accurate product labeling in accordance with certification standards in subsection (d);

(v) No cadmium or mercury to be present in the product; and

(vi) Truth in advertising

(c) Performance standards shall add specificity to quality standards and shall be reviewed at regular intervals. Performance standards shall differentiate, *inter alia*, between lighting for household or domestic use, commercial use, agricultural use, and community use in hospitals, schools, buildings, and roads.

(i) Levels of brightness and luminosity for general household or domestic use must provide a minimum output of 50 lumens. The LA may, after open public hearings, change this standard to others based on the best practicable, affordable, and technologically feasible standards.

(ii) Levels of brightness or luminosity for commercial, agricultural and community purposes shall be established by the Agency, within 1 year of the enactment of this statute, after open public hearings, based on the best practicable, affordable, and technologically feasible standards.

(d) Testing and Certification

(i) All new lighting products and component parts sold and/or marketed under this Act in [*name of country*] shall be tested and certified by approved private, public, or NGO-owned and operated laboratories at the country of origin or manufacture.

(ii) Certification will attest that the products have been tested according to protocol, and comply with the relevant quality and performance standards referred to in this section.

(iii) **Labeling.** Every lighting product and component sold or marketed shall contain consumer-facing labels referring for which social sector(s) (household, commercial, etc.) the product has been certified. All of the following must be reported accurately specified on the label:

- (1) manufacturer;
- (2) model name and model number;
- (3) light output;
- (4) lamp type;
- (5) run time;
- (6) charger rating; and

(7) if the light has phone or small electronics charging capabilities, the change in brightness and power usage as a result of charging while the light is otherwise normally operating.

(iv) The Administrator will communicate with and approve the above-specified laboratories in paragraph (d)(i) based on relevant criteria determined after a public hearing.

(v) The Administrator will agree with the laboratories on a protocol for testing based on the provisions of this law.

(vi) After reaching an agreement on appropriate protocols, the Administrator shall publicly announce and publicize the names of the approved laboratories.

§ 9. Research and Development

(a) Authority

The Minister of Energy is authorized to conduct, promote, coordinate, and accelerate research, development, studies, surveys, experiments, demonstration projects, and training related to the development of lighting products and their components. The Minister of Energy shall assure that the expenditure of any funds appropriated under this Act shall be coordinated with and reflect the needs and priorities identified by the Agency.

(b) Foreign Aid and Assistance

The Minister of Energy shall actively solicit foreign aid, assistance, and collaboration in carrying out research and development from other countries, intergovernmental organizations, scientific bodies, philanthropic organizations, non-governmental organizations, and any other entities supporting access to lighting.

(c) Grants

In implementing this Section, the Minister of Energy may enter into contracts with and make grants to qualified institutions, agencies, organizations, and persons. Priority shall be given first to [country]'s research universities, then to other public or private institutions suitably equipped to carry out scientific, economic, or social research related to indoor illumination in [country].

(d) Reporting

(i) The Minister of Energy shall submit an annual report to the Administrator of the LA and the [National Assembly] about the research projects funded pursuant to this Section, outlining the funding provided for each project, its use of such funds, and the nature and general progress of the project.

(ii) The Administrator of the LA and Minister of Energy shall promote

accurate reporting of research and scientific data by organizations engaged in lighting development, and shall approve regulations to ensure accurate administrative record-keeping by government officials.

(e) Availability of Information to the Public

Subject to the patent provisions of the [*name of country's patent act or other intellectual property law*], all discoveries, inventions, innovations, information, and data resulting from any research studies, surveys, experiments, assessments, or demonstration projects conducted or financed under this Section shall belong to the public domain and be available to the public for their use without charge.

§ 10. Public Health

The Ministry of Health shall encourage early treatment of kerosene-related burns. To this end:

(a) Healthcare workers will report back to the Ministry of Health specific cases of kerosene-related burns by creating records of patients and monitoring their treatment; and

(b) The Minister of Health will enlist the help of NGOs in carrying out duties under this section.

§ 11. Education and Information

(a) The Administrator shall be responsible for educating the public on the benefits of modern indoor lighting technologies and the dangers of fuel-based lighting. The Administrator shall use existing information channels, and enlist the assistance of the private sector in doing so.

(b) Private programs whether voluntary or enlisted by the Administrator to disseminate information to the public regarding indoor illumination shall comply with all provisions of this Act.

(c) The Minister of Commerce shall oversee marketing materials to ensure that only verifiable findings are used.

§ 12. Enforcement

(a) Civil Remedies

Non-compliance order. On the basis of information available to him/her, if the Administrator finds violations of this Act, s/he may issue a non-compliance notice to the identified party. Non-compliance orders may be issued by the Administrator for violations of this Act in accordance with [*name of country's administrative procedure act*]. In addition, the Administrator must:

(i) Issue a notice of the alleged violation to the offending party within 30 days of discovery of a violation;

(ii) Allow the offending party 45 days to rebut the evidence against him/her, or submit to agency-inspected corrective measures; and

(iii) Institute immediate suspension of activities that have or are reasonably expected to impose a grave health risk to the population.

(b) Citizen Enforcement

(i) Any citizen or resident of [*name of country*] may seek judicial remedies under this Section for violations of any mandatory provision of this Act. These citizen suits may be lodged in any District Court against any government agency, department, or private party that either violates a standard established by this Act, or fails to carry out a mandatory duty required by this Act. Prior to bringing an action, a citizen shall:

(1) Give notice to the defendant agency, department, or private party about the alleged violation(s) of this Act; and

(2) Allow a period of 60 days after receipt of notice to enable the defendant to rectify the alleged violation(s) of this Act before filing a lawsuit.

(ii) If the Plaintiff is successful, the court may order the defendant to comply with the Act and award damages. A successful litigant is entitled to recover full costs and the court shall include and order such costs in its judgment.

(iii) In the event an action is dismissed, the court may, in its discretion, order the citizen plaintiff to pay the defendant such costs as it deems reasonable and necessary.

(c) Criminal Penalties

(i) *Violation of Non-Compliance Order.* Any person who fails to comply within 3 months of receipt of a non-compliance order issued pursuant to Subsection (a) shall, after due inquiry by a District Court, be punished by a fine of not less than an amount equivalent to 250 USD [*or other typical fine in national currency*] nor more than an amount equivalent to 2,500 USD [*or other typical fine in national currency*] per day per violation, or by imprisonment for not more than 1 year, or by both.

(ii) *Negligent Misrepresentation.* Any person who negligently misrepresents that lighting products meet the minimum national standards of Section 4 or regional standards established pursuant to Section 4(a)(viii) shall be punished by a fine of an amount equivalent to 250 USD [*or other typical fine in national currency*] per lighting product sold under negligent misrepresentation.

(iii) *Knowing Endangerment.* Any party who knowingly endangers another person or community of persons by manufacturing, marketing and/or distributing lighting products, and/or parts thereof that do not conform to the provisions of Section 4 (or regional standards established pursuant to Section 4(a) (viii)) shall be subject to a fine of not more than 100,000 USD.

(iv) *Other Sanctions.* Nothing in this subsection shall limit or reduce any other punishment, including imprisonment, under any other applicable criminal laws.

COMMENTARY

LAKSHMAN GURUSWAMY*

AUDREY M. HUANG**

Mahir Haque***

Ugyen Tshering****

I. SECTION 1. FINDINGS

The Model Law provides a series of findings and lays the foundation for establishing the programs to support the distribution and use of off-grid lighting products as described in Sections 4 to 12. The Findings are based on domestically and internationally available evidence, and attempt to incorporate the latest available data. Lighting is an extremely crucial area that needs to be addressed among developing countries. Worldwide, 1.3 billion people still do not have sufficient access to light.¹ The Model Law takes a significant step toward implementing Goal Number 7 and its affiliated targets, of the Sustainable Development Goals (“SDGs”) of 2015.² The objective of Goal Number 7 of the SDGs is to “[E]nsure access to affordable, reliable, sustainable and modern energy for all.”³ The targets associated with Goal Number 7 call for this goal to be achieved by 2030, and for the enhancement of international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency, and promote investment in energy infrastructure and clean energy technology.⁴ The targets also call for expanding infrastructure and upgrading technology for supplying modern and sustainable energy services, in particular to least developed countries, small island developing States, and land-locked developing countries.⁵ The Model Law also advances the older United Nations’ Millennium Development Goals (“MDGs”) pertaining to sustainable

*Lakshman Guruswamy is a Nicholas Doman Professor of Law, University of Colorado Law School in Boulder. This Introduction is based upon and reproduces earlier works of the author.

