RAP Energy solutions for a changing world

AFFORDABLE HEAT:

Whole-Building Efficiency Services For Vermont Families and Businesses

The Regulatory Assistance Project

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This report is an update of "*Affordable Heat: A Whole-Buildings Efficiency Service for Vermont Families and Businesses*" which was published by RAP in 2008. Ajith Rao and Riley Allen were the primary authors of this report. The 2008 report was authored by Richard Cowart, Richard Sedano, Frederick Weston and Brenda Hausauer.

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Executive Summary

A. Affordable Heat: The Present Challenge

The average Vermonter and the Vermont economy are facing a fuel affordability challenge of historic proportions. In 2010, Vermonters paid over $600 million to import fossil fuels for use in our homes, businesses, and other buildings. That is almost $300 million more than we were paying in 2000. By any standard, importing fossil fuels imposes a large tax on the Vermont economy. Our annual fuel expenditures for residential and commercial heating alone have been significantly greater than the revenues brought in by the entire agricultural sector[1] and were almost $85 million more in 2009 alone.

This problem will persist. Energy prices over the coming decades will be much higher than they have been in the recent past. World demand for energy continues to rise powerfully, driven in part by the rising economies of countries such as China and India, and new sources of supply are not keeping up. As we move to issue this updated report in early 2011, instability in the Middle East is precipitating yet another round of rising and volatile crude oil prices. Meanwhile, Vermont has a higher than average dependence on unregulated fossil fuels for heat. Dollars for low-income heating assistance are not stretching as far in the tough economy, and prospects for the future do not look better.[2]

In addition to their direct economic costs, fossil fuels used in buildings also represent the second largest source of greenhouse gas emissions in Vermont (after transportation). The buildings sector in Vermont produces a much larger fraction of statewide greenhouse gas emissions (approximately 26%) than does the United States as a whole (approximately 8%),[3] largely due to our state's heavy reliance on these fossil fuels.

The good news: If these costs were unavoidable, we would just have to accept them. But they are not. Analysis of Vermont's building stock and years of experience with the low-income Weatherization Assistance Program, Efficiency Vermont's programs, NeighborWorks® Alliance of Vermont programs, and others all demonstrate that we

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[1] The cash receipts from all Vermont crops and livestock agriculture were approximately $514 million in 2009. (Source: U.S. Department of Agriculture, New England Agricultural Statistics, New England Cash Receipts 2009, September 2010).

[2] Jennifer Reading, WCAX News, "*Will Home Heating Aid Cuts Leave Vermonters Cold?*" February 18, 2011.

[3] *Utility Facts 2008*, Vermont Department of Public Service, Updated July 2008.

could reduce fuel consumption in many thousands of individual buildings by 25% or more.[4] These efforts represent an opportunity to lower the cost of heat by deciding to invest in Vermont's buildings infrastructure. This report recommends a set of policies and services that would allow us to realize this opportunity, by building upon existing efforts.

B. Legislative Goals and Recent Progress

When this report was first issued in early 2008, Vermont was in the midst of another fuel crisis – heating fuel prices were spiking to unprecedented levels. Based on that 2008 report, which highlighted the successes of Efficiency Vermont, the Weatherization Assistance Program, Vermont Gas Systems, and others, the Vermont General Assembly in 2008 adopted a set of challenging but achievable goals for the buildings efficiency initiative with Act 92 (The Vermont Energy Efficiency and Affordability Act).[5] Those goals aim, among other things, to improve substantially the energy fitness of 25% of the state's housing stock by 2020 (about 80,000 units) and reduce annual fuel needs and fuel bills by an average of 25% in the housing units served.

