CLIMATE POLICY INITIATIVE

Meeting Emerging MRV Needs in China, Germany, Italy, and the United States: Are Countries Prepared?

Climate Policy Initiative

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About CPI

Climate Policy Initiative (CPI) is a policy effectiveness analysis and advisory organization whose mission is to assess, diagnose, and support the efforts of key governments around the world to achieve low-carbon growth.

CPI is headquartered in San Francisco and has offices around the world, which are affiliated with distinguished research institutions. Offices include: CPI Beijing affiliated with the School of Public Policy and Management at Tsinghua University; CPI Berlin; CPI Hyderabad, affiliated with the Indian School of Business; CPI Rio, affiliated with Pontifical Catholic University of Rio (PUC-Rio); and CPI Venice, affiliated with Fondazione Eni Enrico Mattei (FEEM). CPI is an independent, not-for-profit organization that receives long-term funding from George Soros.

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Executive Summary

As national responses to climate change evolve and strengthen, so too must the systems for tracking greenhouse gas (GHG) emissions, mitigation actions, and progress toward goals. This evolution is shaped by multiple drivers: new international agreements, shifting political and social pressures, and specific policy reforms at the national and local level. Demands on existing measurement, reporting, and verification (MRV) systems for emissions and mitigation actions will increase and give rise to new systems.

This report identifies emerging MRV needs for four of the major emitters — China, Germany, Italy, and the United States — and assesses how well-positioned each country is to meet those needs.[1] It builds on previous CPI working papers that described and assessed how effectively existing systems used to track emissions and mitigation actions in these four countries are serving the current needs of policymakers and stakeholders.[2] Through this new assessment, we look to the future. We identify where countries are well-placed to meet emerging MRV needs, and where countries require further development and capacity building now in order to keep systems functioning effectively in coming years.

Emerging needs

Looking across specific international and domestic policy processes, and considering broader policymaker, stakeholder, and public demands, Table 1 summarizes emerging MRV needs.

National preparedness: Key findings

China

China's existing domestic policy tracking efforts put it in a good position to report internationally on its mitigation actions.

Biennial reporting on emissions poses a bigger challenge, as it is far more frequent than current practice. Extending existing national capacity to track energy and GHG emissions to the sub-national level is a high priority, as China is devolving greater responsibility for energy and carbon reduction goals to regional and local governments. Improving the reliability and comparability of sub-national MRV systems will be crucial to the successful implementation of China's new emissions trading system.

Germany

Germany is well-placed to meet new requirements emerging from the United Nations Framework Convention on Climate Change (UNFCCC) and EU. Most requirements are less stringent than Germany's existing practices or are in areas where Germany's existing MRV system is strong.

Many of the MRV systems required to monitor Germany's energy transition are already in place, although some additional effort will be required to clearly define goals and indicators and to monitor details of policy implementation. Comparability is a priority area for improvement: Germany needs to revise methods for tracking its mitigation actions — particularly energy efficiency policies — so results can be reported in a comparable manner across all programs.

Italy

Italy is well-placed to meet emerging UNFCCC and EU reporting requirements: It already prepares annual inventories and biennial reports on mitigation actions. Resource and capacity constraints within the national government may create challenges in expanding the preparation of emissions projections and improving transparency on methods.

Italy is also generally well-prepared to track implementation of its new national plan for reducing emissions. Existing capacity to monitor policy impacts is generally strong, particularly for energy efficiency policies. Some

1 This report focuses on measurement, reporting, and verification of emissions and mitigation actions. There are also new MRV requirements for climate finance, which is outside the scope of this study. CPI has surveyed systems to monitor and evaluate the effectiveness of multilateral and bilateral climate finance; see Climate Policy Initiative, "Public Climate Finance: A Survey of Systems to Monitor and Evaluate Climate Finance Effectiveness."

2 Climate Policy Initiative, "Tracking Emissions and Mitigation Actions: Current Practice"; Climate Policy Initiative, "Evaluation of MRV Systems."

Table 1: Emerging MRV needs

	CHINA	GERMANY	ITALY	UNITED STATES
INTERNATIONAL	Biennial updates to GHG inventory Biennial reporting on mitigation actions	Biennial reporting on progress toward climate mitigation goals Biennial reporting on mitigation actions		
REGIONAL		Meeting new requirements for preparing emissions projections Expanded reporting on land use, land-use change and forestry (LULUCF), aviation, and other areas		
DOMESTIC	Tracking progress toward carbon intensity reduction targets in the 12th Five-Year Plan Establishing MRV systems to monitor control of total energy consumption Establishing regional emissions data systems for low-carbon development pilots Implementing MRV systems for carbon emissions trading pilots	Monitoring the energy transition: Defining goals and indicators, tracking implementation progress	Monitoring new mitigation actions under national emissions reduction plan Tracking effectiveness and co-benefits of renewable energy policies	Measuring the impact of the current U.S. climate policy portfolio Monitoring implementation of GHG emissions limits for large emitters Tracking cost-effectiveness and co-benefits Tracking sub-national climate action

additional analysis is needed to track the effectiveness of renewable energy policies. Tracking the economic co-benefits of renewable energy policies will require additional effort, but the Italian government has substantial existing expertise to draw upon.

United States

With very strong capacity in MRV of emissions, the United States is well-placed to meet new international requirements for tracking emissions and emissions projections. The MRV system required to track facility-level emissions under new GHG regulations seems to be largely already in place.

However, the U.S. will need to extend greater effort to track mitigation actions. Both international and domestic policy processes are demanding more comprehensive, comparable information on the impact of individual policies and the climate policy portfolio as a whole. This poses a significant challenge to current MRV processes, which are scattered across agencies and levels of government. The U.S. can draw on existing expertise and capacity in policy assessment in meeting these new MRV needs, but significant new effort is required to track mitigation in a coordinated way across the full suite of U.S. climate policies.

CPI is working with national governments to address the emerging needs identified here, build required capacity, and draw lessons from experience. We will continue reporting on these efforts to share best practices and lessons learned.

Contents

1 Introduction

Measurement, reporting, and verification (MRV) is a critical component of any country's efforts to mitigate climate change. Strong systems to track greenhouse gas (GHG) emissions and the impact of mitigation actions help policymakers understand how they are progressing toward their climate goals, what their efforts are accomplishing, and which areas require further attention.

In previous reports, CPI has examined MRV systems in four of the major emitters: China, Germany, Italy, and the United States. We focus on these four countries because they face different international obligations and have all made significant — though varied — domestic commitments to climate change mitigation; they are also countries where CPI has on-the-ground expertise. We have described current systems to track emissions and mitigation actions,[3] and assessed how effectively these systems are serving the needs of policymakers and stakeholders.[4]

In this report, we look to the future. What new needs for MRV are emerging from domestic and international policy processes? Based on their current strengths and weaknesses, how well-positioned are these countries to meet their own MRV needs over the next several years?

To understand emerging MRV needs, we examine international and domestic policy processes in each of the four countries. We take a broad view of emerging needs: not only legal requirements, but also demands that arise from policymaker, stakeholder, and public pressure. We then assess how well-positioned each country is to meet its particular MRV challenges, given the strengths and weaknesses of its existing tracking systems. Finally, for each country, we identify areas of strength and priority areas for improvement, where current MRV systems must be strengthened in order to meet emerging needs.

What is MRV?

Measurement, reporting, and verification are three key elements of the policy infrastructure needed to monitor and track performance. Although different terms are used across domestic and international policy discussions, this report defines "MRV" broadly, based on the following concepts:

Measurement refers to direct measurement of emissions, abatement, or some other outcome and to estimation based on proxy indicators or data.

Reporting refers to the presentation and transmission of data, measurements, and associated analysis.

Verification refers to the process of checking the accuracy of the emissions, abatement, and other information that is measured and reported.

We define "MRV system" broadly, to cover any institutions or official processes through which countries measure, report, and verify emissions and mitigation actions.

