



Western Development Commission

Response to consultation on a National Bioenergy Strategy

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Introduction

The Western Development Commission (WDC) is a statutory body promoting economic and social development in the Western Region of Ireland (the counties Donegal, Sligo, Leitrim, Roscommon, Mayo, Galway and Clare). The WDC¹ is involved in policy analysis and development, the promotion of regional initiatives and the operation of the Western Investment Fund.

The WDC has been actively involved in the renewable energy sector since 2003, and specifically involved in the bioenergy heat market since 2006 delivering a range of development projects and policy analysis. The WDC was a member of the National Bioenergy Working Group under the Department of the Communications, Energy and Natural Resources (2008 – 2010) and served upon the Supply Chain and Market Development Sub-groups.

Currently WDC is lead partner of the EU funded bioenergy project BioPAD (Bioenergy Proliferation and Deployment), which targets the Northern Periphery of Europe. It promotes the wider use of bioenergy and increases awareness of the opportunities it provides. The project will help the development of bioenergy and improve our understanding of the links between supply and demand by looking at supply chains for a variety of bioenergy fuels and different ways of converting these fuels into sustainable energy. Understanding the supply chains and the ways bioenergy moves from fuel source to energy provision will help the establishment of robust and efficient supply services which can match local demand.

The Project is led by the Western Development Commission (Ireland) and is funded under the EU's Northern Periphery Programme (NPP) and has partners in Scotland (Environmental Research Institute, UHI), Northern Ireland (Action Renewables) and Finland (Finnish Forest Research Institute, METLA).

This development of local renewable bioenergy supply chains will provide sustainable enterprise opportunities for individuals, communities, and municipalities in northern Europe. Along with the four partners, the €0.7 million two year project, includes 11 associated partners representing five countries with experience throughout the supply chain. For more information on BioPAD (which is in its early stages) please see the attached appendix.

The WDC was also lead partner on RASLRES (Regional Approaches to Simulating Renewable Energy Solutions). RASLRES² a €2.8 million EU bioenergy project funded under the Northern Periphery Programme of INTERREG IVB. RASLRES aimed to increase the deployment of biomass fuels in rural communities and grow the number of local businesses involved in the bioenergy sector. Project partners included: Action Renewables, Northern Ireland; Environmental Research Institute, North Highland College, Scotland; and Municipality of Norsjö, Sweden.

¹ See www.wdc.ie for more information

² See www.raslres.eu for more information and for project publications

The RASLRES project aimed to:

- build awareness of opportunities for rural communities to produce and supply locally produced biomass (wood, seaweed and energy crops) to towns and cities
- provide business development support to rural biomass producing communities
- support development of local biomass supply chains through direct business and community engagement

In the Western Region RASLRES focused on support to the wood energy sector by delivering practical services to market players and by informing policy development. RASLRES adopted a full supply chain approach - looking at the energy chain from supply (i.e. fuel producers/processors) to demand (i.e. energy users). The services to the sector include:

- provision of technical and business advisory support services to selected clients progressing wood energy projects in the region
- generation of market information and intelligence to support the sector e.g. resource
- forecasting from private sector forestry, assessment of energy crop potential
- accessing of international expertise and facilitation of networking with EU markets

Given the WDC experience in renewable and bioenergy we are pleased to respond to the consultation on the National Bioenergy Strategy. For further information on our work in the area, or further discussion of the issues please get in contact with Helen McHenry helenmchenry@wdc.ie

Based on our experience we first highlight some general issues of relevance to a National Bioenergy Strategy and then address the questions outlined in the consultation document.

Bioenergy Development: issues for consideration:

The WDC welcomes the opportunity to submit a response to the consultation on the proposed DCENR National Bioenergy Strategy and considers this engagement process a progressive action for the bioenergy sector in Ireland.

Before addressing the specific questions of the consultation, the WDC wish to outline a number of priority issues for consideration in the development of the bioenergy sector. Strategic market and policy interventions, must be cognisant of the wider market environment in order to design and deliver an effective, value for money schemes and identify actions which result in sustainable market growth.

The recently published OECD report “Linking Renewable Energy to Rural Development”³ contains a very useful examination of policy options and actions in fifteen OECD regions. It highlights what makes effective renewable energy policy and shows how bioenergy can provide greater local and national economic benefits than other renewable energies. Its analysis should influence the development of a National Bioenergy Strategy.