Based on the programs and goals from Act 92 and also through the various programs funded through the American Recovery and Reinvestment Act of 2009 (ARRA), Vermont made significant strides toward addressing the challenges posed by heating fuel consumption in buildings. ARRA and other sources provided funds to the Weatherization Assistance Program, NeighborWorks® of Western Vermont, the Vermont Fuel Efficiency Partnership, and the Vermont Housing Conservation Board. As a result of this funding, the Weatherization Assistance Program ramped up its capacity and increased the units treated from about 1,430 in 2007 to about 1,830 in 2009.[6] Efficiency Vermont's Home Performance with Energy Star Program grew from a small effort that addressed less than 100 units per year to one that addressed about 530 units in 2009.[7] NeighborWorks® of Western Vermont established a goal to help 1,000 Rutland County residents complete whole-buildings retrofits over three years.[8] The Vermont Fuel Efficiency Partnership was established to provide more whole-building retrofits to multi-family units. In addition, as a requirement for obtaining the ARRA funding, Vermont in 2009 passed legislation establishing building codes for new buildings that meet the requirements of the 2009 International Energy Conservation Code (IECC). Act

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[4] Personal communication with Shaun Donahue from the State Office of Economic Opportunity; Emily Levin from Vermont Energy Investment Corporation and Ludy Biddle from NeighborWorks® of Western Vermont, January 2011.

[5] Vermont General Assembly, *The Vermont Energy Efficiency and Affordability Act (Act 92)*, March 19, 2008, http://www.leg.state.vt.us/docs/legdoc.cfm?URL=/docs/2008/acts/ACT092.HTM.

[6] Personal communication with Shaun Donahue, State Office of Economic Opportunity, January 2011.

[7] *Efficiency Vermont Annual Report 2009*, November 2010.

[8] Personal communication with Ludy Biddle from NeighborWorks® of Western Vermont, January 2011.

H.56, which was passed in May 2011, addresses some of the roadblocks facing the implementation of Property Assessed Clean Energy (PACE) programs across the state, which can prove to be an important tool in financing residential energy efficiency improvements.

However, largely due to the temporary nature of the funding through ARRA, limitations associated with the scope of existing programs, a decrease in federal tax credits for residential energy efficiency measures, and the expiration of the Green Mountain Energy Efficiency funds, *Vermont likely will fall short of the Act 92 goals for 2020. The analysis conducted in this report suggests that the shortfall will be 24,000-31,000 homes*, creating continuing losses to the economy and also ensuring that the problems will persist in the years to come. Vermont therefore needs to redouble its efforts in this area, in particular by targeting key impediments to efficiency investments to ensure lasting success. This report lays out a set of recommendations that address these impediments based on a detailed analysis of the current situation.

Job Impacts of the Proposed Recommendations

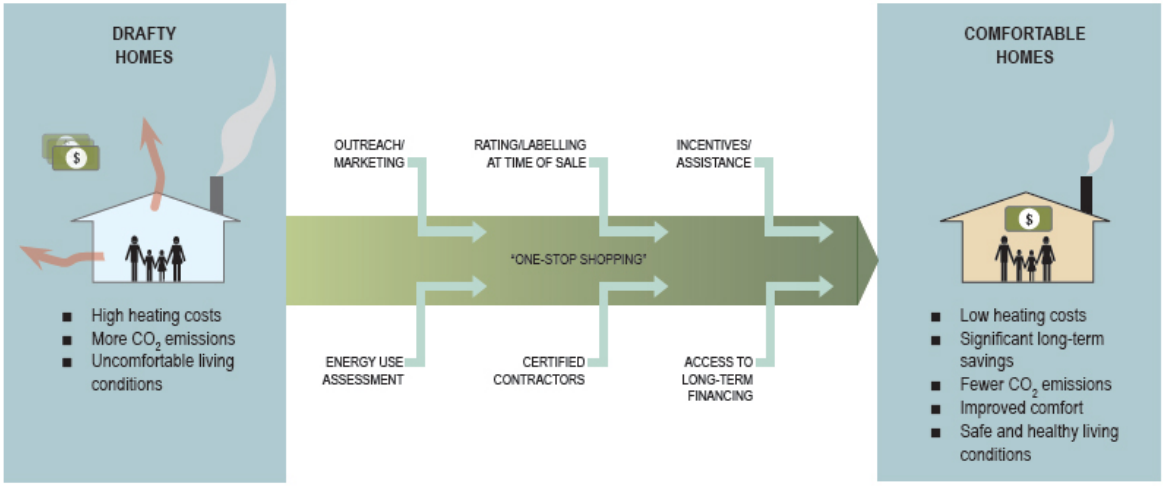
The job impacts of adopting the recommendations of the original 2008 report were positive according to an independent economic analysis conducted in 2008 for the Legislative Joint Fiscal Office. The analysis reported:

- *The expenditures in the first 10 years of the Affordable Heat Program will yield significant immediate and longer term net economic benefits to the state. Ultimately, the reduced energy consumption these investments enable will support real disposable income gains of nearly $2 million per year in constant 2000 dollars.*

- *State stimulus of job growth in the construction, maintenance, and repair sector may be especially timely, with declining construction and real estate markets leaving an increasing number of Vermont workers in this industry unemployed.*

C. What is Needed: Sustained Efforts Encompassing a Comprehensive Approach to Buildings Efficiency

Figure 1: Diagram Illustrating the Different Elements Required for Implementing a Broad-Based Strategy for Driving Whole-Building Energy Retrofits



Vermont's largely rural population resides in widely dispersed buildings that will require more than a single approach to providing whole-building efficiency services. Vermont has more than 240,000 occupied housing units and one of the nation's oldest housing stocks. There are also 21,000 businesses in commercial spaces of widely varying types and over 1,000 new housing units built every year.[9] This report recommends a set of whole-building efficiency services to those buildings, containing seven major elements:

1. Develop effective outreach initiatives for driving demand for home energy retrofits by leveraging entities with direct relationships to the customers, including **town energy committees** and **fuel dealers** (*Section 2*).

2. Initiate a **time-of-sale efficiency review and disclosure** for residential and commercial buildings, coupled with technical and financial assistance for efficiency upgrades (*Section 6*).

3. Steadily increase the number of units served by the low-income **Weatherization Assistance Program** by 7.5% every year to improve efficiency, fuel costs, and life safety in existing low-income housing (*Section 5*).

[9] In recent years (2008 and 2009), the number of new homes built in Vermont has decreased significantly. See Bureau of Census data at http://www.census.gov/const/www/C40/annualhistorybystate.pdf.

4. Continue to focus on multi-family housing units through the **Vermont Fuel Efficiency Partnership** program (S*ection 2*).

5. Continue efforts on the **market-based service** of outreach, financial and technical assistance for other existing housing and commercial buildings on a "**whole-building**" basis, through the State's energy efficiency utility: Efficiency Vermont, Vermont Gas Systems and Burlington Electric Department (*Section 6*).

6. Establish an easy-to-access loan program for high-quality upgrades by home and building owners, with capital provided by a **consortium of banks and private lenders**, possibly supported by the state agencies with lending expertise in the buildings sector (*Section 6*).

7. Establish responsibility for a statewide entity such as the **Department of Public Service** to coordinate whole-building efficiency services programs among diverse providers and to meet state goals (*Section 6*).

Implemented together, these recommendations would provide a seamless path, allowing for the implementation of residential energy improvements on the scale required to meet Act 92 goals.

D. Design Principles and Statewide Goals

The recommendations in this report are built on a set of design principles that are based on the experience gained by Vermont efficiency providers over the past three decades. The most important guiding principles are:

- ***Focus on the needs of customers — that is, Vermont families, homeowners, and business building owners.*** Programs must be customer-focused, maximizing easy-to-use services and "one-stop shopping" and minimizing transaction costs.

- ***Address the persistent market barriers to efficiency.*** This requires a combination of information/audit services, technical assistance, and financial assistance to owners.

- ***Build on existing institutions and their current efforts.*** Vermont has long-term and successful experience with efficiency delivery, including the state's efficiency contractor, Efficiency Vermont, the Weatherization Assistance Program, NeighborWorks® Alliance of Vermont, fuel dealers, utilities, and others.

- ***Maximize savings and minimize transaction costs with a "whole-building" approach that considers all energy fuels and uses.*** The best way to serve customers and reduce energy use is to treat buildings as a whole, rather than undertaking piecemeal improvements. Electricity and fossil fuel efficiency services should be delivered in a coordinated program.

- ***Use public funds to leverage private investment capital.*** Improving a large fraction of the building stock will take a great deal of investment capital. Most of this can come from private sources, but public support in the form of marketing, technical assistance, and financial incentives will be required to leverage those private funds.

Overview of units and public costs. *Table 1* provides a quick overview of the major recommendations in this report. It shows:

- The **number of units** of housing (or business installations) that need to be improved per year to meet the Act 92 goals. Because most of the services ramp up in scale over time, the total number of units served annually rises from about 3,600 in 2011 to about 11,000 in 2020.