3 Climate Policy Initiative, "Tracking Emissions and Mitigation Actions: Current Practice."

4 Climate Policy Initiative, "Evaluation of MRV Systems."

2 What are the emerging MRV needs?

In all four countries, international and domestic policy processes are creating new MRV needs. Some are linked to specific statutory requirements; others are less well-defined and arise from broader policymaker, stakeholder, and public pressures and demands. This section describes each country's emerging MRV needs, organized by the source of the MRV needs:

- International MRV requirements through the United Nations Framework Convention on Climate Change (UNFCCC), which apply to all four countries;
- European Union MRV requirements, which apply to Germany and Italy; and
- Domestic policy processes in each country.

2.1 UNFCCC reporting requirements

Parties to the UNFCCC have agreed to new international requirements for MRV of their GHG emissions and climate policies and actions.[5] This section summarizes the new requirements for Annex I parties to the UNFCCC (including Germany, Italy, and the United States) and for non-Annex I parties (including China).

Annex I parties: Biennial reporting on emissions, mitigation actions, and progress toward targets

The most significant new MRV need for Annex I parties to the UNFCCC is the requirement to report more frequently on their mitigation actions and progress toward emissions reduction targets.

Annex I parties will be required to submit biennial reports beginning in January 2014. These biennial reports will include:

- Information on current GHG emissions and projected emissions for 2020 and 2030;
- Information on progress toward climate mitigation goals;
- Information on mitigation actions and their impacts; and
- Documentation of climate-related support provided to developing countries, including financial and technical assistance.

The new reports will supplement parties' National Communications to the UNFCCC, which are the primary mechanism for reporting on mitigation actions and are submitted every four years. Information reported by Annex I parties will be subject to an "international assessment and review" process; this will involve a technical expert review of the biennial reports, as well as a peer review of progress toward emissions reduction goals under the UNFCCC's Subsidiary Body for Implementation.

For Germany, Italy, and the United States, the new biennial reports have greater implications for mitigation action tracking systems than for emissions tracking systems. Annex I parties already prepare annual emissions inventories; the biennial reports will require only summary information based on these. However, biennial reporting on mitigation actions is a substantive change, as Annex I parties currently report on mitigation actions to the UNFCCC only every four years. Parties will not be required to use a consistent methodology to report on the impact of their mitigation actions, but the increased frequency of reporting and external reviews will place additional pressure on parties to systematically track the implementation and outcomes of their mitigation activities. Parties have committed to establish common reporting tables for mitigation actions by the 18th Conference of the Parties (COP18), which will take place in late 2012.[6]

Annex I parties will also be required to clarify their economy-wide emissions reduction targets and report on progress toward those targets. The information requested relates to the assumptions and methodology underlying the target (e.g., base year, gases, and sectors included). Parties are also required to report on their use of international offsets to meet their targets.

5 The new requirements are detailed in Decision 2/CP.17, representing the outcome of the work of the UNFCCC's Ad Hoc Working Group on Long-Term Cooperative Action at the 17th Conference of the Parties in Durban, South Africa, in 2011. This analysis also draws on previous work on this topic by the World Resources Institute and the Center for Climate and Energy Solutions. UNFCCC, "Decision 2/CP.17"; World Resources Institute, "Transparency and Accountability (MRV) in the Durban Climate Deal"; Center for Climate and Energy Solutions, "Verifying Mitigation Efforts in a New Climate Agreement." Parties have also agreed to new reporting requirements for climate finance, which is outside the scope of this report.

6 UNFCCC, "Decision 2/CP.17," 6.

Non-Annex I parties: Biennial reporting on emissions and mitigation actions

For non-Annex I parties to the UNFCCC, the new reporting requirements represent a significant change in international MRV needs. These parties will be required to report much more frequently and promptly on their GHG emissions than they have previously done.

Non-Annex I parties will be required to submit biennial update reports, with the first reports intended to be submitted by December 2014.[7] The biennial update reports are required to include a GHG inventory not more than four years old. Inventories are only required to include CO_2, methane, and nitrous oxide emissions. The new guidelines indicate that inventories should expand to include emissions of fluorinated gases, which are significant in some non-Annex I countries; however, this is not required.[8]

Non-Annex I parties are also encouraged to report on mitigation actions, including implementation status and estimates of the impact of mitigation actions, as well as on international market mechanisms and domestic MRV activities.[9] They are not required to use a common reporting format. The biennial update reports will be subject to a process of "international consultation and analysis," including technical analysis by experts and "a facilitative sharing of views" under the UNFCCC's Subsidiary Body for Implementation.

The new biennial update reports represent a significant expansion in the scope and frequency of MRV requirements under the UNFCCC. Until now, non-Annex I parties have not been required to produce regular inventories, and they have been encouraged, but not required, to provide information on methodologies and on mitigation actions. Producing inventories with no more than a four-year time lag, and producing updates every two years, will represent a dramatic change from current practices for virtually all non-Annex I parties. To date, the large majority of non-Annex I parties have submitted only one or two National Communications, usually with a gap of 7-9 years between them.[10] China has prepared two GHG inventories: one for the year 1994, released in 2004, and one for the year 2005, released in 2012.

The process of international consultation and analysis for the biennial update reports will represent the first formal analysis of information submitted to the UNFCCC by non-Annex I parties. Until now, National Communications from non-Annex I parties have not been reviewed.[11]

2.2 European Union reporting requirements

Additional emissions monitoring under EU Monitoring Mechanism

The EU has proposed a new regulation on monitoring and reporting relevant to climate change, which if passed would revise the GHG Monitoring Mechanism Decision.[12] The proposed revisions would, in large part, formalize reporting requirements that have been agreed to under existing legislation. They are intended to help the EU and its members comply with new and emerging EU and UNFCCC reporting obligations.

The proposed revisions implement a new review and compliance cycle, established under the Effort Sharing Decision, for member states' binding annual emissions targets. They incorporate enhanced reporting on several topics, including land use, land-use change and forestry (LULUCF), maritime transport, climate adaptation, non-CO_2 impacts of aviation, and the use of revenues from auctioning of carbon allowances under the revised EU Emissions Trading System (EU ETS) Directive.[13] They also introduce reporting on financial and technology support provided to developing countries, which would most likely go beyond the new UNFCCC reporting requirements on support.

The revisions require each EU member to establish a national, integrated system for preparing emissions projection scenarios and evaluating policies and measures. Members would be required to clearly lay out the

7 Ibid., 10-11. Least developed countries and small island developing states are exempt from this requirement.

8 Breidenich, "Improving Reporting of National Communications and GHG Inventories by Non-Annex I Parties Under the Climate Convention"; UNFCCC, "Decision 2/CP.17," 39-40.

9 UNFCCC, "Decision 2/CP.17," 41.

10 UNFCCC, "Non-Annex I National Communications."

11 Breidenich, "Measurement, Reporting and Verification in a Post-2012 Climate Agreement."

12 European Commission, "Proposal 2011/0372"; Herold et al., "Review of Decision No 280/2004/EC (Monitoring Mechanism Decision)."

13 European Commission, "Q&A: Monitoring and Reporting of Greenhouse Gas Emissions and Other Climate Action Information."

procedures and institutional arrangements for preparing emissions projections, as they currently do for inventory preparation. The revisions also require member states to check that the activity data, background data, and assumptions used to estimate emissions for GHG inventories are consistent with data used for reporting under legislation related to air pollution.

The new requirements are expected to improve the EU's environmental performance but impose a financial burden on governments.[14] The European Commission estimates the total cost to be €4–5 million for the EU-27, assuming the regulation is implemented efficiently and as described in the current proposal. The most expensive new requirements relate to the expanded reporting requirements on LULUCF.[15]

Revised guidelines under the EU Emissions Trading System

Two new MRV rules are being introduced for the third trading period (2013–2021) of the EU ETS.[16] These new rules are intended to make EU ETS monitoring and reporting of greenhouse gas emissions more complete, accurate, and transparent,[17] and improve comparability across EU members.[18]

The first new rule, on monitoring and reporting, will change some of the requirements for installations that report under the EU ETS but does not significantly change requirements for member states. The second new rule relates to verification: It will allow small emitters (below 25,000 tCO_2e/year) to verify their own emissions rather than requiring third-party verification. This opt-out provision is intended to reduce administrative costs.