**Audrey M. Huang is the the Director of the Getches-Green Natural Resources, Environmental Law, and Energy Clinic at the University of Colorado Law School.

***Mahir Haque is a 2016 graduate of University of Colorado Law School.

****Ugyen Tshering is currently a student at the University of Colorado Law School.

1. Jörg Peters & Maximiliane Sievert, *On-grid and Off-grid Rural Electrification—Impacts and Cost Considerations Revisited*, in AGENCE FRANCAISE DE DEVELOPPEMENT—PROPARCO/EUDN-CONF. PROCEEDINGS ENERGY FOR DEV. 2 (Dec. 2, 2014), [http://www.afd.fr/webdav/site/afd/shared/PRESSE/Evenements/RENCONTRES%20DU%20DEVELOPPEMENT/Peters%26Sievert_Impacts%20of%20electrification%20\(comment%20on%20Torero's%20paper\).pdf](http://www.afd.fr/webdav/site/afd/shared/PRESSE/Evenements/RENCONTRES%20DU%20DEVELOPPEMENT/Peters%26Sievert_Impacts%20of%20electrification%20(comment%20on%20Torero's%20paper).pdf).

2. U.N. Dep’t of Econ. and Soc. Affairs, *Goal 7*, UNITED NATIONS, <https://sustainabledevelopment.un.org/sdg7> (last visited Mar. 28, 2016) [hereinafter *Goal 7*]; U.N. Dep’t of Econ. and Soc. Affairs, *Sustainable Development Goals*, UNITED NATIONS, <https://sustainabledevelopment.un.org/sdgs> (last visited Mar. 28, 2016).

3. *Goal 7*, *supra* note 2.

4. *Id.*

5. *Id.*

social development and environmental protection,⁶ which have now been incorporated into the MDGs.

The Model Law addresses the prevalence of kerosene lighting in the developing world, particularly unpressurized wick kerosene lamps. Kerosene, while cheaply priced and used in a variety of applications, such as lighting, cooking and heating, poses burns hazards to children from open flames. As will be detailed in the Commentary for Section 10, women and children are the most susceptible to kerosene burns.⁷ In addition to the negative effects on health, lack of lighting or poor lighting also inhibits children's education by not being able to read or study after the sun sets.⁸

Air pollution from kerosene lamps is also a significant problem, as kerosene emits over 240 million tons of carbon dioxide annually.⁹ In addition, as much as 7-9% of the kerosene used in kerosene lamps is converted to carbonaceous particulate matters, which is almost entirely black carbon.¹⁰ Some estimates have

6. See 2000 U.N.Y.B. 50, U.N. Sales No. E.02.I.1. Article III discusses poverty eradication and development, stresses the need to ensure that all countries have good governance standards, promotes cooperation between developed and least developed countries, and resolves to improve education and healthcare across all countries. *Id.* Article IV discusses the need to protect the natural environment and use sustainable energy sources. *Id.* To that end, if there are lighting projects making use of renewable energy sources, they are preferable over projects that do not.

7. See S. Chamania et al., *Pilot Project in Rural Western Madhya Pradesh, India, to Assess the Feasibility of Using LED and Solar-Powered Lanterns to Remove Kerosene Lamps and Related Hazards From Homes*, 41 BURNS J. 595, 595-96 (2014); see also Ashkan Golshan et al., *A Systematic Review of the Epidemiology of Unintentional Burn Injuries in South Asia*, 35 J. PUB. HEALTH 384, 391 (2013) (highlighting how female mortality outnumbered male mortality in the literature on burns in South Asia); Katrine Løfberg & Christopher C. Stewart, *Pediatric Burn Injuries in the Developing World*, GLOB. HEALTH EDUC. CONSORTIUM 1, 9 (2012), (noting that children age five and under and the elderly suffer the highest mortality from burns globally).

8. For negative effects on health, see P. Gupta et al., *Kerosene Oil Poisoning—A Childhood Menace*, INDIAN PEDIATRICS 979, 979-83 (1992), <http://www.indianpediatrics.net/aug1992/979.pdf>; Kristine Pearson, *Kerosene: A Burning Issue in Women's Rights, Human Rights*, LIFELINE ENERGY BLOG (Oct. 2, 2011), <http://lifelineenergy.org/kerosene-a-burning-issue-in-human-rights/>; William D. McNally, *Kerosene Poisoning in Children: A Study of 204 Cases*, 48 THE J. OF PEDIATRICS 296 (1956). For lighting's effect on education, see Simon Batchelor et al., *The Gender-Energy-Poverty Nexus: Finding the Energy to Address Gender Concerns in Development*, (2002), http://www.riacd.net/IMG/pdf/DFID_Doc_Energy_Gender.pdf. Children may not have time to complete their studies during daylight hours, and are therefore unable to take full advantage of their education since it is impossible to read at night without lighting sources. Batchelor et al., *supra* note 8, at 7. It is postulated that there are approximately 1.3 billion people living in poverty and 70% of this population are women; many of these women live in female-headed houses in rural areas. *Id.* at 5, 10. The energy inequality hinders their decision making within the household and community while preventing their abilities perform rudimentary tasks with any degree of efficiency.). *Id.*

9. *Black Carbon Emissions from Kerosene Lamps*, CLEAN AIR TASK FORCE 1 (2013), http://www.catf.us/resources/publications/files/201311-Black%20carbon%20and%20kerosene%20lamps_BRIEF.pdf.

10. Nicholas L. Lam, et al., *Characterizing Kerosene Demand for Light in India and Evaluating the Impact of Measures Affecting Access and Dependence*, in INNOVATING ENERGY ACCESS FOR REMOTE AREAS: DISCOVERING UNTAPPED RESOURCES: PROCEEDINGS OF THE INTERNATIONAL CONFERENCE 116, 116-19 (Martina Schäfer et al. eds., 2014).

found that black carbon is the second contributor to climate change after carbon dioxide.¹¹ Kerosene lamps consume 77 billion liters of oil per year, or 1.3 million barrels of oil per day.¹²

Over the long term, kerosene becomes expensive, potentially costing many times more than some electric light bulbs. A 2003 study conducted in Berkeley found that LEDs of at that time cost five cents per thousand lux hours, while non-pressurized kerosene lamps could cost as much as \$3.80 per thousand lux hours.¹³ While pressurized hurricane lamps do not pose burn hazards, they still pose the same problems as unpressurized lamps in terms of insufficient light and indoor air pollution.

Some of the developing countries, which can be enormous geographically and have vast populations with extensive cultural and socio-economic diversity, are challenged by the absence or inadequacy of access to lighting. For example, India is a federal republic composed of twenty-nine states, each with its own state legislature and a substantial degree of control over its own affairs.¹⁴ Given the sheer size of India's population and the vast differences between each individual state (as well as the sheer size and complexity of India's national government), it would be impractical to adopt these Model Laws for the entire country. However, individual states within India, like Tamil Nadu or Madhya Pradesh, could adopt these Model Laws and tailor them for their own unique geographical and socio-economic situations. Thus, in some cases, it might be more appropriate for these Model Laws to be adopted not by the central government, but by the country's smaller state or provincial governments.

While the Model Law aims to encourage the distribution of off-grid lighting products, it does not specify the specific types of lighting products that should be used or what methods should be used to ensure effective product distribution. Such decisions will be dependent on the specific requirements of each country, such as how available off-grid lighting is or what types of products are available in the country.

11. See *id.*; Nicholas L. Lam, et al., *Household Light Makes Global Heat: High Black Carbon Emissions From Kerosene Wick Lamps*, 46 ENVIRON. SCI. TECHNOL., 13531, 13534-36 (Nov. 19, 2012); *Global Warming: The New Black*, THE ECONOMIST (Jan. 19, 2013), <http://www.economist.com/news/science-and-technology/21569686-soot-even-worse-climate-was-previously-thought-new-black> (however, the impact of kerosene burning on black carbon emissions or the impact of black carbon emissions on climate change are not universally accepted). Cf. Richard A. Kerr, *Soot is Warming the World Even More Than Thought*, 339 SCIENCE at 382 (Jan. 25, 2012) (discounting the impact of biomass burning on global warming).