- The **publicly-supported cost per unit**, on average, for participating units. Of significance, this figure does not include the funds invested by building owners and/or covered by loans to those owners. The public cost per unit is higher for the low-income Weatherization Assistance Program (approximately $5,200 per unit) than it is for the Market Housing service, in which owners are expected to contribute a large fraction of the total costs of upgrades.

- **Funds needed per year** provide a snapshot of the total new revenues that will be needed from public sources to support the expanded activities. That amount rises over time as more units are served (from just $17.1 million in 2011 to $33.6 million in 2020). (New public funds needed are much less than total program budgets.)

Table 1: Expanded Residential Efficiency Services -- Overview and Key Data Points

RESIDENTIAL SERVICES SUMMARY AND FUNDING REQUIREMENTS 2011-2020*				
Initiative/Service	Units/year	Public cost/unit	Funds needed/year	Total units over 13 years
Weatherization Assistance Program (WAP)	2,000 rising to 2,800	$5,200	$12.5 million rising to $19 million	31,300
Market Housing retrofits w/incentives	1,300 to 2,900	$2,300 rising to $3,000	$3 million rising to $10.4 million	19,400
Market Housing retrofits addressed through other proposed initiatives	0 to 4,900	*Note 1*	*Note 1*	22,200
Vermont Gas program	100 rising to 470	$2,700 rising to $3,400	$300,000 rising to $1.4 million	4,000
Other programs with transitional funding, including non-WAP ARRA	270 rising to 770 through 2013	An average of $1,300 through 2013	$300,000 rising to $2.8 million through 2013	2,100 through 2013
Other initiatives prior to 2011	530 in 2009 to 600 in 2010			1,100
TOTAL	3,670 rising to 11,040 units per year		$17.1 million rising to $33.6 million (*Note 2*)	80,000

* Total units over 13-year period starting with passage of Act 92 in 2008

Note 1: Public funds required here remain an open question. It is critical that that the recommendations for other proposed non-incentive initiatives are put in place, which would minimize the funding requirements here. Absent this, the incentive levels necessary to achieve the targets may be as high as $2,500 per unit and cost up to $11 million per year by 2020, and may still fall short of the goals.
Note 2: With additional incentives required, we estimate total program costs in 2020 of almost $45 million.

E. Institutional Roles

The proposed recommendations establish an important goal of building on Vermont's existing experience and strengths, including:

- The experience of Vermont's existing efficiency institutions, including Efficiency Vermont, the community-level agencies administering the Weatherization Assistance Program, Vermont Gas Systems, and others.

- The capacity of Vermont's fuel dealers and other private sector actors who can deliver funding, expertise, and on-the-ground installations of insulation, HVAC systems, and other building shell improvements.

- The experience of lending institutions such as the Vermont State Employees' Credit Union, the Opportunities Credit Union, and many others in administering lending programs for home energy efficiency retrofits.

- The presence of over ninety Town Energy Committees across the state, loosely organized under the Vermont Energy and Climate Action Network, formed as a grassroots response to address the energy problems of the state.

The initiatives recommended in this report are intended to build on those existing strengths. All of Vermont's existing efficiency service providers have important roles to play — and for many of them, significant new business opportunities — in the expanded buildings service. The institutional arrangements summarized in the report build consistently on the arrangements and market roles that already characterize work in this domain. For example, in the low-income Weatherization Assistance Program, projects are managed by five regional agencies with assistance from Efficiency Vermont and others. In the Market Housing service recommended in this report, Efficiency Vermont, Burlington Electric Department, and Vermont Gas Systems undertake marketing and "intake," and they provide financial incentives under their whole-building programs.

Expanding on whole-building efficiency services on this scale will require effective coordination and leadership. Given its central role in the oversight of utilities and energy efficiency programs, the Vermont Department of Public Service is well positioned to take on this role.

F. Costs and Benefits of Efficiency Services

Vermont's legislative goal of making efficiency upgrades in 80,000 housing units across the state will require significant investment capital and a highly professional, customer-focused team of program administrators and energy experts. This report (*Section 7*) examines the costs and benefits of expanding whole-building efficiency efforts. Overall, the services will deliver total investments over the next 10 years of approximately $710 million, of which about half is private capital and half will come from a variety of public and utility sources.