In addition to the two new rules, other upcoming EU ETS policy decisions may affect MRV needs for EU member states, including the carbon leakage list and potential changes to the auction timetable.

The carbon leakage list, which determines which installations receive a higher share of free allowances, will be revised in 2014.[19] In 2009, when the Commission compiled the first carbon leakage list, ad-hoc data surveys had to be sent out to member states due to a lack of sufficient data.[20] There does not yet seem to be any process in place to gather the necessary data for the upcoming carbon leakage assessment; EU members will likely need to track indicators and submit data to Eurostat, but the nature and size of the reporting burden will depend on guidance from the Commission.

In addition, the Commission is discussing changing the timetable of allowances auctions to improve the functioning of the carbon market. There seems not to be any process in place to evaluate the impact of this measure on the carbon market, so it is unclear what new MRV needs (if any) it would impose on member states or on the Commission. However, in order for the Commission to assess the effectiveness of this measure, it will need to establish indicators for success and track those indicators over time.[21]

Transparent and consistent implementation by EU members is necessary in order to effectively carry out these changes within the EU ETS.

2.3 Domestic policy processes

2.3.1 China

In China, MRV needs emerge from a wide variety of domestic policy processes, including China's carbon intensity reduction target, its plan to implement control of total energy consumption, and the establishment of low-carbon development and emissions trading pilots.

14 European Commission, "Commission Staff Working Paper: Impact Assessment."

15 Ibid.

16 European Commission, "Climate Change Committee Approves Two Draft Regulations on Monitoring, Reporting and Verification."

17 Taylor, "EU ETS Phase III – Monitoring, Reporting & Verification."

18 The European Commission has also published electronic templates for monitoring emissions from aviation activities, which will reduce the administrative burden associated with reporting and promote a harmonized approach across EU members. The templates are in line with Annexes XIV and XV of the Commission's guidelines for the monitoring and reporting of GHG emissions. European Commission, "EU ETS Data Handling for Phase II (2008-2012)."

19 European Commission, "Amended and Consolidated Version of Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 Establishing a Scheme for Greenhouse Gas Emission Allowance Trading Within the Community and Amending Council Directive 96/61/EC."

20 Ibid.; Juergens, Barreiro-Hurlé, and Vasa, "Identifying Carbon Leakage Sectors in the EU ETS and Implications of Results."

21 European Commission, "Q&A Emissions Trading: Commission Prepares to Change the Time Profile for Auctions of Emission Allowances"; European Commission, "Draft Regulation Amending Regulation No 1031/2010 in Particular to Determine the Volumes of Greenhouse Gas Emission Allowances to Be Auctioned in 2013-2020."

Tracking progress toward carbon intensity reduction targets in the 12th Five-Year Plan

China's central government has set a national carbon intensity reduction target of 40–45% below 2005 levels by 2020 and has recorded that pledge in the international climate negotiations. As a first step toward that target, China, for the first time, set a binding target of a 17% reduction in carbon intensity during the 12th Five-Year Plan (FYP) (2011–2015). This builds on China's previous energy-focused efforts. China first implemented an energy intensity reduction target in the 11th FYP (2006–2010); this was renewed in the 12th FYP and is set at 16%.

The new carbon intensity target indicates that China has officially integrated climate change actions into its economic and social development planning. The 12th FYP divided the country into five regions (based on the level of economic development, sectoral structure, energy-saving potential, environmental capacity, and other factors) and set a specific carbon intensity target for each region. Less developed areas were granted more lenient targets to allow room for economic development. The national energy intensity reduction target was similarly broken down into regions and sectors.

The Chinese government has identified MRV as a key priority: one of the primary objectives of its work plan for controlling GHG emissions is to establish a statistical accounting system to track GHG emissions during the 12th FYP.[22]

Establishing MRV systems to monitor control of total energy consumption

Limits on total energy consumption were proposed for the first time during the 12th FYP. These complement the energy intensity targets: They are intended to limit excessive growth of high energy-consuming industries and contribute to the transformation of China's mode of economic development. Limiting total energy consumption will affect the GDP growth rate, energy structure, energy prices, GDP sectoral structure, migration of high energy-consuming industries, and other important economic and social factors. A fixed target for total energy consumption will encourage local governments to focus on low energy-consuming industries for GDP growth.

The National Energy Bureau has a tentative plan to control consumption of fossil fuels, especially coal. It proposes to verify base-year consumption in each province, then set provincial targets based on projected incremental changes in consumption. Two alternative strategies have also been proposed: 1. direct national control of energy consumption; and 2. limiting total fossil energy consumption as well as the share of fossil energy consumption in total energy consumption.[23]

Establishing regional and local emissions data systems for low-carbon development and emissions trading pilots

Five provinces (Shaanxi, Yunnan, Guangdong, Liaoning, and Hubei) and eight cities (Guiyang, Xiamen, Nanchang, Chongqing, Baoding, Hangzhou, Shenzhen, Tianjin, and Chengdu) were selected in 2010 as low-carbon development pilots. Tianjin and Chongqing are provincial-level cities, and Shenzhen is a national special economic zone located in Guangdong Province. These low-carbon pilots are expected to establish their own regional GHG emissions data accounting and management systems.

China aims to use emissions trading to help realize the 40–45% carbon intensity reduction target in a cost-efficient way. As a first step, pilots are being developed in seven cities: Beijing, Chongqing, Shanghai, Tianjin, Hubei, Guangdong, and Shenzhen.[24] The National Development and Reform Commission (NDRC) requires each piloting region to measure GHG emissions and determine the cap on annual carbon emissions in its jurisdiction, investigate and decide how carbon permits should be allocated, and set up monitoring and registry systems for carbon emissions permit trading in its jurisdiction.[25] Each pilot will design its own trading system; this is a bottom-up counterpart of the top-down approach that disaggregates the national target and assigns responsibility to regions. Plans are currently being developed, and the pilots are expected to perform dry runs in 2013.

22 State Council, "Greenhouse Gas Emission Control Work Plan During the 12th Five-Year Plan."

23 21st Century Business Herald, "The total energy consumption program will be an initial local GDP 'straitjacket'."

24 These cities were selected by the NDRC in late October 2011.

25 National Development and Reform Commission, "Notice of Implementing Carbon Emission Permit Trading Pilots."

2.3.2 Germany

In Germany, the key driver for new MRV needs is the energy transition (*Energiewende*), which aims to transition the country to a low-carbon economy by 2050 and provides the framework for current climate and clean energy policies.[26] Although the ultimate goal of the energy transition is many years in the future, its implementation requires immediate and ongoing efforts to track policy progress.

Monitoring the energy transition

The energy transition sets three types of goals: quantitative (e.g., reducing GHG emissions to 80% below 1990 levels by 2050), regulatory (e.g., improving the approval process for offshore wind farms), and conceptual (the so-called "goal triangle": making the transition reliable, affordable, and environmentally sound).[27] The relevant national ministries are expected to report progress to Parliament through an annual monitoring report and a progress report every three years. This requires the reporting ministries and associated institutions to track a detailed set of indicators.

Energy transition monitoring will track progress against Germany's quantitative, regulatory, and conceptual goals. The annual monitoring report will track a set of indicators for the energy transition's quantitative goals, including progress indicators for reducing emissions and energy consumption, and increasing the share of renewables.[28] The indicators were developed through collaboration amongst the relevant government agencies with public and expert input.

For regulatory goals, Germany needs to track the implementation of the relevant energy and climate laws, as well as their impact on renewable energy deployment, grid expansion, and energy efficiency improvements at the sectoral level. Tracking regulatory effectiveness will be essential to achieving the transition's quantitative goals.