The WDC identifies the following as priority market development issues to achieve sustainable supply chain growth in the bioenergy sector:

- *Flexibility of Approach:* High level targets, be they national or EU, must be translated into a regional and local context if they are to drive delivery of market growth rates. Regions have varying levels of competitive advantage in bioenergy resources e.g. there are significant wood resource in the western counties, energy crop potential in the southern tillage areas. Regions must develop their bioenergy resources in the most effective and appropriate manner given their conditions and characteristics. The development of local loops of demand and supply typically result in sustainable, efficient deployment of resources.
- *Supply Chain Approach:* A supply chain development approach is necessary to tackle the barriers to growth and achieve sustainable development of the sector. The piloting of supply chain demonstration projects serves to build market confidence and expertise. Such projects will highlight current gaps and limitations to the policy framework and thereby inform policy makers on the design of national policy.
- *Partnership Approach:* The WDC advocate a supply chain approach to support the development of the bioenergy sector. The successful delivery of this approach is dependent on effective cross-agency and cross departmental working arrangements, and partnerships between public and private stakeholders. Effective supply chain interventions must be dealt with through partnership i.e. linking of demand- and supply-side support programmes delivered by various agencies and departments into present a coherent and comprehensive sectoral intervention.

³ OECD, 2012, *Linking Renewable Energy to Rural Development*, OECD Green Growth Studies, OECD publishing. <http://dx.doi.org/10.1787/9789264180444-en>

Barriers to Bioenergy Development

The WDC believes the following are key issues for the development of the bioenergy sector and which should be addressed in any National Bioenergy Strategy.

- To ensure sustainable market growth, the policy must consider the fuel supply implications of the projected rates of market deployment. To maximise the economic benefits of market growth, policy and the market must stimulate local fuel supply chains in as far as is practically possible given the resource base, and then assess import scenarios and consequences.
- The renewable heat market has the potential to create considerable levels of employment across the Western Region and to provide long-term stable markets for low value wood fuels which can compete with fossil fuels and so reduce and fix energy prices for end users. Local wood biomass resources are finite, however, and as demand for biomass increases in a variety of markets, a greater understanding of the available resources at both a county and regional level is required. Under RASLRES the WDC prepared resource assessments which provide an overview of the potential supply of wood based biomass and estimate demand for renewable heat market within each county. They also highlight the issues regarding the potential impacts of large scale projects such as Bio-Refineries and/or Combined Heat and Power (CHP) plants on county and regional supply chains.
- As noted in the OECD report bioenergy policy interventions are typically most effective when delivered at a regional and/or local level where it can be tailored to local resources and conditions. This focus on ensuring the most suitable development takes place in the right location is important in ensuring that the widest benefits are levered from the development.
- The National Bioenergy Strategy should seek to apply the principles of a full supply chain approach, partnership and industry consultation, and continued flexibility of response to ensure that targets are met, and that the benefits of bioenergy development are realised in their fullest sense.

QUESTIONNAIRE

Resources

What would you contribute either in investment, including infrastructural development, or other terms to assist in the mobilisation of biomass and its use in bioenergy in Ireland?

As noted above (with further details in the attached appendix) the WDC has been promoting the development of bioenergy in the Western Region in the last five years. This has largely been through the €2.8m RASLRES project (EU Northern Periphery Programme) and the €0.7m follow up project BioPAD.

The RASLRES project undertook detailed assessments of the available resources in each of the 7 western counties. **Resource Assessments of the Western Region** (see publications list in the appendix). These provide interested parties with an overview of the potential supply of wood based biomass and estimated demand for renewable heat market within each county. They also highlight the issues regarding the potential impacts of large scale projects such as Bio-

Refineries and/or Combined Heat and Power (CHP) plants on county and regional supply chains.

The RASLRES project also published a **Review of Woodchip Supply in the Western Region of Ireland**: This market research report presents an overview of the woodchip supply sector in the Western Region

In addition in relation to the mobilisation of biomass use **Energy from Wood Biomass – Environmental Management Considerations**: This report raises awareness of potential environmental impacts and how to mitigate them when increasing the uptake of biomass in terms of forestry

What do you see as your role in supporting the development of the bioenergy sector to 2020 and beyond?