The large majority of public expenditures on buildings efficiency services are in the form of direct assistance to property owners, with small fractions for administration and loan guarantees. For low-income weatherization services, the program will continue to pay the full costs of the measures. *Figure 2* shows how the efforts increase over time.

Over their lifetimes, **the efficiency services recommended for the first decade will return $2.26 in overall savings[10] for every public and private dollar invested.** Thus, even after paying back the full cost of building upgrades, for every dollar invested, net savings of $1.26 will remain in the pockets of Vermont's home and business owners, instead of being sent out of state to pay for heating fuels. These services can have wide-sweeping impacts beyond cost savings through reducing heating fuel use. Homeowners may also experience an array of non-energy benefits including greater comfort in the home. In addition, these services can also lead to societal benefits that accrue to those with no direct relationship to these services. These include environmental benefits in the form of emissions reductions, and economic benefits in the form of increased economic activity, job creation, etc.

G. Funding Sources

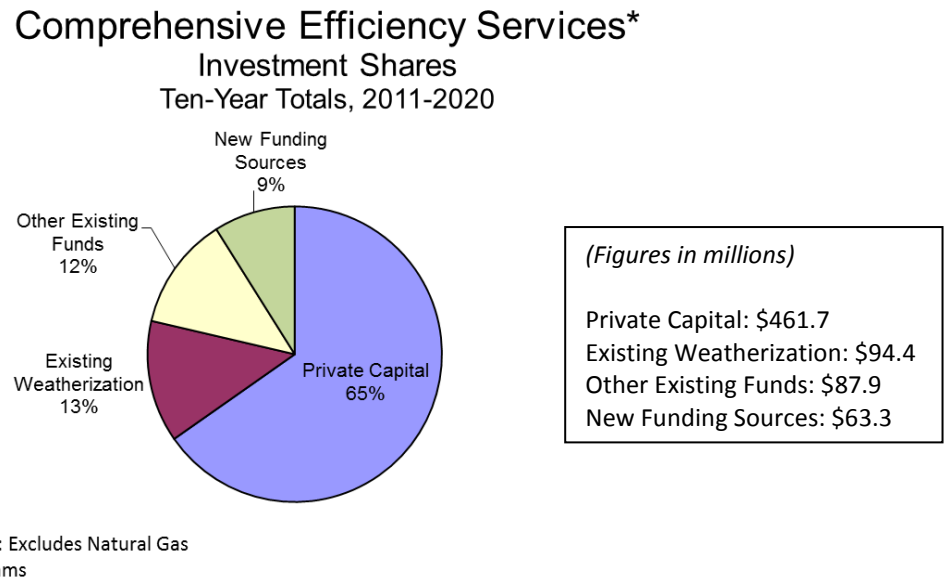
This report (*Section 8*) examines a wide range of funding options for the whole-building efficiency services recommended and concludes that a package of existing and new funding sources is needed to create the savings potential. It is important also to provide stable and predictable funding sources so that enterprises can hire and train the staff they will need and customers can count on services they will need to make major renovations and investments.

By relying on private investment capital and by making use of multiple funding streams, the percentage of new public revenues needed is only 9% of the total investments needed for the entire program (*Figure 2*). Vermont saw a large influx of ARRA funds in

[10] $1.55 on a present value basis

2009 to support different programs, largely centered on low-income weatherization. The ARRA funds have bolstered retrofit activities considerably across the state and helped fill gaps in funding levels. The 2012 sunset date on these funds will result in a dip in funding after this year, which will need to be bridged by other sources.

Figure 2: Expanded Whole-Building Efficiency Services: Investment shares: Ten-Year Totals, 2011-2020



- ***Private capital*.** The most important financial component of the buildings efficiency program is private capital. Approximately three quarters of the investment capital outside of the low-income weatherization program and half of the total spending on efficiency in the first 10 years of the programs comes from private capital — loans to and out-of-pocket expenditures by customers. However, substantial programmatic assistance — including marketing, audits, other activities to drive customer demand for efficiency, technical assistance, and direct financial assistance to borrowers — will be needed to make these private investments a reality. It has to be noted that the *investment of this capital needs to occur in conjunction with various other non-incentive measures prescribed in the recommendations that would address the various barriers that are prevalent*.