For the conceptual goals, Germany needs to develop a methodology to assess the quality of implementation of the energy transition. The "goal triangle" requires the government to clearly define reliability, affordability, and environmental soundness; these definitions will help Germany evaluate the effectiveness of individual measures and the portfolio as a whole. This will require new tracking efforts, including long-term cost-effectiveness and co-benefits such as employment (affordability), data on grid expansion and load management (reliability), and environmental effects (environmental soundness).

In the three-yearly progress report, the coordinating reporting ministries are expected to illustrate trends and compare Germany's performance to the qualitative and quantitative goals of the energy transition.[29] The report will describe and evaluate the status of implementation of policy measures and allow for deeper assessment, potentially using statistical analysis. The report will analyze causes and barriers for the performance of measures, and will recommend changes to better achieve the energy transition goals. To be able to effectively illustrate policy success, the progress report needs to include a credible set of indicators that can be tracked simply and cost-effectively, as well as analysis detailed enough to show how policies could be improved.

2.3.3 Italy

Italy may face new tracking requirements associated with the National Plan for the Reduction of GHG Emissions, approved in April 2012.[30] Short-term plans for design and adoption of new MRV procedures are focused on improving renewable energy monitoring.

26 The energy transition was implemented in 2011 and builds on earlier climate and energy programs, most recently the Integrated Energy and Climate Program (IEKP).

27 The IEKP measures are incorporated in the energy transition goals, and there will be no separate IEKP monitoring. BMWi, "Monitoring Process Energy of the Future"; BMWi and BMU, "10-point Immediate Action Program for Energy Plan"; ZEW, "A Concept for Monitoring Energy Policy Achievements"; German Parliament, "Small Inquiry: Monitoring of the Energy Transition (Monitoring der Energiewende - 17/10315)." See also UBA, Economic Effects of Energy and Climate Policies 1995-2011 (Gesamtwirtschaftliche Effekte Energie- Und Klimapolitischer Maßnahmen Der Jahre 1995 Bis 2011).

28 These are indicators with regard to the development of energy supply, energy efficiency, renewables, power plants, grid infrastructure, GHG emissions, energy prices and costs, and macroeconomic impacts. Germany will also track indicators on the social dimension, jobs, and other co-benefits of the energy transition. BMU and BMWi, "Monitoring Der Zukunft - Indikatoren Zur Öffentlichen Diskussion"; German Parliament, "Small Inquiry: Monitoring of the Energy Transition (Monitoring der Energiewende - 17/10315)."

29 BMWi, "Monitoring Process Energy of the Future."

30 MATTM, "Proposta Di Delibera CIPE."

Monitoring new mitigation actions under the National Plan for the Reduction of GHG Emissions

The national plan sets emissions targets and additional mitigation actions through 2020. Once approved by the Inter-Ministerial Committee for Economic Planning (CIPE),[31] its effectiveness will ultimately depend on the adoption of associated policies and enforcement through regulation.[32]

Reporting activities explicitly mentioned in the plan include updated emissions scenarios (reference and "with measures") out to 2030, updated emissions (and related) targets and gaps, and evaluation of the status of implementation of new mitigation actions. These will be included in an annual submission to the Technical Committee on Emissions and published in the Economic and Financial Document.[33]

In addition, the plan's proposed mitigation actions may bring monitoring needs not explicitly mentioned in the legislation. The white certificates system is being extended to industrial processes and energy efficiency projects in the transport sector, a "catalogue" of low-carbon technologies that will benefit from the 55% tax reimbursement will be established and updated on a yearly basis, and a carbon tax is being introduced to target sectors not covered by the EU-ETS.

Tracking progress toward renewable energy targets

Italy's 2011 legislative decree on the promotion of renewable energy sets an agenda to 2020[34] that defines the required policy instruments, mechanisms, and incentives, and the institutional, regulatory, and financial framework. A regional expert group within the Italian Energy Services Operator (GSE) has been established to develop methodologies to monitor progress toward renewable energy targets at the regional level by the end of 2012.[35]

The decree requires that the GSE establish a national system to monitor renewable energy, with data at the regional and national level.[36] For this purpose, at the end of 2011, the GSE launched the online platform SIMERI,[37] which currently covers the electricity sector at the regional and national level, and transport and heating and cooling sectors at the national level.

The decree also provides that the GSE develop appropriate methodologies and report every two years on occupational and economic/industrial benefits related to the promotion of renewable energy and energy efficiency, as well as the costs and effectiveness of the measures implemented.[38]

2.3.4 United States

While new international MRV needs are clear, the domestic drivers of emerging MRV needs in the United States are more diffuse than in the other countries in this study. The U.S. does not have a comprehensive national climate policy framework, as the other three countries in this study do. Federal mitigation actions are dispersed among several agencies, and while the federal government is beginning to limit GHG emissions through regulation, it remains possible that this regulation will be replaced or supplemented by future national climate legislation. Many states are also implementing their own mitigation actions.

In this context, our analysis of emerging needs is based not only on existing statutory requirements, but also on the information needed to support the ongoing domestic policy and political debate.

Measuring the impact of the current U.S. climate policy portfolio

The United States' broad climate and clean energy goals, coupled with a decentralized set of current policies, create pressure for greater consistency and comprehensiveness in climate reporting.

31 Provisions from the Ministry of Economy and Finance will need to be taken into consideration.

32 Technical Committee on Emissions, personal communication, April 2012.

33 The Economic and Financial Document (Documento di Economia e Finanza) was launched in 2011 to align the economic and budgetary policy of EU member states, by conforming and articulating national policy documentation and political processes. Law 39/2011 provides for an annex to the document reporting on the status of implementation of emissions reduction measures. Camera dei Deputati e Senato della Repubblica, "Legge Del 7 Aprile 2011, N. 39."

34 Gazzetta Ufficiale, "Decreto Legislativo 3 Marzo 2011 , N. 28." This implements Directive 2009/28/EC.

35 Lato, "Energie Rinnovabili Monitoraggio e Informazione."

36 Gazzetta Ufficiale, "Decreto Legislativo 3 Marzo 2011 , N. 28," sec. 40.1.

37 Available on GSE's website: http://approfondimenti.gse.it/approfondimenti/Simeri/Monitoraggio/Pagine/C1.aspx

38 Gazzetta Ufficiale, "Decreto Legislativo 3 Marzo 2011 , N. 28," sec. 40.3.

Internationally, the United States has committed to reducing GHG emissions by 17% below 2005 levels by 2020. Domestically, the Obama administration has prioritized clean energy and climate policy and has also made transparency in government a general priority.[39] Meeting these commitments will require more information on the impact of individual policies and the climate policy portfolio as a whole.

The continuing evolution of the U.S. climate policy landscape underlines the need for more comparable and complete tracking of the current policy portfolio. Congress and executive agencies will be much better-positioned to consider options for future policy if they have a cohesive picture of how well current climate policies are performing.

Tracking cost-effectiveness and co-benefits

The federal budget deficit is a central concern in U.S. politics and is producing greater demand for information on the cost-effectiveness and economic impact of policies. Recent debate has focused on the United States' loan guarantee program for renewable energy companies, as well as on the methods used to count "green jobs" associated with particular climate and energy policy measures.[40] Congress' willingness to continue authorizing and funding these policies could depend on the availability of reliable information on their economic impacts and cost-effectiveness.

Monitoring implementation of GHG emissions limits for large emitters

The U.S. Environmental Protection Agency (EPA) has begun issuing regulations limiting GHG emissions from new and modified facilities with annual GHG emissions over specified thresholds.[41] Additional regulations for both new and existing sources are forthcoming.

When fully implemented, these regulations will require states to limit GHG emissions from covered facilities and will require EPA to assess whether states and facilities are complying. The data requirements for enforcement depend on what form the regulations ultimately take. In principle, controlling emissions may require little new data collection, since facility-level emissions data are already reported under the GHG reporting rule.[42] However, as reporting becomes linked to regulatory controls, EPA will face increased pressure to show robust verification of data.