The WDC has significant experience in bioenergy development, supporting pilot projects and conducting essential analysis. While the RASLRES project worked to support the development of bioenergy sector in the Western region by detailed assessments of the issues it also provided consultancy support to potential bioenergy users under a series of pilot projects for assessment of bioenergy options and installation of bioenergy systems. The WDC is happy to use these experiences to contribute to the further development of a National Bioenergy Strategy.

BioPAD will focus on further understanding of supply chain issues and the development of bioenergy clusters and also on the dissemination of the work undertaken during the RASLRES project.

This will support the development of the bioenergy sector to 2020 and beyond.

Demand side issues

Analysis shows that biomass is competitive with oil for the production of heat in some sectors yet the evidence shows that uptake of these technologies are limited. What would you consider the most significant barriers to the uptake in this situation?

The WDC considers that, in addition to those highlighted above, the barriers to uptake of bioenergy include:

Market awareness and confidence: Many energy users are simply unaware of the technology and the fuel supply options available. In addition there can be a lack of market confidence in the technology and fuel supply chain because it is new to the region. For the market to develop there needs to be greater confidence in the reliability and convenience of the supply chain.

Market development: In order to grow the market, the technical, design and practical skills in the installation, operation and conversion of fuel resources to energy must be developed. The business case and fuel supply models must be understood. The investment process is typically more complex than in the fossil fuels markets and specialist expertise may be required. This investment is therefore more time consuming and risky than an investment in established fossil fuel technologies.

Integrated supply chain: There is a low level of awareness of the market opportunities, and limited knowledge and technical expertise of the fuel supply chain amongst potential suppliers/producers. New investment in equipment and infrastructure will be required in order to respond to market opportunities. In the Western Region many of the plantations that are most suitable for wood energy production are dispersed and small in scale and therefore must be 'clustered' to make market entry commercially viable.

Supportive policy: Supportive planning policies will help to increase the rate of market development. For instance there is a lack of awareness among potential users as to the planning requirement for a wood heat facility. Similarly, better understanding of the benefits of bioenergy systems and technology is needed to improve their passage through the planning process.

Finance: Bioenergy development is capital intensive. Although bioenergy feedstock is usually significantly cheaper than fossil fuels the capital investment required for installation is higher. In countries with more established bioenergy use this is widely recognised and accessing private finance from a bank is relatively straightforward and bioenergy projects are not considered unusual. In Ireland where the sector is less established, and where banks have less experience of the sector, and where there are significant difficulties in gaining finance for all project types, lack of access to loans is an important restriction on the development of the sector. It is essential to consider capital grants or alternative loan facilities for those making an investment. As payback times are short and reasonably predictable this should not involve a significant risk and there are possibilities for a revolving loan system, at low interest rates in addition to or instead of grant options.

Regulation: This is also a key element. While a National Bioenergy Strategy would set policy requirements it is likely that in certain sectors (CHP and Electricity) the regulation of the market will influence the shape of development. It is important that policy makers give clear direction and work with regulators to ensure the regulations allow for the types of development envisaged. The heat market, which is unregulated, would not be affected by this.

What factors do you take into account when making a decision with respect to the fuel type your organisation uses?

The WDC would welcome the opportunity to use bioenergy with our organisation, but while the building where we are located is publically owned and the WDC has requested that consideration is given to the use of bioenergy for heating the decision is not within the WDC control.

However, if this were within WDC control the following would be important considerations:

- Cost of installation and maintenance
- Reliability of fuel supply (both quantity and quality)
- Age and functioning of current heating installation

How much emphasis is placed on the security of fuel supply and is this an issue for biomass technologies?

Security of fuel supply is one of the three key pillars of Irish energy policy as outlined in the Energy White paper "Delivering a Sustainable Energy Future for Ireland. The Energy Policy Framework 2007 – 2020". Biomass technologies and bioenergy in general can, where the

material is sourced in Ireland, significantly improve fuel security both at a local and at a national level.

For individual organisations relying on bioenergy, security of supply combined with quality of supply can be key concerns for the user. The poor development of supply chains in the sector add to this concern and it is a further risk for those committing to bioenergy over an established fuel such as oil. For significant uptake of bioenergy to occur potential users have to be satisfied and confident that the biomass will be easily sourced and available.

At what price would you consider meeting your energy needs from biomass?