  A loan loss reserve fund will be required to support efforts to unlock private capital, thus maintaining the lending capacity of the loan pool and attracting additional funding. A loan loss reserve would help to extend the financing credit to the swath of customers who do not have a credit score sufficient to qualify for conventional home improvement loans. The creation of a loan loss reserve would likely require

either public dollars, funds from philanthropic organizations or donated capital from banks.

This report is accompanied by two companion studies that examine in more detail solutions to reducing financing barriers to carrying out extensive home energy retrofits. The first study, carried out by Efficiency Vermont, describes three case studies that demonstrate the cost-effectiveness of home energy retrofits and the attractive economics of financing these investments. The second study, by the Institute for Energy and the Environment at Vermont Law School, characterizes Vermont's housing stock and homeowners' financial health and identifies opportunities for the financial community and other investors to finance residential energy efficiency improvements.

- ***Increased Support for the Weatherization Trust Fund through the Gross Receipts Tax*.** In this report, the most significant portion of new public sector funding is from increases to the Gross Receipts Tax (GRT) on unregulated fuels. This increase would fund additional efficiency services for low-income housing units. Emphasis on investment in this segment is made for the following reasons:

  First, it is highly unlikely Vermont will hit its legislative targets for improving the overall fitness of the housing stock without significant improvement to the roughly 20% of households that are low income (roughly 49,000 households). This targets the segment of housing that will not be otherwise addressed through private sources, such as banks and traditional lenders. Second, access to capital is a fundamental barrier to this segment that will not be met without direct public investment. Third, investment in energy efficiency for low-income households is a sound investment of tax dollars. By reducing the energy consumption of low-income households, we can reduce the need for ongoing direct fuel assistance (such as Low Income Home Energy Assistance Program (LIHEAP)) to these households. Finally, failure to address the fitness of low-income households ultimately will expose those households to extraordinary health-related risks during periods of fuel pricing volatility, particularly during the winter months, which occurred in early 2011. Even apart from such health and safety concerns, *the greater need to direct energy efficiency funding toward low-income households is compelling*.

  The GRT currently is paid by the electricity and natural gas sectors, as well as the unregulated fuels sectors. During the past two decades, total energy efficiency expenditures by the electricity and natural gas sectors have increased. These sectors now pay much more than the unregulated fuels sectors to support energy efficiency. As a result, this report recommends an increase of the GRT on unregulated fuels only (*Section 8*).

Additional sources of funds may be needed to supplement those already in place. As noted previously, priority should be given to policies and approaches that address the underlying barriers included in the list of design principles. To the extent that additional funds are required, we recommend that the source of funds be broad-based and consideration be given to electric utility fees if taxes are not an option. Taken together, these funding options provide a range of choices for legislators to consider and are adequate and appropriate sources of support for efforts in addressing whole-building efficiency.

In summary, this report sets out a broad-based strategy to improve the energy fitness of Vermont buildings and to lower fuel bills for Vermont families and businesses. The set of policies and services recommended in this report will allow us to:

- *Lower Vermont's overall fuel bill by about $1.6 billion over the lives of the steps taken and measures installed,*
- *Substantially improve the energy fitness of over 78,000 residential and commercial buildings from 2011 to 2020, and*
- *Lower the fuel bills of roughly 72,000 participating families in existing housing by an average of $800 to $1,100 per year for the first 10 years and over 5,000 participating businesses by an average of $4,000 to $6,000 per year for the first 10 years.*

These policies and services will diminish Vermont's continuing dependence on unregulated heating fuels and mitigate the escalating deleterious impacts on both the economy and the environment that this dependence causes. If more of the dollars Vermont families export for fossil fuels stayed in the Vermont economy, they could support our neighbors and our quality of life while buoying savings and local investment. It is therefore critical that immediate action be taken to ensure their implementation.

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts focused on the long-term economic and environmental sustainability of the power and natural gas sectors. We provide technical and policy assistance on regulatory and market policies that promote economic efficiency, environmental protection, system reliability and the fair allocation of system benefits among consumers. We have worked extensively in the US since 1992 and in China since 1999. We added programs and offices in the European Union in 2009 and plan to offer similar services in India in the near future. Visit our website at www.raponline.org to learn more about our work.