Tracking sub-national climate action

In the absence of comprehensive federal climate policy, many U.S. states and regions are setting their own targets and taking action to mitigate GHG emissions.[43] The growth in sub-national action creates two new MRV needs for the federal government: accounting more fully for sub-national action in order to make national climate reporting more transparent and comprehensive, and assessing sub-national mitigation actions in a comparable manner to inform development of federal climate policy.

The individual and cumulative impact of sub-national action is significant. For example, the state of California, which accounts for approximately 8% of U.S. emissions,[44] has adopted broad climate change legislation mandating that the state reduce its emissions to 1990 levels by 2020.[45] The effects of California's and other states' mitigation actions are captured in aggregate in the U.S. GHG inventory and in facility-level emissions reporting. However, the GHG inventory does not give a state-by-state picture, and even facility-level emissions reporting does not show how emissions reductions are linked to particular policies. The National Communication to the UNFCCC — the most comprehensive picture of U.S. mitigation actions, for both international and domestic purposes — mentions California's climate policy but does not include an estimate of its impact on emissions.

39 Orszag, "Open Government Directive."

40 See, for example, Geman, "Energy Department Report Says Green Power Grants Created up to 75,000 Annual Jobs"; Yehle, "Green Jobs: New GOP Report Casts Stimulus Program Obama Touts as a Bust."

41 The threshold is 75,000 or 100,000 tCO_2e per year for different facilities. EPA, "Carbon Pollution Standard for New Power Plants."

42 EPA, "Regulatory Impact Analysis for the Proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units."

43 As of August 2012, 24 of 50 states had set emissions targets, 39 had implemented climate action plans, and 15 had set emissions performance standards or emissions trading systems for the power sector. Center for Climate and Energy Solutions, "Climate Change 101: State Action"; Center for Climate and Energy Solutions, "Table of All State Initiatives."

44 California Air Resources Board, "California Greenhouse Gas Inventory for 2000-2009"; EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010."

45 California Air Resources Board, "Assembly Bill 32: Global Warming Solutions Act." The target is equivalent to a 12% reduction from 2005 levels.

The continuing development of federal climate policy will require a more thorough picture of state climate action. As EPA moves forward with regulation of GHG emissions, it may allow states with existing mitigation actions to use those policies to meet the new emissions standards, rather than create new programs. In this case, EPA would need to assess the mitigation impact of state-level policies in a reliable and comparable way, to determine whether those policies achieve equivalent emissions reductions to the federal standard.[46] In addition, if the federal government moves forward with comprehensive climate policy in the future, it will be better positioned to learn from and complement state policy by having more extensive, comparable information on state actions.

2.4 Summary of emerging MRV needs

Table 1 summarizes the emerging MRV needs identified for each country in this section.

Table 1: Emerging MRV needs

	CHINA	GERMANY	ITALY	UNITED STATES
INTERNATIONAL	Biennial updates to GHG inventory Biennial reporting on mitigation actions	Biennial reporting on progress toward climate mitigation goals Biennial reporting on mitigation actions		
REGIONAL		Meeting new requirements for preparing emissions projections Expanded reporting on land use, land-use change and forestry (LULUCF), aviation, and other areas		
DOMESTIC	Tracking progress toward carbon intensity reduction targets in the 12th Five-Year Plan Establishing MRV systems to monitor control of total energy consumption Establishing regional emissions data systems for low-carbon development pilots Implementing MRV systems for carbon emissions trading pilots	Monitoring the energy transition: Defining goals and indicators, tracking implementation progress	Monitoring new mitigation actions under national emissions reduction plan Tracking effectiveness and co-benefits of renewable energy policies	Measuring the impact of the current U.S. climate policy portfolio Monitoring implementation of GHG emissions limits for large emitters Tracking cost-effectiveness and co-benefits Tracking sub-national climate action

46 Monast et al., "Regulating Greenhouse Gas Emissions From Existing Sources: Section 111(d) and State Equivalency."

3 Are countries prepared to meet emerging MRV needs?

Some emerging MRV needs draw on aspects of current national systems that are already very strong; countries will be able to meet these without significant new effort. In other cases, emerging needs impose pressures where current systems are weak. In this section, we assess the fit between emerging needs and current MRV systems, identifying where countries are well-positioned and where further effort is required.

3.1 China

China's existing annual progress report puts it in a good position to report internationally on its mitigation actions. Biennial reporting on emissions poses a bigger challenge, as it represents a significant shift in frequency from current practice. Expanding capacity to track energy and GHG emissions beyond the national to the sub-national level is a high priority, as China is devolving greater responsibility to meet energy and carbon reduction goals to regional and local governments. Improving the reliability and comparability of sub-national MRV systems will be crucial to the successful implementation of emissions trading.

Capacity for tracking GHG emissions and mitigation actions needs to be enhanced to meet international reporting requirements.

Biennial inventory reporting will pose a challenge for China. Under the new UNFCCC guidelines for biennial reporting, China is being asked to report on its emissions much more frequently and with a shorter delay. To date, timeliness has been a weak point in China's emissions tracking efforts: China's first emissions inventory was produced with a 10-year lag, and the second with a 7-year lag from the year reported on. China has significantly improved its capacity through preparation of its second National Communication, but it has more to do.

China will also report to the UNFCCC more frequently and in more detail on its mitigation actions, including reporting on the methods it uses to project the impact of mitigation actions. In general, it is well-placed to meet this need. China prepares annual progress reports for its portfolio of mitigation actions; this provides a strong basis for its biennial update reports. However, transparency about the methods used to assess policy progress could be improved; this has been weak in annual progress reports to date.

Monitoring progress toward carbon and energy intensity goals in the 12th FYP requires better administrative coordination and improvements in the energy statistics system.

China's Statistics Indicators, Monitoring, and Examination (SME) system was a critical tool to monitor progress toward the national energy intensity reduction target in the 11th FYP. Better enforcement will be important to enable achievement of the 16% energy intensity reduction target in the 12th FYP. For example, mandatory reporting of energy use by key energy-consuming enterprises (as required under China's Energy Conservation Law) was weakly enforced during the 11th FYP. Energy statistics for the tertiary sector also need to be improved — existing statistics are particularly weak in the buildings sector, where data collection usually only takes place every five years.

China needs to integrate its different national MRV systems to track progress toward climate and energy goals in a coordinated way. Multiple institutions are involved in developing and implementing climate-related MRV systems: The NDRC's Energy Conservation Department leads development and implementation of the SME system, while the NDRC's Climate Change Department is responsible for designing a system for the carbon intensity reduction target. Because these targets are closely connected, good coordination or integration will help minimize administrative and regulatory costs.

To track progress toward national goals, China needs to build capacity to track energy data and GHG emissions at the sub-national level.

China devolves much of the responsibility for reducing energy use and emissions to the regions and provinces. The SME system plays a central role in tracking national and sub-national progress towards energy-intensity goals; China needs an SME-like system to track GHG emissions and progress towards its carbon-intensity goals. This would support China's mitigation efforts by providing information to help monitor policy implementation and evaluate the outcomes of policies.

A key first step is to establish national and provincial GHG inventories. Building on its improved national capacity, China is training local officials on provincial inventory preparation. All provinces are expected to prepare provincial GHG inventories for the year 2005; this will provide a baseline for tracking provincial-level progress toward the national carbon intensity target.

Provincial capacity building is also needed to improve data quality. The sum of provincial energy data usually does not match national energy data. While this can be partly explained by flaws in statistical methods (provincial statistics generally double-count energy flow in and out of provincial borders), it also reflects that provinces lack the capacity to balance energy data. The National Bureau of Statistics has comprehensive information and abundant personnel to prepare energy statistics, whereas bureaus at the local level have very limited capacity.

Emissions trading requires a sophisticated MRV regime, which China is working to build.

Reliability, comparability, and transparency are fundamental characteristics for an MRV system to support emissions trading. While still in the early stages of developing its pilots, China is working to build this MRV capacity and is drawing on overseas experience and expertise to help.