As mentioned above, this decision does not rest with the WDC.

However for biomass to be considered by potential users as a fuel source it has to make commercial sense and compete well with available alternative fuels taking account of the perceived increase in risk associated with its use.

Bioenergy installations usually involve higher capital costs than fossil fuel installations and have higher maintenance costs. They require a more specialist servicing approach which is currently less available than that for standard fossil fuel boilers (though as the supply chain develops this should become more available). In general, however, the feedstock is significantly cheaper.

What barriers exist and what supports or policies do you see as necessary for a greater uptake of bioenergy in contributing to each sectoral target: electricity, heat and transport

While there are different requirements in each of these sectors because of the early stage of development of the bioenergy sector in Ireland they all face some common issues. Policies and actions which develop the supply chain along all stages are essential and should be developed based on a rigorous analysis of the stage of supply chain development and the gaps or weaknesses.

Given the limited scope for Exchequer support, how should the cost of supports be met and by whom?

The WDC has sought to develop the bioenergy sector in our region with funding from EU Interreg under the Northern periphery programme. Funding from a variety of EU sources is available including Intelligent Energy Europe, which provide support and encourage development. Other options, for example in addressing issues of finance could include the European Investment Bank (depending on on the size of the project) and other government backed loans or roll over investment fund could also be considered. The WDC has experience of a micro loan fund to stimulate creative businesses which could provide a model for this and the WDC also makes commercial investments as appropriate.

SEAI plays an important role in the promotion and support of renewable energy in Ireland including supporting the bioenergy sector. This could be further developed to as part of implementation of this National Bioenergy Strategy.

In Scotland Community Energy Scotland provides advice and support through a non-profit mechanism which allows them to support community investment but also to make their own investments. They also administer grants and schemes on behalf of the Scottish government. Some elements of this model could be used in Ireland.

It should be noted that not all policy and market interventions require significant funds. A directive ensuring that public buildings are required to use bioenergy for heating when heating systems are to be replaced would considerably aid the development of the sector. RASLRES found that one third of the commercial heat demand in the region was in public buildings.

Additionally, experience on RASLRES found that a broadening of support, with less focus on grants but with a focus on provision of information, analysis and expertise can be a very cost effective means of providing support for the development of the sector.

The RASLRES aim was to stimulate the western biomass energy sector (primarily heat). We designed a method we called market stimulation method (MSM) which basically involved a range of specialist supports directly to clients and providers to enable commercially viable biomass projects to be realised. We supported the supply chain and the client demand aspects as both where deemed in need of stimulus.

We had intended to undertake 4 pilots as such in the west . To date such has been the demand that **11 were** completed with 29 new fte jobs (many more actual jobs in reality as this is in the main part time work) and a number of new businesses created. In terms of the local economy this is driving every year € **1.79 M** in fuel spend. A recent success has been the Donegal woodland co-operative working with us to the point where they have now purchased three biomass boilers to serve three 15 year fuel contracts with residential homes etc. This means long term revenues for many of the co-ops members (over 100).

This has exceeded realistic expectations and we hope to complete several more support initiatives before the year end.

In addition we have developed several strategic support products for the regional bioenergy sector:

- The Bioenergy Tool (www.raslres.eu) – an open access decision making tool which allows clients (public and private) to assess initial commercial viability of biomass in their buildings/businesses
- Suite of market intelligence resources – on website. Tangible outcome of this is the fact that we now have a 50 MW CHP plant progressing to build in Mayo on the back of fuel supply forecast data provided by RASLRES data.
- Transnational network of Bioenergy specialists – Sweden/Scotland/Northern Ireland/Ireland. Which support commercial enquiries from all sources and signpost them to providers etc.

Supply side issues

What support/price guarantees would be necessary for you to produce biomass to be used in bioenergy?

One of the main issues is market stability. Having certainty about future prices are helpful for planning and development. Price guarantees are most easily applied in a regulated market such as that for electricity, where there are a relatively small number of larger buyers, and would be difficult to implement for heating. Price guarantees are an option for some biomass types and these may be implemented through options such as might be available under the CAP involving area based incentives for growing energy crop. In addition actions to increase the number of developed energy supply companies which would in turn seek supply contracts to ensure availability of supply for their use. In the future development of long term contracts and a clear stable market are most likely to stimulate supply.