12. TECHNOLOGIES AND INNOVATIONS FOR DEVELOPMENT: SCIENTIFIC COOPERATION FOR A SUSTAINABLE FUTURE (Jean-Claude Bolay et al. eds., 2012).

13. Evan Mills, *Technical and Economic Performance Analysis of Kerosene Lamps and Alternative Approaches to Illumination in Developing Countries*, LAWRENCE BERKELEY NAT'L LAB. 3 (June 28, 2003), <http://evanmills.lbl.gov/pubs/pdf/offgrid-lighting.pdf>.

14. CENTRAL INTELLIGENCE AGENCY, THE WORLD FACTBOOK: INDIA (Mar. 16, 2016), <https://www.cia.gov/library/publications/the-world-factbook/geos/in.html>.

II. SECTION 2. POLICY

The policy articulated here is expressed in generic terms and is meant to be adopted by any country, and may be adapted to suit the particular circumstances of that country. However, the policies articulated are based on a number of common factors shared by countries seeking to offer access to lighting.

It is open to an adopting country to change wording of the Model Laws to comport with its own policies. The need to do so might become evident where the meaning of some words may be “lost in translation” from English into a foreign language.

The reference to NGOs acknowledges the fact that several profit and non-profit initiatives are working to address lighting distribution around the developing world. These initiatives run the gamut from small non-profit organizations distributing plastic bottles with bleach solution, which serve as lights when the bleach is added to water in the bottle,¹⁵ to large multinational organizations such as the United Nations and the World Bank’s Lighting Global initiative.¹⁶ Even some musical performance artists are contributing to direct lighting schemes by establishing their own distribution and infrastructure for lighting.¹⁷ In addition to these initiatives, private corporations such as Nokero are manufacturing their own lighting equipment and selling them directly to distributors working in developing countries.¹⁸

Providing lighting to developing countries can be a costly endeavor, even if the long-term benefits are shown to outweigh the initial costs. Extending and maintaining the main electrical grid out to remote rural areas is an expensive national undertaking. Even in India, one of the largest growing economies in the world, over 400 million people live in communities are lacking reliable electricity that can supply electricity for more than three hours per day.¹⁹ Solar lighting would at first seem like a cheaper solution, as much of India is located in a climate zone that receives, on average, at least eight hours of sunlight per day.²⁰

Thus, off-grid solar LED lights have been shown to be a relatively effective medium-term solution for areas that cannot be connected to the electrical grid. Again, to use the case studies in India as an example, a single solar LED light like the ones used in these studies can be purchased for, on average, about 549 Indian Rupees (nine US dollars at the time of the study), and has a warranty of six

15. See *Liter of Light –About Us*, MYSHELTER FOUNDATION (2015), <http://literoflight.org/about-us/> (these plastic lights have also been reported on by international news agencies); see, e.g., Kotoc Oshima, *Plastic Bottles Light up Lives*, CNN (Aug. 30, 2011), <http://www.cnn.com/2011/WORLD/asiapcf/08/30/eco.philippines.bottle/>.

16. See LIGHTING GLOBAL (2015), <http://www.lightingglobal.org/>.

17. See *Overview – Akon Lighting Africa*, AKON LIGHTING AFRICA (2015), <http://akonlightingafrica.com/our-activities/overview/> (from February 2014, the rapper Akon has been working with Samba Bathily and Thione Niang on the Akon Lighting Africa project, which provides solar lights and small scale village and town lighting infrastructure projects).

18. See generally NOKERO SOLAR, www.nokero.com (last visited Mar. 30, 2016).

19. S. Chamania et al., *supra* note 7, at 596.

20. *Id.*

months.²¹ Assuming that a warranty of six months represents the *absolute minimum lifetime* of the product, this would mean that the maximum the household using this light could spend is about 1,098 Rupees (eighteen US dollars) in one year, all other factors being equal (although, in the final study, most of the lights actually exceeded the initial six month period, lasting the full year, and thus bringing the actual cost down to only 549 Rupees for most of the participating households).²² The same study found that the average rural Indian household in Madhya Pradesh spends 1,800 Rupees per year on kerosene for one lamp (and that excludes other factors such as the cost of the lamp itself, or the external costs to health resulting from burns and inhalation of smoke).²³ Thus, even at its "most expensive" (*i.e.* assuming that each light needs to be replaced every six months), the use of off-grid solar lighting products was still proven to be more economical than kerosene lighting, saving each participating household at least 702 Rupees. In addition, each household would avoid the associated health risks of using kerosene lighting.

The solar lights in this study were all produced, tested, and certified within India, thereby cutting down on the costs associated with procurement and distribution.²⁴ These Model Laws are drafted to allow and encourage the adopting countries to establish a similar lighting market. As discussed above, having a lighting market may address corruption and would also allow for easier distribution and replacement or repair of the lighting products.

III. SECTION 3. DEFINITIONS

Many of these definitions are self-explanatory and simply explain terms and concepts in the model law. However, the fact that an agency or concept is defined does not mean that it should become a part of the laws or institutions of the adopting country. For example, it is possible that the adopting country does not propose to set up a Lighting Agency, and instead tasks an equivalent agency with the same responsibilities. In this case, the definition of "Agency" may be altered to reflect this change.

IV. SECTION 4: ESTABLISHMENT OF AGENCY

As just mentioned and made clear in the Introduction,²⁵ the adopting country may not wish to establish a new agency to address the issue of insufficient lighting.²⁶ Similarly, the adopting country may also not wish to create a new cadre of provincial assessment officials.²⁷ The exact administrative and logistical choices clearly fall within the individual choices and administrative structure of

21. *Id.*

22. *Id.* at 599.

23. *Id.*

24. *Id.*

25. Lakshman Guruswamy, *Drafting Model Laws on Indoor Pollution on Developing and Developed Nations Workshop*, 42 COLO. NAT. RES., ENERGY & ENV'T'L. L. REV. 319, 326 (2012).

26. *Id.* at 350.

27. *Id.*

each adopting country's government. However, the task of implementing, overseeing, and enforcing these laws must be institutionalized within the administration and law of each adopting country.

The first major objective for the agency, addressed in Section 4(a), is to perform needs assessments and develop specifications for what products and programs will be implemented based on the findings of these assessments. Needs assessments are expensive and time-consuming, but they are also necessary to avoid a "cookie-cutter" or "one-size-fits-all" approach to the promotion of lighting.²⁸ While it is generally accepted that everyone needs lighting, the geographical, economic, social, and culture situation of each country and community is unique. Thus, local needs assessments help to discover the specific local needs and conditions, which then allow for the creation of an area-specific lighting program that: (1) addresses particular community needs; (2) is "bottom-up" rather than "top-down;" (3) is sustainable in the long term; and (4) ensures that the country's limited resources are expended in the most productive and impactful manner.²⁹

In conducting a needs assessment, a country does not necessarily have to "reinvent the wheel." A country could model its needs assessment after those that have been conducted in other locations. For example, some need assessments consist of a brief five-to-ten minute conversations with each household that provide sufficient information to the administrator.³⁰ Furthermore, most functioning governments should already have a civil service in place that is used to regularly perform surveys and censuses of the population.³¹ However, as will be discussed further below, this may not always be the case in some developing countries.

Sections 4(c) and (d) concern the implementation and review of pilot programs, which are mini or scaled-down versions of a full-scale program.³² Pilot programs fulfill a range of important functions and can provide valuable insights for assessing the feasibility of a full-scale program. Pilot programs: (1) help identify logistical problems, which might occur using proposed methods; (2) estimate variability in outcomes; (3) collect preliminary data; (4) determine what resources (finances, staff, et cetera) are needed for the full program; (5) assess the proposed programmatic techniques to uncover hidden potential; and (6) serve as an important "quality control" test run for the products that the administrator eventually intends to use.³³ The results of pilot programs will yield are highly contingent upon factors such as the intended duration and scope of the pilot

28. *Id.*

29. *Id.*; FERNANDO I. SORIANO, CONDUCTING NEEDS ASSESSMENTS: A MULTIDISCIPLINARY APPROACH 4 (2d ed. 2013).