The NDRC leads development of China's carbon emissions permit trading. A separate entity will perform verification functions; an independent auditor accredited by the NDRC (or the trading executive board) is expected to verify and validate whether projects have achieved planned GHG emissions reductions. Financial institutions, such as China's bank or securities regulatory commissions, are also expected to contribute to building a transparent MRV system. Finally, grid operators, metering companies, and sectoral associations will be important in providing practical expert knowledge on technical topics, although it is not yet clear to what extent these entities will be involved in MRV activities.

Detailed enterprise-level reporting requirements are still being developed. These will need to cover issues including emissions monitoring systems, installation boundaries, accuracy levels to be reached, emissions and oxidation factors, and quality control/quality assurance.

Pilot regions will need to develop legislation to support monitoring, reporting, accreditation, and verification activities. This legislation would set the obligations for enterprises and/or installations to hold and update permits, to report emissions, and to let a designated entity verify emissions. It would also foresee more specific guidelines and rules for monitoring, reporting, accreditation, and verification. Legislation will also need to put penalties in place to ensure compliance.

3.2 Germany

Germany is well-placed to meet new requirements emerging from the UNFCCC and EU: Most are less stringent than Germany's existing practices, or are in areas where Germany's existing MRV system is strong.[47]

Many of the MRV systems required to monitor Germany's energy transition are in place, although some additional effort will be required to clearly define goals and indicators and to monitor details of policy implementation. Comparability is a priority area for improvement: Germany needs to revise methods for tracking its mitigation actions — particularly energy efficiency policies — so results can be reported in a comparable manner across all programs.

Germany is well-positioned to meet new UNFCCC reporting requirements.

Germany's strong GHG inventory system[48] puts it in a good position to meet UNFCCC requirements for biennial inventories. Germany is responsive to the annual international expert reviews and constantly improves its inventory system.[49] Reporting of mitigation actions requires greater effort, but Germany builds on strong foundations, including past evaluation of the Integrated Energy and Climate Program (IEKP)[50] and systems established to track progress of the energy transition.

47 Data on financing of climate assets that enable mitigation and adaptation activities are scarce and not systematically tracked. While not within the scope of this report, CPI is currently researching public and private finance flows in climate assets in Germany. Climate Policy Initiative, "The German Climate Finance Landscape" (forthcoming).

48 Climate Policy Initiative, "Evaluation of MRV Systems."

49 UNFCCC, Germany. Report of the Individual Review of the Annual Submission of Germany Submitted in 2011. FCCC/ARR/2012/DEU.

50 In addition to the UBA's IEKP status report (discussed in Climate Policy Initiative, "Tracking Emissions and Mitigation Actions: Current Practice," 20), a consortium of research institutes has analyzed the mitigation actions of the IEKP in depth; however, the consortium's findings were not published.

Germany is well-positioned to meet new EU MRV requirements.

Germany's existing domestic MRV systems exceed EU requirements.[51] Germany prepares emissions projections for 2030 taking into account implemented and additional measures; these are the basis for its EU Monitoring Mechanism submission.[52] However, Germany could improve the timeliness of its submissions to the European Commission.

Action taken now to improve industrial activity data would help inform the 2014 revision of the carbon leakage list. In order to enable effective assessment of carbon leakage, Germany will need to start collecting timely data on gross value added, annual turnover, and trade (import/export by value) data by industry installations included in the EU ETS. The European Commission may support this process and lessen the burden on member states by specifying and harmonizing data requirements, as well as by engaging Eurostat in the data collection process.

Germany is well equipped to fulfill new requirements for enhanced reporting on maritime transport and on LULUCF, judging from past in-depth reviews of the national inventory, its proven capacity to improve methods, and its access to multi-country expert groups.[53]

Tracking the progress of Germany's energy transition will require greater institutional coordination and some expansion of existing MRV systems.

Government agencies already track most of the data required to monitor annual progress of the energy transition.[54] Germany can draw on strong methodological and institutional capacity in developing relevant policy-specific indicators to evaluate the effectiveness of individual policy instruments; these will complement the high-level indicators already in place. The evaluation criteria used to monitor the IEKP provide a good starting point.[55]

Institutional coordination is important to ensure MRV efforts are comparable and useful. The Ministry of Economics (BMWi) and the Ministry for the Environment (BMU) have established three new discussion forums — the Grid Platform, the Power Forum (for new power plants), and the Renewable Energies Platform — to find consensus between relevant ministries, the Federal Network Agency (BNetzA), German States, civil society, and industry on pre-implementation planning. These could also prove to be useful platforms to identify gaps in existing MRV systems, agree on indicators to track measures after their implementation, and inform ongoing policy reform.

For example, the Power Forum is considering available power generation capacities, likely new developments, and how to identify and remove investment barriers for necessary power capacities.[56] To address the first two topics, BNetzA compiled a publicly available spreadsheet showing the capacity of current power generating plants above 10 MW and the capacity of plants above 5 MW to be added and to be decommissioned in coming years.[57] This process has identified where new MRV efforts are required to address data gaps on investment barriers and track progress in removing those barriers.

Existing energy statistics systems need to evolve in response to changes in Germany's technology mix and energy market. The current energy statistics law does not include power plants below 10 MW capacity. As small-scale renewables such as photovoltaics and biomass make up a growing share of German power generation, information from the Federal Statistical Office increasingly needs to be supplemented by data from other

51 Germany has recently issued a report covering the experience of auctioning EU allowances over the past five years. See, for example, Dehst, "Versteigerung Von Emissionsberechtigungen in Deutschland: Auswertungen Und Hintergründe Aus Fünf Jahren Verkauf Und Versteigerung Am Übergang Zur Dritten Handelsperiode Des EU-Emissionshandels."

52 Matthes, "Zwischenergebnisse Aus Den Modellierungsarbeiten Im Projekt 'Politikszenarien Für Den Klimaschutz VI'."

53 Climate Policy Initiative, "Evaluation of MRV Systems."

54 For instance, the Working Group on Energy Balances, the Federal Statistical Office, the Federal Network Agency, the Federal Environment Agency, the Federal Cartel Office (Competition Authority), and the Federal Office of Economics and Export Control. Climate Policy Initiative, "Tracking Emissions and Mitigation Actions: Current Practice," 28.

55 German Parliament, "Small Inquiry: Monitoring of the Energy Transition (Monitoring der Energiewende - 17/10315)"; BMU, "Energy Transition - Energy Concept Monitoring."

56 BMWi, "Die Energiewende in Deutschland," 28.

57 The German Association of Energy and Water Industries (BDEW) has independently released a list of power generating plants above 20 MW, which includes plants that are in the approval process. Previously, the Federal Environment Industry (UBA) has issued a list of all power plants above 100 MW. BDEW, "Power Plant List (Kraftwerksliste)"; UBA, "Kraftwerksliste."

institutions to provide a comprehensive picture of energy supply.[58]

Energy market monitoring systems also need to be updated.[59] For instance, due to a lack of flexibility in the energy statistics law, current data collection practices cannot be used to track the changes in Germany's energy market structure towards liberalization, or to show compliance with international environmental and climate policy monitoring requirements. Data-gathering institutions, such as the Federal Statistical Office, Working Group on Energy Balances, and statistical advisory council, are currently discussing ways to improve the energy statistics law.

With its increasing focus on energy efficiency, Germany needs to better coordinate analysis and methodologies across government. Different ministries currently commission separate analyses of energy efficiency programs in buildings, transport, products, and industrial technologies; results can be difficult to compare because the studies use different methods. Better coordination could save time and effort and deliver more useful outcomes. For instance, such coordination would be important to evaluate the impact of energy management systems that allow for a continuation of the reduced energy tax rate for large manufacturing facilities.[60] This coordination is not yet happening. Some elements are already in place (for example, the Federal Bureau of Energy Efficiency has issued a Methodological Accompanying Document to the Second National Energy Efficiency Action Plan[61]), but systems need to be updated to incorporate new policies and measures and to quantify the measures' individual and aggregate effect on emissions.