Are there factors other than price affecting the change of land-use to produce energy crops or forestry?

A decision to afforest land is a significant long term decision which is likely to be affected by a farmers future plans and needs and the other opportunities available on the farm. The quality of land and the available alternatives will be an influence as will the existence of an established local market for forestry by products or energy crops. In addition the availability of knowledge and experience and skills associated with the crop requirements are important. Finally, the availability of contractors for harvesting can also influence the availability of supply, because of concern about being able to harvest at the appropriate time.

What factors need to be addressed in order to optimise the use of biodegradable waste in producing bioenergy in a cost-effective manner?

It is expected that, as part of the BioPAD project, we will be examining the use of biodegradable waste in bioenergy production but the WDC has not previously worked on this.

There are many issues which are likely to need to be addressed in the development of this sector, however, in the immediate term planning guidelines, acceptability in the planning progress and public acceptance issues are likely to be important.

Support mechanisms

Given the limited scope for Exchequer support, what support mechanisms do you believe will deliver a least-cost solution for Ireland to meet its renewable energy and climate change targets?

The WDC has found that soft supports such as information and market analysis, provision of specialist expertise and advice of boiler requirements, fuel supply and quality, tendering and contracting (all provided by consultants) and networking of suppliers and users were important and very cost effective mechanisms for stimulating development (see above for further information).

To address the issue of investment capital availability for smaller projects a loan mechanism or rollover fund should be instituted. Funding from the carbon tax could be allocated to this. Larger projects should be directed to other supports and loans such as those available from the EIB.

As mentioned above, requirements for installation of bioenergy systems in public buildings can be an effective way of stimulating bioenergy development and reducing costs in the long term. It is important that expertise is available to ensure installation of appropriate systems and training for those using or responsible for them, as well as standard contracts for heat supply. It would be envisaged that ESCo heat supply contracts would be most suitable in many of these situations.

District Heating

What do you see as the barriers to the development of renewable district heating and how should they be addressed?

District heating systems are one of the most efficient ways of using bioenergy for heat, or for heat and electricity in CHP installations. There are, however, barriers to its development that need to be addressed. In Ireland the size of the investment may often be a barrier, a DH system will require significant up front finance in what is a relatively new area of development for Ireland. This combined with the on-going credit squeeze means that funding can be difficult to obtain for investment in DH projects.

A key barrier is also the difficulties of getting commitment from users to connect to the DH system. It is essential to contract a significant anchor tenant, but having other users will be important. In some countries once a DH system is to be installed there is an obligation on users in the vicinity to connect to the DH network. This provides graded demand and also great security for the DH developer. Additionally it has been found elsewhere that once familiarity with DH is established then connection demand increases.

Given that DH is not well established in Ireland there may also be concern about the nature and type of contracts which can be used for this. The WDC under RASLRES developed a number of model contracts : **RASLRES ESCO Model Contracts and Guidance Notes** : These model contracts and guidance notes were developed to provide a template for public ESCO model contracts which would be available to business or public sector users seeking to use a heat purchase contract. SEAI continues to work in this area

Finally, as with other less developed technologies there is a perception of higher risk associated with DH projects than with individual heating systems. These issues were investigated under RASLRES with a short study "**District Heating as an Enabling Technology for Biomass in**

the Western Region". It examined issues for District Heating as an Enabling Technology for Biomass in public sector buildings and the wider community in the Western Region.

Biogas

Biogas has the potential to contribute to meeting renewable energy targets in heating, electricity and transport. What are your views as to how it can best be used and what are the least-cost policies to facilitate that use? What can your organisation contribute to its uptake?

Biogas has significant potential in all of the energy sectors (heat, electricity and transport), however in Ireland it is in its very early stages of development. Good support for a strong pilot demonstration project (or one in each sector) would be a useful way of both improving understanding of the development requirements and barriers, and supporting a project through the process to make it as smooth as possible. Such a project would then also be available to demonstrate the workings of a biogas installation to other potential developers and also, importantly, to members of the public who might have concerns in relation to biogas development.

Appendix

The BioPAD project

Developing a local bioenergy market can provide significant opportunities for rural and remote areas, by improving security of supply, contributing to reduction in CO₂ emissions and stimulating the local economy by creating jobs and keeping payments for energy within the community.