30. Johannes Urpelainen & Semee Yoon, *Solar Home Systems for Rural India: Survey Evidence on Awareness and Willingness to Pay from Uttar Pradesh*, 24 ENERGY FOR SUSTAINABLE DEV. 70, 72 (2015).

31. SORIANO, *supra* note 29, at 79.

32. See Guruswamy, *supra* note 25.

33. *Id.* at 351.

program. For example, with regards to quality control, if the program lasts only one year, then the administrator will know only if the products involved in the program will last one year or not. Thus, the administrator might modify the pilot program to be two years in duration, in order to see if the lighting products last at least two years.

The optimal duration of a pilot program must strike a balance. It should be long enough to provide sufficient information, but not being too long so as to delay implementation of the full-scale program. Generally, many pilot programs last for 365 days, with at least one mid-term evaluation at the six-month mark.³⁴ One pilot project in Nigeria distributing off-grid lighting to 36 rural hospitals even used a program lasting as little as three to four weeks, and claimed that the introduction of these lighting products had an almost immediate effect of increasing the working hours of hospital employees by 30%.³⁵ However, one month may be far too short for a pilot program intended to measure the impact that introducing electric lighting can have on an entire community.

The other two challenges in establishing a pilot program are determining the appropriate sample size and selecting a sample that most accurately reflects the average conditions of the adopting country's small rural communities. Some pilot programs use 1,000 households, as 1,000 was found to be a sufficiently large enough number to represent the larger population, while also being within the manageable limits of the agency's resources.³⁶ These Model Laws propose conducting two pilot programs consisting of 500 households to provide sufficient data.

The final part of Section 4 mandates that the Lighting Agency shall review and analyze the data from the pilot projects. This report should be made available to both the legislature and citizens of the adopting country. However, during this stage special care must be taken by the adopting country's government to ensure that the information is accurately analyzed. One of the biggest challenges in conducting research in the developing world is the reliability of the information collected.³⁷ Various political interests may act to skew data in ways beneficial to their own interests during the process of gathering information. Many of the governments of Sub-Saharan Africa are notorious in this respect.³⁸ Thus, the needs assessment and pilot programs should be overseen by an NGO, a citizen advocacy group, or by a different governmental agency.

V. SECTION 5: ADMINISTRATIVE DISCRETION

This Section grants discretion to the Administrator, after due process and

34. S. Chamania et al., *supra* note 7, at 596.

35. LOUIS GYOH, *FEEDBACK ON THE PERFORMANCE OF OFF-GRID LIGHTING PRODUCTS DEPLOYED IN 36 HEALTH CENTERS IN NIGERIA* 7-13 (2014).

36. S. Chamania et al., *supra* note 7, at 599 (stating that project was originally going to use larger sample size, but scaled back down to roughly 1,000 due to budget and equipment constraints).

37. MORTEN JERVEN, *POOR NUMBERS: HOW WE ARE MISLED BY AFRICAN DEVELOPMENT STATISTICS AND WHAT TO DO ABOUT IT* 83 (2013).

38. *Id.* at 85.

public inquiry, to adopt and adapt standards and regulations to comport with the specific conditions of the country. While the Administrator shall have broad discretion to adopt standards, as determined by the Lighting Agency's fact-finding and research, the adoption of such standards should be performed within three years.

VI. SECTION 6: ADMINISTRATION AND IMPLEMENTATION

This Section refers to implementation by the Administrator of the provisions of the Model Law. The first part relates to Pilot Projects. The second, to the Strategic Plan envisioned in Section 6(b), that institutionalizes the need for the new or existing Lighting Agency to define its strategy and to make decisions on resource allocation to pursue this strategy. In doing so, the strategic planning process should endeavor to encourage the creation of markets for lighting and ensure that the plans are instruments for generating lighting markets. One aspect of market advancement lies in creating standards and certifications. Another relates to public participation and consultation. It is important to undertake bottom-up planning that incorporates the views of the people. Finally, no lighting scheme can succeed unless durability standards are monitored on an ongoing basis.

Corruption remains a major problem in many developing countries where large numbers of complex, restrictive regulations are coupled with inadequate controls. The United Nations Convention on Corruption offers ample contemporary evidence of the problems caused by corruption.³⁹ It recognizes the "seriousness of problems and threats posed by corruption to the stability and security of societies, undermining the institutions and values of democracy, ethical values and justice and jeopardizing sustainable development and the rule of law."⁴⁰ In his Foreword to the Convention, Kofi Anan, the UN Secretary General at the time, refers to corruption as an "insidious plague" that has a wide range of corrosive effects on societies.⁴¹ He continues by asserting that:

It undermines democracy and the rule of law, leads to violations of human rights, distorts markets, erodes the quality of life and allows organized crime, terrorism and other threats to human security to flourish. This evil phenomenon is found in all countries—big and small, rich and poor—but it is in the developing world that its effects are most destructive. Corruption hurts the poor disproportionately by diverting funds intended for development, undermining a Government's ability to provide basic services, feeding inequality and injustice and discouraging foreign aid and investment. Corruption is a key element in economic underperformance and a major obstacle to poverty alleviation

39. G.A. Res. 58/4, Convention Against Corruption (Oct. 31, 2003) [hereinafter Convention Against Corruption]. As of April 1, 2015, 177 parties have signed and ratified or otherwise acceded to the Convention. *United Nations Convention Against Corruption: Signature and Ratification Status as of 1 December 2015*, UNITED NATIONS OFFICE ON DRUGS AND CRIME, <https://www.unodc.org/unodc/en/treaties/CAC/signatories.html> (last visited Feb. 8, 2016).

40. Convention Against Corruption, *supra* note 39, at 2.

41. *Id.* at iii.

and development.⁴²

In both advanced developing countries (“ADCs”) and least developed countries (“LDCs”) corruption is a pervasive problem. Not only are official decisions—for instance, the award of government contracts or the amount of tax due—bought and sold, but very often citizens must pay for access to a public service or the exercise of a right, such as obtaining civil documents. The process of allocating political and administrative posts—particularly those with powers of decision over the export of natural resources or import licenses—is influenced by the gains that can be made from them. As these exchanges of privileges are reciprocated by political support or loyalty, it cements the political foundations.⁴³ Corruption in turn can have a dramatic effect on a country’s economy. It has been estimated, for example, that moving from a relatively “clean” government, like that of Singapore, to one as corrupt as Mexico’s, would have the same effect on foreign direct investment as an increase in the marginal corporate tax rate of 50%.⁴⁴

Thomas Pogge offers a radical and trenchant criticism of corruption as something ingrained in the international structure of power. According to him “many developing countries are run by corrupt and incompetent leaders, unwilling or unable to make serious poverty-eradication efforts.”⁴⁵ Pogge continues that bad leadership, civil wars, and widespread corruption in the developing countries are not wholly homegrown, but strongly encouraged by the existing international rules based on the sovereignty of states.⁴⁶

As ordinary citizens of the rich countries, we are deeply implicated in these harms. We authorize our firms to acquire natural resources from tyrants, and we protect their property rights in resources so acquired. We purchase what our firms produce out of such resources and thereby encourage them to act as authorized. In these ways, we recognize the authority of tyrants to sell natural resources of the countries they rule. We also authorize and encourage other firms of ours to sell to the tyrants what they need to stay in power – from aircraft and arms to surveillance and torture equipment.⁴⁷

Whatever its particular form, public hearings, and the open nature of rulemaking, required by this model law is aimed at combatting corruption.

Especially in areas where limited competition and cozy relationships between favored corporations and government officials may be present, open markets, and a market based system, may best promote access to lighting. Moreover, stimulating

42. *Id.*

43. Irene Hors, *Fighting corruption in the developing countries*, OECD OBSERVER (April 2000), http://www.oecdobserver.org/news/archivestory.php/aid/291/Fighting_corruption_in_the_developing_countries.html.

44. S-J. Wei, *How Taxing Is Corruption on International Investors?*, (Williams David Institute, Working Papers Series 63, 2007).