Overall, Germany is well on its way to meeting the new and expanded MRV needs created by the energy transition. Current efforts to define indicators, adapt statistical systems to collect the required information, coordinate across agencies and stakeholders, and report on progress will help Germany better assess the actual impacts and cost-effectiveness of its policies and measures over time. This lays the foundation for a reliable, affordable, and environmentally sound energy system.

58 German Parliament, "Small Inquiry: Monitoring of the Energy Transition (Monitoring der Energiewende - 17/10315)."

59 Bayer, "Sich ständig wandelnde Energiemärkte"; German Parliament, "Small Inquiry: Monitoring of the Energy Transition (Monitoring der Energiewende - 17/10315)."

60 Eichhammer et al., "Improving Energy Efficiency in Exchange for Energy Tax Exemptions (Verbesserung Der Energieeffizienz Als Gegenleistung Für Vergünstigungen Bei Der Energiebesteuerung)."

61 BMWi, "Die Energiewende in Deutschland."

3.3 Italy

Italy is well-placed to meet emerging UNFCCC and EU reporting requirements through existing MRV processes, although resource constraints within the national government may create challenges in expanding the preparation of emissions projections and improving transparency on methods.

Italy is also generally well-prepared to track implementation of its new national plan for reducing emissions. Existing capacity to monitor policy impacts is strong, particularly for energy efficiency policies. For renewable energy policies, some additional effort is required to monitor policy effectiveness. Tracking economic co-benefits for renewable energy policies will also require additional effort, but the Italian government has substantial existing expertise to draw on.

Italy is in line to meet new UNFCCC reporting requirements.

New international requirements will not be a significant burden for Italy, which already prepares annual GHG inventories and biennial reports on mitigation actions to the EU. The main area for improvement is transparency of methods related to inventory data collection (in particular with regard to the energy balance) and mitigation action analysis.

For the inventory, new UNFCCC requirements are largely being addressed at the EU level,[62] and new UNFCCC reporting software will be provided in 2014 to help countries adjust submissions and modify their inventories.[63] Italy has been planning for these methodological updates; some of the expected changes have already been introduced through the implementation of 2006 IPCC guidelines. As a result, the new methodological requirements should not constitute a burden on the existing MRV system, except for the recalculations needed to adapt scenarios and previous years' estimates to the changes in the inventory.[64] However, with simultaneous submissions under the UNFCCC and Kyoto Protocol and

62 Through the revised Monitoring Mechanism Decision (Decision 280/2004/EC).

63 Ispra, personal communication, April 2012.

64 Ispra, personal communication, April 2012.

the new reporting related to 2020 commitments in 2014, Italy's inventory preparation capacity will temporarily be strained.[65]

EU revisions will require additional institutional coordination, but no major new MRV activities.

Italy's recent improvements to its land use inventory make it well prepared for the new EU Monitoring Mechanism requirements. The aviation sector will require more effort, but the EU is taking steps to reduce the burden on national governments.[66] Italy needs to establish an integrated national system for preparing emissions scenarios. Italy has strong technical capabilities in this area: the Institute of Environmental Protection and Research (Ispra) and the Agency for New Technologies, Energy, and the Environment (ENEA) already prepare scenarios and have a strong modeling capacity in this field. However, Italy will need to clarify tasks and allocate responsibilities among agencies.[67]

Domestic regulations will require expanded efforts to track individual mitigation actions.

The new measures envisioned in the National Plan for the Reduction of GHG Emissions may require some new monitoring efforts, but in general the national MRV system is well placed to meet emerging needs.

ENEA will need to expand existing MRV systems to support extension of White Certificates to new sectors. In particular, ENEA needs to prepare evaluation methodologies for newly eligible energy efficiency measures and may need to scale up on-site checks.[68] The 55% tax reimbursement for low-carbon technologies also draws on existing systems: While new methodologies to assess the GHG abatement potential of technologies are required, verification functions will be carried out by the Fiscal Police in the context of standard fiscal checks.[69] Italy needs to expand current post-implementation evaluation of policy impacts for the new annual submissions to the Technical Committee on Emissions.

For renewable energy, there is already an effective system in place to monitor deployment nationally and regionally. However, in order to meet the legislative requirement of monitoring policy effectiveness, additional analysis is required to estimate the impact of specific financial incentives on deployment levels in a transparent, comparable manner.

The GSE has not yet implemented reporting on employment and economic benefits. However, work is underway, drawing on the agency's existing capacity to evaluate economic co-benefits,[70] and a project was recently launched to develop a new methodology. Monitoring will rely on existing reporting on renewable energy deployment (such as the online SIMERI platform) and industry surveys.[71]

3.4 United States

With strong capacity in MRV of emissions, the United States is well-placed to meet new international reporting requirements for emissions and emissions projections. The U.S. has already implemented a strong MRV system to track facility-level emissions that could meet the MRV needs associated with new national GHG regulations.

Greater effort is required to track mitigation actions. Even a very well-developed system to track emissions does not by itself provide a basis to assess the effectiveness of specific policies. Existing systems to track mitigation actions are not adequate to meet emerging domestic and international demands for more complete, timely, transparent, and comparable reporting on the U.S. climate policy portfolio. Tracking sub-national climate actions poses an additional challenge. Nevertheless, the U.S. can draw on substantial existing expertise and capacity to improve these systems.

65 Ispra, personal communication, April 2012.

66 European Commission, "Commission Staff Working Paper: Impact Assessment."

67 Ispra, personal communication, April 2012.

68 Monitoring of Green Certificates is less complex, as it is only based on the energy produced.

69 ENEA, personal communication, April 2012.

70 GSE did similar analysis in a 2010 study involving 128 enterprises participating in a project offering renewable energy companies access to a website to promote their products. Gilardoni and Carta, "Profilo e prospettive dell'industria italiana delle rinnovabili."

71 Additional capacity is already being planned in terms of the establishment of two periodical observatories on employment and technology cost and employment. Lato, "Monitoraggio, Gestione Degli Incentivi Ed Evoluzione Normativa."

The United States is well-placed to meet new international requirements for emissions reporting.

The new UNFCCC biennial reports create no new needs in terms of tracking emissions, as the U.S. already produces highly transparent and reliable annual GHG inventories. However, the U.S. will need to prepare more frequent long-term emissions projections for non-energy-related emissions. While the Energy Information Administration develops energy-related emissions projections every year, the EPA and Department of Agriculture currently only prepare non-energy sector projections every four years for the National Communication.

The U.S. needs to increase the frequency and coverage of reporting on its mitigation actions, including post-implementation impact assessment.

In order to meet both domestic and international policy needs, the federal government will need to devote more resources to tracking progress toward national climate and clean energy goals. More extensive reporting on the impact and effectiveness of the climate policy portfolio are needed in order to fulfill the Obama administration's domestic policy commitments and lay the groundwork for future climate policy decisions.

The National Communication to the UNFCCC, submitted every 4-5 years, is currently the only document in which the U.S. comprehensively reports on mitigation actions and their impact. To date, mitigation estimates have been generated independently by agencies, often using different methods, and the National Communication has not provided details of the methods used. For some policies, no mitigation estimates are provided.

Biennial reporting will challenge the United States to report more rigorously and comprehensively, and may warrant a more systematic and coordinated approach to policy tracking, evaluation, and reporting. Key areas for improvement include publishing more detailed information on the methods, data, and assumptions used to produce mitigation estimates; adopting a unified baseline for measuring the impact of federal policies, using consistent emissions factors and assumptions about economic growth and technological improvements; and handling policy interactions clearly (avoiding double counting where possible, and where not, presenting the aggregate impact of a group of overlapping policies and clearly explaining how the policies interact).

Making mitigation estimates across agencies more consistent and transparent is a sizable task. However, the U.S. has strong capabilities and institutions to draw on. Agencies typically undertake extensive analysis of new regulations before implementation, and emissions tracking systems are rigorous and transparent.

Assessing cost-effectiveness and economic impact is difficult but increasingly important.