A new project, BioPAD (Bioenergy Proliferation and Deployment), which targets the Northern Periphery of Europe, aims to ensure that bioenergy becomes more widely used and that awareness of the opportunities for it provided are increased. The project will help the development of bioenergy and improve our understanding of the links between supply and demand by looking at supply chains for a variety of bioenergy fuels and different ways of converting these fuels into sustainable energy. Understanding the supply chains and the ways bioenergy moves from fuel source to energy provision will help the establishment of robust and efficient supply services which can match local demand.

The Project is led by the Western Development Commission (Ireland) and is funded under the EU's Northern Periphery Programme (NPP) and has partners in Scotland (Environmental Research Institute, UHI), Northern Ireland (Action Renewables) and Finland (Finnish Forest Research Institute, METLA). Along with these four partners, the €0.7 million two year project includes 11 associated partners representing five countries with experience throughout the supply chain.

While some areas of northern Europe have well-developed biomass supply chains, others face significant challenges in developing cost-effective and sustainable supply chains to better exploit their biomass resources. The project aims to gain a better understanding of the current status of biomass supply chains for a range of biomass types including wood products, energy crops, marine macroalgae and agricultural wastes.

The analysis of regional supply chains will help develop tools which enable users to source and use locally available biomass, across a range of appropriate technologies (anaerobic digestion, combustion, or micro combined heat and power (CHP)). In addition, supply chain mapping work, undertaken as part of the project, will inform policy frameworks and interventions to support renewable energy deployment in the NPP.

A bioenergy tool which highlights key steps along the supply chain for each fuel type or conversion method will be easily available in a variety of formats (for web, mobile and app). The promotion of this information system and tool are important elements of the project and there will be a focus on making it accessible through the project region.

This development of local renewable bioenergy supply chains will provide sustainable enterprise opportunities for individuals, communities, and municipalities in northern Europe and stimulate great use of bioenergy for heating.

RASLRES publications

The RASLRES project has been responsible for the drafting and dissemination of a number of important publications in the bioenergy field – all of which are available to download for free from <http://www.raslres.eu/publications/>

These publications include:

- **Resource Assessments of the Western Region:** These provide interested parties with an overview of the potential supply of wood based biomass and estimated demand for renewable heat market within each county. They also highlight the issues regarding the potential impacts of large scale projects such as Bio-Refineries and/or Combined Heat and Power (CHP) plants on county and regional supply chains.
- **RASLRES ESCO Model Contracts and Guidance Notes:** The ESCO model contracts and guidance notes were developed to provide a template for public ESCO model contracts which would be available to business or public sector users seeking to use a heat purchase contract.
- **District Heating as an Enabling Technology for Biomass in the Western Region:** examines issues for District Heating as an Enabling Technology for Biomass in public sector buildings and the wider community in the Western Region.
- **Wood Energy Guide:** The Wood Energy Guide is an ‘all you need to know guide’ for end users in considering locally produced timber as a renewable energy resource for their homes and businesses
- **Energy from Wood Biomass – Environmental Management Considerations:** This report raises awareness of potential environmental impacts and how to mitigate them when increasing the uptake of biomass in terms of forestry
- **Wood Energy in the Western Region of Ireland:** A series of reports on Wood Energy in Western Region of Ireland resulting from the RASLRES pilot projects, including:
 - **Bioenergy in the Western Region of Ireland:** This report aims to assist the Local Authorities in reviewing the benefits of bioenergy and how they may be leveraged
 - **Review of Woodchip Supply in the Western Region of Ireland:** This market research report presents an overview of the woodchip supply sector in the Western Region
 - **Wood Energy Installations in the Western Region of Ireland:** This market research report presents a review of medium scale wood energy installations (defined as systems with a boiler size range of 60kW to 1MW) in the Western Region of Ireland
- **Energy Crop Opportunities in the Western Region:** This report presents an analysis of the potential of energy crops in the Western Region of Ireland based on the application of the national bioenergy Geographical Information System (BGIS), and discusses key factors impacting on the future development of the energy crop sector
- **Research on Wood Energy in the West of Ireland:** The results of research that has been carried out through the RASLRES project into the availability and need for wood energy in the West of Ireland is available in 3 specific publications
- **Technical Reports:** These 2 Technical Reports share lessons from the RASLRES project with other potential industrial heat users- specifically on “Process Drying” and “Biomass Boilers for Process Steam”