45. T. W. POGGE, *WORLD POVERTY AND HUMAN RIGHTS: COSMOPOLITAN RESPONSIBILITIES AND REFORMS* (2nd ed. 2008).

46. *Id.*

47. *Id.* at 148.

lighting markets and fostering the growth of the private sector may decentralize large scale decision making, and allow private entrepreneurs to invest in and disseminate energy efficient lighting products and systems. Additionally, incentivizing local market development may also provide an opportunity for small communities to understand and take charge of their lighting products, and the joint enforcement environment created by all community members may help alleviate corruption, thereby allowing the lighting agency to focus on more pressing areas of the Model Law.

Market incentives, however, may not always lead to a decrease in corruption. For example, if the market is left to its own devices, one large retailer may force many small competitors out of the market, and this may lead to interest group corruption.⁴⁸ If appropriate governmental and independent institutions are established to ensure that lighting products are thoroughly distributed at fair prices, this may alleviate corruption concerns in the market.⁴⁹ Ultimately, the success of these incentives and institutions' efforts will depend on how well government, NGOs and the private sector can work together to implement and enforce national laws regarding corruption.⁵⁰

Section 6(c)(i), in particular, envisions a number of ways that local dissemination of lighting may occur through the market. Most obviously, non-profit and for-profit organizations may sell lighting products to consumers directly or through local vendors. Consumers may also pay for their lights in other ways if they do not have the appropriate compensation up front. In the "fee-for-service" system, where the light can be either purchased or rented for the household at a nominal fee, a light that can be recharged after the end of its life.⁵¹ The proceeds go towards maintaining the system and giving the lighting distributors a small income,⁵² and the lights themselves have been used in villages, towns, and farms in various areas around India.⁵³ Having multiple local vendors allows consumers to obtain lights at affordable prices, even where a supplier's business integrity may be compromised. This is compared to having a central authority supply lights to various towns and cities in a province, where a public official's corruption may severely affect how consumers are able to obtain adequate lighting equipment. A similar system is a rent-to-own system, where households purchase lights and make rental payments with the eventual goal of paying off the lights.⁵⁴ However, where rental payments are missed, agents have to seize the lights, and when

48. Countries with very strong private sectors may encounter this type of corruption, whereby public officials are bribed to open and maintain access to new and emerging markets. See *FIGHTING CORRUPTION IN DEVELOPING COUNTRIES: STRATEGIES AND ANALYSIS* 116 (Bertram I. Spector, ed., 2005).

49. *Id.* at 48.

50. *Id.*

51. *Id.*

52. *Id.*

53. *Id.* at 44.

54. Doug Vilsack, *Lessons Learned from Six Years of Selling Solar in Africa*, in *INTERNATIONAL ENERGY AND POVERTY: THE EMERGING CONTOURS* 253 (Lakshman Guruswamy ed. 2015).

cultural barriers prevent them from seizing lights, they must often make a collection visit.⁵⁵ Households may also pay for their lights through a “pay-as-you-go” system, whereby villagers must make payments at regular intervals to keep their lights operating, and may visit an agent or use a cloud-based app to make a payment when their light turns off.⁵⁶

Research projects such as those described above, may help to understand the nature of incentives required to reach hard to reach areas, and illuminate how research projects help in the evaluation of lighting distribution projects. Lighting a Billion Lives found that girls studied for longer periods of time when there was adequate lighting, and villagers were able to provide more services to their villages, such as tutoring and local eco-tourism.⁵⁷ Houri and Khoury found that residents liked the CFL bulbs they implemented but were disappointed with the amount of electricity they received, due to the blackouts.⁵⁸

As detailed in the commentary for Section 4 and in Section 4(d), accurate data is the backbone of a well-run lighting product distribution program. Therefore, communicating accurate data to the public and other government agencies should be a top priority for the Lighting Agency. Data can greatly influence how the government distributes resources, because inaccurate information may lead to an over or under-allocation of resources, greatly influencing how unequal access to energy is resolved.

VII. SECTION 7. AUTHORIZATION AND APPROPRIATIONS

This Section deals with authorization and appropriations for three administrative/governmental units: the new Lighting Agency, the Department of Energy, and the Department of Health. The adopting country can change these provisions to suit its own administrative structures.

It is critical for the legislature to authorize and appropriate funds for the purposes referred to in Section 8 to enabling the policy and purposes of the Act to be achieved. Section 8 discusses funds, including loans and other fiscal devices, to encourage lighting markets and underlines the importance of promoting private investment and markets for lighting.

The incorporation of NGOs into the administration and implementation of the Act is based on compelling evidence that NGOs and other non-governmental entities are in many cases more effective and efficient distributors of goods and services than government agencies.⁵⁹ NGOs may also be able to raise funding independently of the government, whether through private donations or foreign

55. *Id.*

56. *Id.* at 254-55.

57. Debajit Palit & Jarnail Singh, *Lighting a Billion Lives—Empowering the Rural Poor*, 59 BOILING POINT 42, 45 (2011).

58. Ahmad Houry & Pierre Al Khoury, *Financial and Energy Impacts of Compact Fluorescent Light Bulbs in a Rural Setting*, 42 ENERGY AND BUILDINGS 658, 665 (2010).

59. Miklos Marschall, Exec. Dir. of Transparency Int'l, *Legitimacy and Effectiveness: Civil Society Organizations' Role in Good Governance* (Oct. 29, 2002) (transcript available at the World Bank Library).

aid, and thus, spare the adopting government some of the financial burdens discussed above. It is clear that a number of NGOs are committed to addressing the problems of access to lighting, and are a resource that should be utilized. However, it is important to note that NGOs are not intended to subsume the role of government. These Model Laws focus on collaboration between the adopting country's government and the NGOs.

VIII. SECTION 8. NATIONAL MINIMUM STANDARDS AND CERTIFICATIONS

National Minimum Standards and standardization are crucial in lighting product funding, manufacture, fabrication, marketing, and distribution. Establishing minimum standards helps to ensure that the lighting products are safe and reliable. The standards hold manufacturers accountable for producing suitable products. Certification allows the lighting agency to be certain that lighting products conform to its standards. Standardization brings important benefits to businesses, including a solid foundation upon which to develop new technologies and an opportunity to share and enhance existing practices. Standardization also promotes more business activities in the developing country and advances policy initiatives.

In accordance with the SDGs, any lighting solution, while benefitting citizens in developing countries, cannot cause more pollution or environmental harm than the method of lighting it is replacing. Many modern lighting projects and products are solar or wind powered, or as seen through the Liter of Light campaign,⁶⁰ require little-to-no electrical components and do not generate excessive carbon emissions. Many lighting schemes are focusing on using LED lights in developing countries, given that LED bulbs last up to 25 times longer than incandescent bulbs.⁶¹ Solar lights are becoming an increasingly common fixture in 2015 Sub-Saharan Africa, as more vendors now sell a wide variety of solar lights to on and off-grid customers, a phenomenon that was much less common in 2009.⁶²

Actual minimum brightness standards under Section 8 will be country specific, based on what the adopting country determines is achievable. Metrics for measuring brightness and luminosity are often based on lumens. A lumen measures one square foot of light that is produced by a candle one foot away from a wall.⁶³ Although lux and watts may also be acceptable measurement standards in some instances, this Model Law will use lumens.⁶⁴

60. LITER OF LIGHT, <http://www.literoflightusa.org/> (last visited Mar. 29, 2016).

61. *Lighting Made Easy – Just Look for the Energy Star*, ENERGYSTAR.GOV, https://www.energystar.gov/ia/partners/manuf_res/ES_Lighting_ConsumerFactsheet.pdf?0b551475.

62. MEG HARPER ET AL., *A GROWING AND EVOLVING MARKET FOR OFF-GRID LIGHTING, LIGHTING AFRICA* 12-13 (2013).

63. K. SOMAN, *INTERNATIONAL SYSTEM OF UNITS: A HANDBOOK ON SI UNITS FOR SCIENTISTS AND ENGINEERS* 16 (2009); *see also LED Flashlights Fact Sheet*, STARLINE INC, https://us.starline.com/content/image/Forms/distributor_resources/FactSheets/Starline_FactSheet_LED.pdf.