Given sustained concerns with the federal budget, the U.S. needs to increase post-implementation assessment of climate policies' economic impacts and cost-effectiveness. This information will be crucial to future policy debates.

While this analysis can be challenging, the U.S. government has strong relevant analytic capabilities and institutions. For example, U.S. agencies conduct extensive prospective analysis of the costs and benefits of regulations.[72] This could be extended with post-implementation analysis of actual impacts on emissions and costs. Existing annual budget requests and agency reporting that provide good information on government spending are starting points to identify and track program outcomes. New methods or guidelines will be required, as there are currently no standard methods for post-implementation analysis of economic impact.

Current MRV systems are well-placed for monitoring GHG emissions limits for large emitters.

When EPA begins to enforce compliance with regulatory GHG emissions limits, more pressure will fall on verification systems to ensure that reporters are submitting accurate information. However, current systems are

72 U.S. Office of Management and Budget, "OIRA Reports to Congress"; Congressional Budget Office, "Our Work." New legislation and regulation regularly undergoes analysis of cost-effectiveness and economic impact prior to implementation; see, for example, EPA's analysis of the impact of proposed GHG limits for new power plants. EPA, "Regulatory Impact Analysis for the Proposed Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units"; U.S. Office of Management and Budget, "OIRA Reports to Congress." The nonpartisan Congressional Budget Office has also undertaken prospective analysis of the impact of broad climate policies on the U.S. economy; see, for example, Congressional Budget Office, How Policies to Reduce Greenhouse Gas Emissions Could Affect Employment.

well-placed to handle this new need, as long as sufficient resources are available. The United States already tracks facility-level emissions from large facilities, including those covered under new GHG limits for large emitters, and the GHG reporting program includes penalties for false reporting or not reporting. EPA and states already verify compliance with emissions limits for other air pollutants.

Comparable reporting on sub-national climate action may not be feasible, but aggregation of state reporting would help meet policy needs.

With states playing an important role in U.S. climate action, the U.S. needs to improve systems to track implementation and impacts of state policies. Fleshing out descriptions of U.S. climate action with more robust information on sub-national action would make U.S. reports to the UNFCCC more complete. Improving federal tracking of sub-national policy will also be necessary to strengthen the linkage between federal and state policies as EPA develops and implements new GHG regulations.

The federal government already conducts some tracking of sub-national emissions and climate policy. EPA provides detailed guidance for states to prepare their own inventories,[73] and the Energy Information Administration publishes state-level inventories of energy-related GHG emissions. The United States' most recent National Communication to the UNFCCC describes state, regional, and local climate actions, and reports estimated mitigation impact for some individual programs, although it is not comprehensive.[74] Within the energy sector, the Department of Energy maintains a database of state and local energy efficiency and renewable energy policies.[75] EPA also compiles best-practice case studies and program evaluation resources for states.[76] New systems could build off this foundation.

In developing a more complete picture of U.S. action, the federal government could also draw on existing state-level MRV systems. However, comparability will remain a major challenge. Methods for estimating the impact of policies vary even among federal agencies, so it does not seem feasible (at least in the near term) for federal agencies to compile harmonized data on sub-national mitigation actions. This suggests EPA may need to do some state-by-state analysis of existing policies and measures to determine their equivalence to new federal standards.

73 EPA, "Developing a Greenhouse Gas Inventory."

74 U.S. Department of State, U.S. Climate Action Report 2010, 61-64.

75 The Database of State Incentive for Renewables & Efficiency (DSIRE) is publicly accessible at http://www.dsireusa.org/. It includes detailed information on state and local energy efficiency and renewable energy policy design, but does not include any measures of program impact.

76 EPA, "State Climate and Energy Program."

4 Conclusion

For all four countries in our study, emerging international reporting requirements will require more frequent reporting and often more comparable information. Domestic policy dynamics are more varied. All four countries are working toward improving methods to evaluate and report the impact of mitigation actions. Budget pressures are increasing the focus on cost-effectiveness and economic impacts in Italy and the United States. In China and the United States, sub-national governments are playing an important role in climate policy, and better information on sub-national emissions and mitigation actions is important to support national policy efforts.

Based on this analysis of emerging MRV demands, as well as our assessment of strengths and weaknesses in current MRV systems, we find that in some cases, new MRV needs play to countries' strengths, leaving them well-placed to meet emerging demands. However, in other areas, new MRV needs relate to areas where countries are already struggling; here, countries need to start working immediately to build capacity and develop new systems.

Table 2 identifies which new needs are likely to be met relatively easily by existing MRV systems, and which are priorities for near-term effort and capacity building.

CPI is already working with the countries in this study to understand and improve their MRV system capacities.[77] We hope to expand this work in the future and will continue reporting on these efforts to share best practices and lessons learned.

Table 2: Capacity to Meet Emerging Needs

CHINA	**Well-positioned:** • (Mitigation actions) Regular reporting on mitigation actions as part of biennial update reports to UNFCCC **Priorities for further development:** • (Emissions) Preparing more frequent and timely national GHG inventories • (Emissions) Strengthening the reliability of sub-national and sectoral energy and emissions tracking systems, including establishing special working and basic statistics teams for GHG emissions accounting • (Mitigation actions) Reporting more transparently on methods used to estimate the climate impact of mitigation actions • (Mitigation actions) Strengthening verification processes in connection with the use of market-based mechanisms for emissions reduction
GERMANY	**Well-positioned:** • (Mitigation actions) More frequent, comprehensive reporting to UNFCCC on mitigation actions and progress toward emissions reduction target • (Emissions) Preparation of additional emissions projections and more comprehensive reporting on emissions from particular sectors, to meet enhanced international reporting requirements **Priorities for further development:** • (Mitigation actions) Identifying key indicators and implementing data collection systems to track progress of the energy transition • (Mitigation actions) Updating the energy statistics law to enable timely, comparable, and consistent monitoring of key energy market indicators • (Mitigation actions) Improving comparability of reporting on energy efficiency programs by building consensus on methods

77 For example, CPI Beijing has analyzed China's SME system for energy statistics and is working with the Chinese government to identify areas for improvement.

ITALY	Well-positioned: • (Mitigation actions) More frequent, comprehensive reporting to UNFCCC on mitigation actions and progress toward emissions reduction target • (Emissions) Streamlining the preparation of GHG inventories and emissions scenarios, to meet expanded international reporting requirements Priorities for further development: • (Mitigation actions) Expanding methodology for evaluating energy efficiency programs and establishing a catalogue of low-carbon technologies • (Mitigation actions) Expanding renewable energy reporting to include more information on economic impacts
UNITED STATES	Well-positioned: • (Emissions) Additional international reporting of emissions projections • (Emissions) Monitoring facility-level emissions to enforce regulation of GHG limits for large emitters Priorities for further development: • (Mitigation actions) Making measurement and reporting of policies' impact on climate change more comprehensive and comparable across the full climate policy portfolio, for international reporting and to inform domestic policy • (Mitigation actions) More comprehensive and transparent post-implementation assessment of policy outcomes, including mitigation impact and cost-effectiveness • (Mitigation actions) More comprehensive and comparable reporting on sub-national climate action

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Glossary

BMU	Ministry for the Environment (Germany)
BMWi	Ministry of Economics (Germany)
BNetzA	Federal Network Agency (Germany)
CIPE	Inter-Ministerial Committee for Economic Planning (Italy)
ENEA	Agency for New Technologies, Energy, and the Environment (Italy)
EPA	U.S. Environmental Protection Agency
EU ETS	European Union Emissions Trading System
FYP	Five-Year Plan (China)
GHG	Greenhouse gas
GSE	Italian Energy Services Operator
IEKP	Integrated Energy and Climate Program (Germany)
Ispra	Institute of Environmental Protection and Research (Italy)
LULUCF	Land use, land-use change, and forestry
MRV	Measurement, reporting, and verification
NDRC	National Development and Reform Commission (China)
SME	Statistics Indicators, Monitoring, and Examination system (China)
UNFCCC	United Nations Framework Convention on Climate Change