64. Wattage is a measure of power, and lux, a measure of the spread of light in an area, is defined as one lumen per square meter. Power does not necessarily translate into luminance; while a lightbulb

There are five existing global electrification standards a lighting agency may adopt, if it does not already have an electrification standard applicable throughout its borders: U.S., French, Australia/New Zealand, SABS (South Africa), or IEC/ISO systems, developed by the International Electrotechnical Commission ("IEC").⁶⁵ These electrification standards, *inter alia*, specify what the voltage output at a power outlet would be, what plug type should be used for plug in appliances and equipment, and certification criteria used to test electrical equipment. In 2012, the IEC,⁶⁶ a Switzerland-based organization, promulgated the latest version of Recommendations for Small Renewable Energy and Hybrid Systems for Rural Electrification (IEC 62257-9-5) after conducting a survey across 30 countries.⁶⁷ The Recommendations were developed to assist electricity producers in rural areas of developing countries develop off-grid lighting methods using solar and wind-generated power.⁶⁸ The Joint Working Group for the IEC standards was meant to integrate further comments on renewable energy types it had received from the surveyees.⁶⁹

Lighting Global, an initiative of the World Bank that focuses on spreading sufficient electrical lighting around the world, particularly in Asia and Africa, also revised its Global Quality Standards for lighting products as of March 2015; these standards are based on IEC 62257-9-5.⁷⁰ Adoption of this series comes at a time when lighting manufacturers, such as Nokero, are increasingly selling solar-powered lights in developing countries.⁷¹ As part of Lighting Global's support for the growing global off-grid lighting product market, the Global Quality Standards are intended to create a baseline level for lighting quality, durability and truth-in-advertising so that consumers are informed and have access to internationally-

may use a certain wattage, if it is especially inefficient it will emit a low light output. Lumens are appropriate to use here because they measure the total light output from a source, and are useful as a base or foundation measure from which to work out a lux measurement, for example, if a light bulb is fitted in a home. Further, not all lights are likely to be used indoors and lighting equipment often draw more attention to a lumens measurement than a lux measurement. For example, the United States Dept. of Energy's EnergyStar program now measures bulb brightness in lumens. ENERGYSTAR.GOV, *supra* note 61.

65. Leon Drotsche, Presentation on the Int'l Electrotechnical Comm'n Tech. Specifications 62257 Series (Oct. 2, 2012).

66. The IEC develops and promulgates internationally accepted technical specifications for electro-magnetic equipment. Member countries participate in the IEC through National Committees ("NC"), which represent all public and private electro-technical advocacy organizations in the country. *National Committees*, INTERNATIONAL ELECTROTECHNICAL COMMISSION, <http://www.iec.ch/about/profile/members.htm> (last visited Feb. 9, 2016). IEC currently has eighty-three members. *Id.* IEC has collaborated with the International Organization for Standardization ("ISO") to develop over 200 technical specifications for developing country and affiliate members. *Adoption of IEC International Standards*, INTERNATIONAL ELECTROTECHNICAL COMMISSION, www.iec.ch/affiliates/adoptions (last visited Feb. 9, 2016).

67. Drotsche, *supra* note 65.

68. Morand Fachot, *Supporting Rural Electrification*, IEC E-TECH (June 2014), <http://ieccetech.org/issue/2014-06/Supporting-rural-electrification>.

69. *Id.*

70. WORLD BANK GROUP, LIGHTING GLOBAL QUALITY STANDARDS, VERSION 5, 2 (2015).

71. HARPER ET. AL., *supra* note 62, at 3.

approved and certified lighting products.⁷² These standards set forth six requirements for quality: (1) truthful advertising;⁷³ (2) lumen maintenance;⁷⁴ (3) durable batteries;⁷⁵ (4) one year warranty coverage on the product;⁷⁶ (5) quality and durability standards of the lighting equipment;⁷⁷ and (6) a ban on using hazardous substances in the lighting equipment, such as cadmium and mercury, are among them.⁷⁸ Because the electrification standards discussed above may vary as to exact requirements for lighting equipment, at a minimum, the Model Law incorporates the truthful advertising and prohibition on mercury and cadmium requirements of the Lighting Global Standards.

Section 8 also deals with certification. Product certification, undertaken by independent entities, ensures that a certain product is authentic, has passed performance and quality assurance tests or standards, and is designed for its intended purpose. Understanding the light output and power that a product is expected to use will assist the lighting agency in approving lighting products that accord with the country's energy generation and distribution circumstances. Certification also helps consumers select the correct products for their needs, and helps the manufacturer gauge whether certain products should be promoted over others. The Model Law proposes that product certification should take place at the country of origin because it is likely better equipped to develop and enforce certification standards. In addition, it is not practical for manufacturers to ship lighting products to a developing country that, upon receipt, finds that the products are inadequate and uncertified. Over time, however, the developing country may take over such certification responsibilities once its lighting industry is further developed, and delegating certification to countries of manufacture will help developing countries develop and adopt their own certification standards in the meantime.⁷⁹

72. LIGHTING GLOBAL QUALITY STANDARDS, *supra* note 70, at 1.

73. *Id.* at 2. Lighting Global specifies that all of the following must be reported and reported accurately: (1) manufacturer; (2) model name and model number; (3) light output; (4) lamp type; (5) run time; (6) charger rating; and (7) any other details included with the product.

74. *Id.* Lighting Global specifies that the light must maintain at least 85% of initial luminance for 2,000 hours or at least 95% of initial luminance for 1,000 hours.

75. *Id.* Lighting Global specifies that the average capacity loss of a random sample of six batteries must not exceed 25% during a durability test of the type outlined in IEC 62257-9-5 Annex BB.

76. *Id.* Specifying that the warranty must cover one year under "normal use, including the battery," although this implies, by exclusion, that *abnormal* uses of the lamp are not covered by the warranty.

77. *Id.* Specifying that all lighting products must pass the tests described in the section, including a test of Physical Ingress Protection, Water Protection, a "drop test" (wherein at least five out of six samples must still be functional after being dropped 1m onto concrete), a soldering and electronics inspection, and a switch, gooseneck, connector, and strain relief durability test (wherein at least five out of six samples must still be functional after 1,000 cycles).

78. *Id.*

79. This proposal is based on comments solicited at the Access to Energy for All Conference (2015). See generally *Sustainable Energy For All*, UNITED NATIONS, <http://www.se4all.org/> (last visited Mar. 29, 2016).

IX. SECTION 9. RESEARCH AND DEVELOPMENT

Section 9 places the prime responsibility for research and development on the Ministry of Energy and emphasizes the importance of soliciting and attracting foreign funds and assistance. As in every other administrative allocation of duties, the adopting country is free to make its own arrangements, provided that the substantive importance of research and development is in fact institutionalized.

The design and manufacture of affordable lighting for the energy poor has not attracted large amounts of scientific funding. Affordable sustainable energy technologies ("ASETs"), such as solar bulbs advanced by the model law, rely on cutting edge modern lighting technology relating to photovoltaic cells ("PVCs"), batteries, LED lights, charge controllers, and casing materials that were developed for and marketed within developed countries. What has been lacking is funding on how to use and adapt such modern technologies to create the ASETs required by the energy poor. The absence of applied engineering research required to adapt modern technologies to the modest and prosaic needs of the energy poor may partly arise from the weak returns on investment. The Model Law seeks to overcome this funding shortfall by calling for Scientific research and development ("R&D") that can focus on the importance of designing and manufacturing effective, cheap, and durable lighting for the energy poor. This should be a joint collaborative enterprise involving scientists and engineers from both developed and developing countries. The R&D envisioned by the Model Law has been anticipated, for example, by the research undertaken by a group of Social Entrepreneurship Seminar students from Stanford University, who together with the NGO Light Up the World, developed three prototypes of a solar-powered LED lamp for Indian, Mexican and Chinese consumers.⁸⁰ They also created associated business plans to market the prototypes.⁸¹

In addition to natural science and technological research, socioeconomic research should also be encouraged as these studies help researchers ascertain consumers' reactions to lighting products, so that more consumer friendly ASETs may be implemented. In the Houry and Khoury study, and the Lighting a Billion Lives study, researchers interviewed consumers for their thoughts on how the lighting products affected their daily activities and financial status.⁸² A pilot project for CFL lighting efficiency was established in the rural village of Niha in central Lebanon, where 1,000 CFL bulbs were distributed to the town's residents, and the study evaluated the project's effectiveness of adequate lighting and how

80. *Affordable, Solar-Powered, LED Lights for Developing World*, ARIZ. STATE UNIV. DESIGN CONSORTIUM, <https://universitydesign.asu.edu/db/affordable-solar-powered-led-lights-for-developing-world> (last visited Feb. 9, 2016).

81. *Id.*

82. Houry & Al Khoury, *supra* note 58, at 658; Palit & Singh, *supra* note 57, at 43. The Houry and Khoury study, jointly led by a university professor and a government official from the Lebanese Center for Energy Conservation ("CEC"), was set against a 2006 CEC lighting efficiency program, as the agency wished to promulgate national minimum lighting standards and policies. Houry & Al Khoury, *supra* note 58, at 659-60.

the town's socio-economic conditions improved.⁸³ The study run by Lighting a Billion Lives, discussed above, evaluated the effectiveness of the "fee-for-service" system at improving socio-economic outcomes in the villages the system was used in.⁸⁴ The Lighting a Billion Lives campaign and the "fee-for-service" system were developed by The Energy and Resources Institute ("TERI"), a small research university in New Delhi, as a response to the shortcomings of individual solar lantern distribution. These shortcomings included a lack of after sales service in rural areas and a lack of awareness among consumers as to how to operate and maintain individual solar lanterns.⁸⁵

X. SECTION 10. PUBLIC HEALTH

This Section acknowledges the importance of treating the health problems caused by kerosene use. To aid the adoption of lighting products by people who use kerosene lamps, it is important to educate them regarding the health risks associated with doing so. Therefore, Section 10 requires the government to support the treatment of kerosene-associated injuries and also requires public health officials to document injuries caused by kerosene.

A recent estimate from 2014 places the annual number of deaths resulting from all kinds of burns (not just kerosene) at about 300,000 globally (possibly even higher due to the number of deaths that go unreported).⁸⁶ Of this figure, over 90% of deaths are estimated to occur in "low-to middle-income countries," and the prevalence of kerosene for both cooking and lighting is a major contributing factor to this trend.⁸⁷ Furthermore, kerosene has significant negative consequences on children's health, particularly when the children are malnourished.⁸⁸

A localized study done in Indore, India, found that women aged twenty-one to forty were disproportionately more likely to suffer burns than any other demographic, and that the main cause of this were kerosene-burning lamps.⁸⁹ A couple of reasons were given for this: women aged twenty-one to forty are more likely to be economically active in the home and during nighttime hours than men of the same age group, and traditional women's clothing in India is more vulnerable to catching fire than men's.⁹⁰ Another compounding factor was that most of the kerosene lamps used in this part of India were of bad quality or design, usually purchased second or third-hand, or else homemade and improvised using

83. Houry & Al Khoury, *supra* note 58, at 659-60.

84. Palit & Singh, *supra* note 57, at 42.

85. *Id.*

86. S. Chamania et al, *supra* note 7, at 595.

87. *Id.*

88. INT'L YEAR OF LIGHTS, *Study after Sunset* (2015), <http://www.light2015.org/Home/LightForDevelopment/Study-after-Sunset.html>; Gupta, *supra* note 8, at 979, 982; Nicholas L. Lam et al., *Kerosene: A Review of Household Uses and their Hazards in Low- and Middle-Income Countries*, 15 J. TOXICOLOGY & ENVTL. HEALTH, Pt. B, 396, 396, 414 (2012); Palit & Singh, *supra* note 57, at 42.

89. S. Chamania et al, *supra* note 7, at 595.

90. *Id.* at 595-96.

materials like tins.⁹¹ Thus, these statistics show that the issue of energy poverty can indeed be a matter of gender equality and women's health too.

"The challenge of burns lies not in the successful treatment of a 100[%] burn, but in the [100%] prevention of all burn injuries."⁹² The replacement of these dangerous open-flame lamps with safer LED lamps seems an obvious fix to the problem. However, the general public must first be educated and informed as to the dangers of kerosene lamps and the long-term benefits of electric lighting.

XI. SECTION 11. EDUCATION AND INFORMATION

The dangers of indoor air pollution and burn injuries resulting from kerosene are often unknown to those using kerosene, and lighting programs should be premised on providing awareness and information regarding kerosene's health risks.⁹³ If people are aware of the risks of using kerosene lamps, they may be willing to use off-grid lighting products instead. These Model Laws place the primary responsibility for educating the public on the Ministry of Health. These Model Laws grant the adopting country the flexibility to make its own administrative arrangements, provided it accepts the importance of and commits to promoting awareness and education.

The most efficient channel for the dissemination of information to the general public may be through existing channels, such as public schools, or other educational programs for rural communities that the adopting country may already have in existence. The adopting country should first examine its existing programs on educating the public on other health matters to determine whether these same channels can be used to educate about the dangers of kerosene use. For example, many developing countries like India and Kenya already have extensive programs in place to provide for education on the issue of HIV/AIDS.⁹⁴ These programs may be through the public school system, or through other channels, such as television advertisements or public bulletins, and either private, NGO, or through the government.⁹⁵

However, these existing programs may not be effective. For example, a recent study in India showed that while the vast majority of a sample of school children in India are aware that HIV and AIDS exist, most of these students still harbor great misconceptions, misunderstandings, and resultant prejudices over the exact nature of AIDS.⁹⁶ For example, less than one third of the students sampled

91. *Id.* at 596.

92. Michael D. Peck, *Epidemiology of Burns throughout the World. Part I: Distribution and Risk Factors*, 37 BURNS 1087, 1088 (2011) (quoting M. H. Keswani, *The Prevention of Burning Injury*, 12 BURNS 533, 534 (1986)).

93. Guruswamy, *supra* note 25, at 352.

94. TANIA BOLER ET AL., THE SOUND OF SILENCE: DIFFICULTIES IN COMMUNICATING HIV / AIDS IN SCHOOLS, EXPERIENCES FROM INDIA AND KENYA, ACTION AID 5 (2003), <http://www.hivpolicy.org/Library/HPP000318.pdf>.

95. K. Mitchell et al., *Community-based HIV / AIDS Education in Rural Uganda: Which Channel Is Most Effective?*, 16 HEALTH EDUC. RES. 411, 420-22 (2001).

96. Sharma et al., *Mounting Aids Awareness through Educational Intervention: How Effective*

knew the difference between HIV and AIDS, and less than one half knew that condoms could be used to help prevent the spread of HIV.⁹⁷ Therefore, it is important to conduct follow-up surveys following a public education campaign to ensure that the information is being accurately conveyed and understood.

Finally, any education program must consider traditional, spiritual, and cultural norms and differences.⁹⁸ There can be severe cultural and traditional impediments to effective public health education. For example, a number of Western-based AIDS education and prevention programs in Africa failed because they failed to take into account “traditional African perceptions of causes of illness [. . .], perceptions of sexuality, and cultural beliefs inhibiting the usage of condoms.”⁹⁹

XII. SECTION 12. ENFORCEMENT

Judicial and administrative enforcement is a necessary facet of the broader implementation of the Model Laws. While civil and criminal enforcement by public officials is a familiar feature of the laws of many developed countries, the citizen suit provisions may need some explanation in the context of developing countries. In essence, a citizen suit is a form of private enforcement. With private enforcement, the private litigant steps into the public domain by calling for enforcement against the official enforcers or government agencies (for failing to enforce or uphold the laws that have been adopted), or against private actors (for violating the standards of performance, warranty, and safety required by this law).

For a variety of reasons, government agencies are often unable or unwilling to enforce regulatory laws. Regulatory agencies seem unable to act speedily and comprehensively to achieve the social goals committed to them for a number of reasons, four of which merit special mention:¹⁰⁰

(1) Their efforts may be impeded by inadequate staff, funding, and information, a persistent problem even in developed nations;

(2) Agencies may be slow off the mark and playing catch up with changing circumstances- often due to the backlog resulting from reason (1);

(3) Agencies may be “captured” by the very groups and special interests that they are supposed to regulate.¹⁰¹ Corruption, bribery, and cronyism at all levels of government

Can It Be?, 3 NAT’L J. MED. RES. 151, 151 (Apr.-June 2013).

97. *Id.* at 151-52, 154.

98. Margaret Njirambo Matinga et al., *Behavioral Challenges and the Adoption of Appropriate Sustainable Energy Technologies*, in INTERNATIONAL ENERGY AND POVERTY: THE EMERGING CONTOURS 147 (Lakshman Guruswamy ed., 2015).

99. Alta C. Van Dyk, *Traditional African Beliefs and Customs: Implications for AIDS Education and Prevention in Africa*, 31 S. AFR. J. PSYCHOL. 60, 60 (2001).

100. Guruswamy, *supra* note 25, at 353.

101. Benjamin Van Rooij, *The People’s Regulation: Citizens and Implementation of Law in China*, 25 COLUM. J. ASIAN L. 116, 137, 142, 177 (2012).

can be huge problems in many of the developing nations these laws are meant for (and even in some developed nations as well),¹⁰² and

(4) They could be ensnared in the procedural red tape that is a common facet in many developing countries' bureaucracies.¹⁰³

When armed with citizen suit authority and given the standing necessary to pursue a case, private citizens are empowered to take over the enforcement of such laws, free of some of the bureaucratic and political constraints that can hobble government enforcers. Other advantages of allowing citizen enforcement is that the citizens in question often have a closer and more intimate connection with their environment, as well as providing a greater variety of non-institutional perspectives and information.¹⁰⁴

It is possible for some governments and their bureaucracies to consider citizen suits as potential instruments for attacking government institutions who are doing their best in difficult circumstances. They may also consider such suits a device for drawing national and even international attention to their country. From a more objective perspective, any government that enacts this statute is seeking to address the problems of indoor air pollution and should not try to cover up the poor conduct of their agencies. A citizen suit allows the citizens of a country to draw attention to agency inaction and enables an independent judiciary to call for the implementation of mandatory and non-discretionary provisions of the Act. Bringing questionable conduct into the sunshine of judicial scrutiny will help governments meet the challenges they seek to address through this Act.

In the United States, many federal environmental statutes allow citizen suits.¹⁰⁵ These laws include the Clean Water Act, the Clean Air Act, the Resource Conservation and Recovery Act, and the Endangered Species Act.¹⁰⁶ For example, the Clean Air Act permits "any person" to "commence a civil action" against any other entity, including the government, "who is alleged to have violated [. . .] or to be in violation of an emission standard or limitation," as well against the Administrator "where there is alleged a failure of the Administrator to perform any act or duty under this chapter which is not discretionary with the Administrator."¹⁰⁷

102. Emmanuel C. Onyeozili, *Obstacles To Effective Policing In Nigeria*, 1 AFR. J. CRIMINOLOGY & JUST. STUD. 32, 40 (2005).

103. AKHIL GUPTA, RED TAPE: BUREAUCRACY, STRUCTURAL VIOLENCE, AND POVERTY IN INDIA 5 (2012). In this book, writer Akhil Gupta summarizes his argument by first comparing India's "bureaucratic red tape" with a natural disaster, such as an earthquake, in terms of the number of people who die each year because they are kept in poverty despite India having one of the world's largest and fastest growing economies. *Id.* at 4, 21-22.

104. Irene Villanueva Nemesio, *Strengthening Environmental Rule of Law: Enforcement, Combatting Corruption, and Encouraging Citizen Suits*, 27 GEO. INT'L ENVTL. L. REV. 321, 330 (2015).

105. Altman et al., *Citizen Enforcement In Environmental Law*, D. DAVID ALTMAN CO., LPA 1 (Feb. 14, 2016), http://www.environlaw.com/pdf/citizen_suits.pdf.

106. 33 U.S.C. § 1365 (2015); 42 U.S.C. § 7604 (2015); 42 U.S.C. § 6972 (2015); 16 U.S.C. § 1540 (2015).

107. 42 U.S.C. § 7604(a)(1)-(2) (2015).

Following the example set by the United States, a number of both developed and developing states have recognized that public authorities are not always the best suited towards enforcing compliance with environmental laws and have begun to allow private enforcement of environmental laws.¹⁰⁸ The first major international agreement was Article 18 of the 1993 Lugano Convention of the Council of Europe, which states that “[a]ny association or foundation which according to its statutes aims at the protection of the environment” would be granted standing to litigate against any violators of each European state’s respective environmental regulations.¹⁰⁹

In many developing countries that have introduced environmental regulations, lack of citizen enforcement provisions ensure that citizens do not have standing to pursue their claims in the courts.¹¹⁰ In addition, the costs and efforts involved in the process of litigation can be formidable.¹¹¹ For example, in China, a recent study found that one of the primary reasons that enforcement of environmental regulations remains lax and insufficient is due to the lack of public participation.¹¹² The study also suggested a number of measures that could be made to increase the active participation of the citizens in both the legislative process and in the enforcement of the laws once they are formally adopted.¹¹³

Current environmental legislation in India illustrate some of the issues facing citizen suits in developing countries.¹¹⁴ India first included an environmental citizen suit provision in its Environment (Protection) Act of 1986.¹¹⁵ Later on it also passed a Right to Information Act that, in theory, guarantees all citizens the right to be fully informed of all environmental effects that industrial centers and manufacturing facilities have on the surrounding area, and thus enabled citizens to take legal action against polluters.¹¹⁶ However, it is claimed that the task of monitoring and obtaining that information may be well beyond the ability of many private individuals in India, especially as some of the more specialized tests need to be performed outside of India.¹¹⁷ It is worth recalling that citizen suits supplement the enforcement of the law by government agencies. These suits arise where the government agencies default in the execution of their duties. They are secondary and not meant to be a primary source of enforcement of the model law.

108. IMPROVING COMPLIANCE WITH INTERNATIONAL ENVIRONMENTAL LAW 53 (Jacob Werksman et al. eds., 2014).

109. Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, art. 18, June 21, 1993, Europ. T.S. No. 150, 32 I.L.M. 1228.

110. Nemesio, *supra* note 104, at 333.

111. *Id.*

112. Wang Canfa, *Chinese Environmental Law Enforcement: Current Deficiencies and Suggested Reforms*, 8 VT. J. ENVTL. L. 159, 159, 164 (2007).

113. *Id.* at 173, 177-78, 183.

114. Monish Gulati, *Citizen Participation in Environmental Enforcement in India – Looking Beyond The RTI Act*, SOC. SCI. RES. NETWORK (Aug. 1, 2010), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1663148.

115. The Environment (Protection) Act, India 1986, ch IV, pt 19, A.I.R. (Act No. 29 of 1986).

116. The Right To Information Act, India 2005, ch II, A.I.R. (Act No. 22 of 2005).

117. Gulati, *see supra* note 114.

If the adopting country finds that citizens do not have access to information, they are free to take remedial action that complements the provision of the model law.

In places where law enforcement is weak or even non-existent, it is possible that other entities may rise to fill in the void, such as non-state actors (including even insurgent groups) or traditional social hierarchies (and with them, traditional forms of adjudication and dispute resolution).¹¹⁸ Thus, in these areas, the local people may choose to turn to these methods for enforcement rather than using official channels.¹¹⁹ Often these methods of resolution are family, village, or community orientated, and they usually involve those individuals who are within the immediate community.¹²⁰ One possible solution for the adopting country would be to modify some of the provisions of the citizen enforcement section of this law, allowing a village elder or similar representative to litigate on behalf of someone else in their village and/or the community as a whole, through whichever local channels of adjudication are recognized by the Administrator in the adopting country.

The Model Laws are meant to be a guideline that the adopting country is meant to adapt to suit its own political, legal, economic, and social realities. But at the same time, the adopting country must ensure that every step be taken to make the litigation process as accessible as possible to the ordinary citizenry, regardless of the final form these laws may take.¹²¹

118. SANDRA F. JOIREMAN, *WHERE THERE IS NO GOVERNMENT: ENFORCING PROPERTY RIGHTS IN COMMON LAW AFRICA* 104 (2011).

119. *Id.*

120. *Id.* at 14.

121. Nemesio, *supra* note 104, at 342.